
Energy Journal

Issue 13 / January 2019

**America's
Energy
Renaissance**



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CESI



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Editorial



Salvatore Machì / Chairman, CESI
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For this issue of *EJ* we chose to concentrate on America, bringing north and south into focus as a single, sweeping panorama. We wanted to think outside the box, offering our readers a parallel interpretation of two extremely different realities that may nevertheless, when taken together, offer a multidimensional picture of the current energy scenario. The Americas are a single continent, but their energy profiles, potential scenarios and the challenges lying ahead of them are numerous.

The United States is the spearhead of the Western world, both in terms of market maturity and in technology: a symbol of innovation. The territory is so far ahead of the curve that today people talk of an “Advanced Energy Economy,” in other words a specific economic sector that involves more than just those companies directly and traditionally committed to the production and generation of energy, extending to incorporate the entire, complex economy and production system that has risen up around the concept of smart energy. The Advanced Energy Economy means IoT, demand-response services, prosumers and electric automobiles, which will become an integral part of tomorrow’s energy distribution system. It means that cities join together and establish coalitions in order to create a new kind of demand for renewable energy, one that is capable of changing the market. It is avant-garde technology, but first and foremost a healthy awareness of the changes currently underway.

In Latin America, a great deal of transformation has yet to be realized. The region’s economic, energy and social potential has yet to be fully expressed. In the meantime, we take a closer look at places like the Atacama Desert, which on its

own possesses the resources necessary to satisfy growing energy needs across all of Latin America. Or Paraguay, which currently fulfills 100% of its electricity needs through hydroelectric energy alone. We talk about Medellín, a city that is reinventing its identity and betting on smart innovation, flexibility, and supporting entrepreneurs through programs and hubs like Ruta N, which has attracted a generation of “digital nomads” from across the globe.

As a whole, the American continent needs to grapple with the great global challenge of climate change. From north to south, warmer temperatures are already having dramatic effects: on one hand we’re witnessing catastrophic climate events; on the other hand drought, which has tested these countries’ capacities for resilience. Prevention policies and emission reduction plans are no longer enough. Today people’s attention has turned to defining concrete resilience strategies and responses to the effects of climate change. Answers can come from cities as well: Boston, Rio de Janeiro, Philadelphia, Santiago and New York are all members of C40, the international network of urban metropolises that share a single radical strategy for reducing emissions.

The America we detail in this issue of *EJ* is an extraordinary continent, one that can glean enormous advantages from being increasingly interconnected. It is a continent that is on the move, albeit at different speeds, and increasingly in the direction of new energy frontiers, through what many observers have already defined as “America’s energy renaissance.”

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“America is not a country, it is a world.”

Oscar Wilde

Oscar Wilde in America: The Interviews

p. 66, University of Illinois Press, 2010



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Latest from CESI

**Kyrgyzstan**

CESI selected to modernize grids in the Osh region

The European Bank for Reconstruction and Development has developed a project together with the Joint Stock Company Oshelectro and the Ministry of Finance of the Kyrgyz Republic to modernize electricity distribution grids in the Osh region of the Kyrgyz Republic.

CESI has been selected to provide support as Technical Consultant for the rehabilitation and modernization of the metering system and other key network infrastructure, providing organizational and technical assistance to ensure successful completion of the Project Implementation Plan, ensuring safety requirements, monitoring all the phases, developing a project of quality assurance, planning, organizing, monitoring, and reporting for the Environmental and Social Action Plan.

The Project includes the installation of modern electricity meters and automatic control systems, strengthening the capacity and efficiency of transformers and distribution lines in order to reduce distribution network losses and increasing energy efficiency.

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Modernization of
electricity distribution
networks

”

**USA**

Preparing a modern grid with cybersecurity

EnerNex, a CESI Company, is supporting a Southwest US Transmission and Distribution Utility's security architecture and NERC CIP compliance efforts related to grid management and operational assets.

The Client's goal is to ensure that appropriate security measures are implemented as technologies and operational practices change. EnerNex, thanks to its recognized know-how in cybersecurity activities, is providing the Client with cross-organization cybersecurity expertise, including both field and back office equipment within the Transmission and Distribution areas to help prepare modern and safer grids.

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Implementation of
appropriate security
measures in line with
technologies and practices

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CESI wins a central role for EuroAfrica Interconnector construction

CESI is working as consultant in the EuroAfrica Interconnector project for the definition of a cost-benefits analysis regarding a submarine interconnection that will allow electricity exchanges between Europe and Africa. 1,707 km long and capable of conveying 2,000 MW of energy, the project will connect Greece, Crete, Cyprus and Egypt by 2022.

CESI has been selected to evaluate the project's economic feasibility, analyzing, from a socio-economic point of view, the expected benefits, particularly in terms of renewable integration, electrical systems adequacy and CO2 emissions reduction among the countries involved.

Thanks to this electric highway, Egypt will be connected to European electricity grids, becoming a crucial energy hub for Africa.

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1,707 km of submarine cable;
2,000 MW of energy to be conveyed

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CESI protagonist of sustainability strategies during the LCA Network Conference

CESI presented its specialized studies on environmental engineering issues during the XII Italian LCA Network Conference, held at the University of Messina on 11-12 June 2018.

The aim of the Conference was to discuss LCT's role for sustainability strategies. With this in mind, CESI presented the article "A case study of green design in electrical engineering: an integrated LCA/LCC analysis of an Italian-manufactured HV/MV power transformer," highlighting application of the Sustainability Assessment Methodology to a traditional private business: an integrated Life Cycle Assessment (LCA) / Life Cycle Costing (LCC) analysis of a green 250 MVA HV/MV power transformer produced by Tamini Trasformatori S.r.l., innovatively insulated with ester oil. This effort also led to development of the Environmental Product Declaration (EPD) and the related preceding Product Category Rules.

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Integrated Life Cycle Assessment (LCA) / Life Cycle Costing (LCC) analysis of a green 250 MVA HV/MV power transformer

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Top stories

Modernizing the American Grid

Is the American grid ready for the future? The latest Index published by the Grid Wise Alliance underlines the need for a systemic vision for innovation in the country's energy sector.

For further information on this topic, please contact:

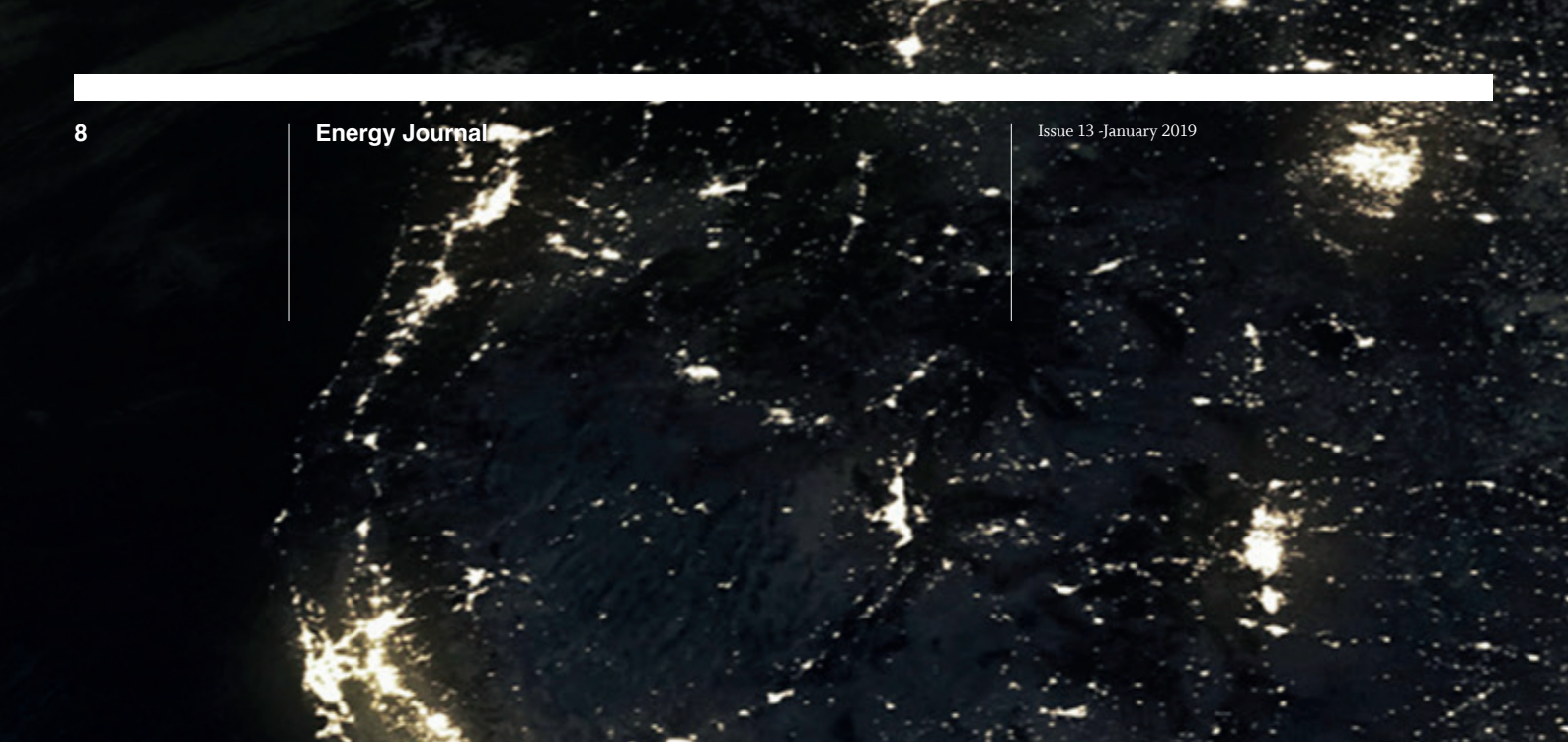
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Safe. Resilient. Economically competitive. Environmentally responsible. According to the United States Department of Energy, these are the main characteristics that any federal energy system must possess. In recent years the electric grid has adopted a leadership role at the center of this system. Therefore, achieving these general objectives means intervening on the grid in an important manner. It also means placing front and center a specific strategy for infrastructural development, innovation and research, understood as an integral part of a system, rather than focusing on individual “killer technologies,” no matter how avant-garde. At the base of an appropriate strategy in this direction, it is also important to draw a clear picture of the current landscape. The GridWise Alliance is making an attempt to do just that. It is an association that gathers together the main stakeholders in the energy sector, and establishes a classification based on the modernity and efficiency of a given network, including the services it is capable of offering.

The fourth edition of the Grid Modernization Index was published in 2017. GridWise analysts focused on three different environments in order to create their ranking: policies designed to support grid development and modernization

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Where should we look to find the most modern grid in the United States of America? It is no surprise to find eyes drawn to the West Coast, to California

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(state support); active communication with the involvement of consumers (customer engagement); technological innovation and services offered (grid operations).

The central issue that these rankings attempt to address can be summed up with a question: Are we ready for the future? Integration of renewable energy sources, distributed energy generation, energy storage, electric vehicles, mini-grids, smart metering, communications, consumer empowerment... these are the initiatives and tools that countries adopt when dealing with these issues which, according to analysts, clarify if and to what extent a given nation has equipped its own grid with what it requires in order to face upcoming challenges. Particular attention was paid to initiatives aimed at guaranteeing grid security and safety, with respect to both climate change and the increasingly frequent hurricanes that sweep through numerous states (the theme of resilience), and with respect to potential computer attacks (cybersecurity).

Where should we look to find the most modern grid in the United States? It is no surprise to look to the West Coast, to California, which earned the highest number of points in all three areas analyzed, and has topped the GridWise rankings for several editions, followed by Texas, Maryland, Oregon, Arizona, Washington DC, New York, Nevada and Delaware.

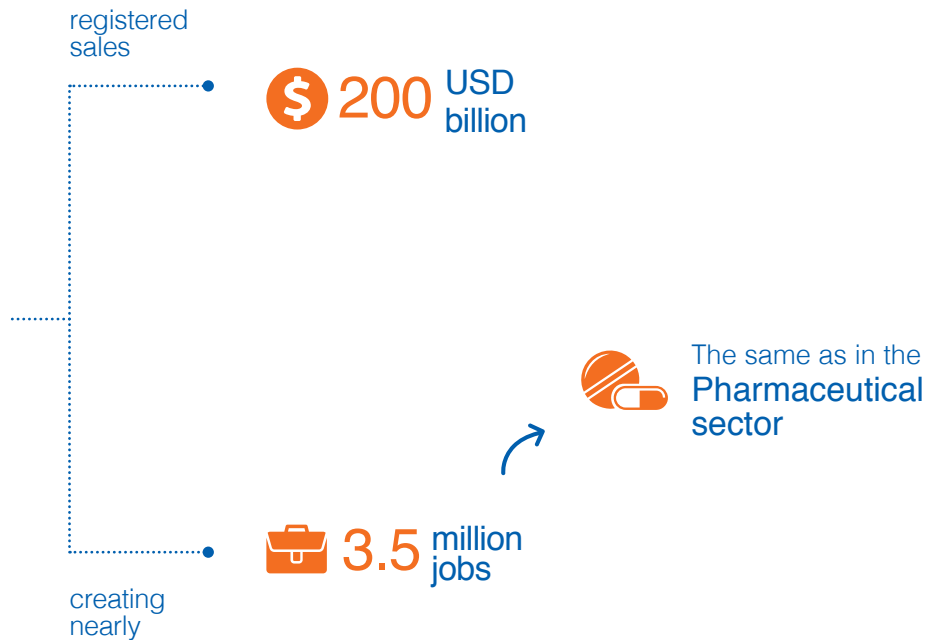
But the state that earns the highest annual performance ratings is Rhode Island, which in 2016 took a 25-point leap forward, rising from the bottom of the rankings all the way to 23rd. In this case, credit goes to the Governor, Gina Raimondo, who drove through a plan called “1,000 in 2020” designed to bring overall energy production from renewable sources to 1,000 MW by the year 2020.

Thanks to growth in electric vehicles, as well as the general implications for industrial development at large, the extent of transformation in America’s energy sector is significant enough that today people speak of the Advanced Energy Economy (AEE) as a standalone entity: a dynamic sector that includes among its ranks – in addition to companies that create and distribute energy – businesses that produce technological innovations, services and products for the energy systems of the future for both generation and consumption. In the current US market, mergers between “traditional” energy companies and software businesses are relatively frequent. One example is when CLEAResult, a company specializing in energy efficiency, acquired Green Team Energy, a software company that focuses on demand-side management. As the Advanced Energy Now 2017 Market Report notes, “electric and plug-in hybrid cars, natural gas-fueled trucks, high-performance buildings, energy-





GridWise Alliance's 2016 report



saving industrial processes, high capacity wind turbines, on-site and utility-scale solar power, and nuclear power plants are all examples of advanced energy, as they diversify energy sources, reduce health and environmental costs to communities, and use energy resources more productively.”

The most innovative examples deal with management of energy consumption and the new, proactive role played by consumers. Direct Energy, an energy retailer with roughly 5 million customers in the United States and Canada, partnered with Grid4C, a software vendor specializing in predictive analytics, to deploy an innovative set of applications to approximately 300,000 customers in Texas. Through these online apps, the energy retailer presents interval meter data all the way down to major appliances, sending alerts when there might be an issue, and offering predictive energy consumption information for the coming week.

When it comes to cars, Tesla’s decision to open Gigafactory, a battery production facility located just outside Reno, Nevada, is a crystal clear indicator for the future: the facility occupies 1,200 hectares, and once it is up and running it will produce 5 gigawatts per hour, capable of powering 1.5 million electric cars per year.

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While individual states have begun the push forward, the same level of awareness has yet to be seen at the federal level.

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According to the GridWise Alliance’s 2016 report, the energy sector registered sales totaling 200 billion USD and created almost 3.5 million jobs, roughly the same numbers as those registered by the pharmaceutical sector. The report also underlines that annual growth has stood at 5%, for a total 28% overall since 2011. And within the sector the advanced electricity generation segment has grown by 8% annually, driven by growth in solar PV and wind power. The building efficiency segment also registered 8% growth, garnered thanks to investments made in energy efficient lighting and commercial building retrofits.

In transportation, plug-ins for electric vehicles increased ten times over in just five years.

While individual states have begun the push forward – some more decisively, others more slowly – and America’s entrepreneurial world has clearly focused on the potential that these technological transformations represent, the same level of awareness has yet to be seen at the federal government level. This fact is highlighted in two authoritative documents, published respectively by the American Energy Innovation Council (AEIC) and the Department of Energy.

Like the AEE document, “The power of innovation. Inventing the future,” published in June 2017 by the AEIC, makes a direct





U.S Capitol, Washington D.C, USA



comparison with the pharmaceutical sector. According to the report, from 1987 to the present day federal government investments in R&D in the energy sector have dropped from 14.4% to 5.3% for overall spending. Investments in the health sector, by comparison, moved from 36% to 50% overall for the same period of time.

This is primarily due to changes in the investment mix of government spending in R&D in the energy sector. The reasons for this change lie mostly in a drop in investment in nuclear energy, which has been replaced by investments in RES and efficiency. These last two have increased significantly, but still cannot be compared to the amounts invested in nuclear energy overall from a financial point of view.

Within its report, the AEIC also highlights 2016 data supplied by the Information Technology and Innovation Foundation (ITIF), according to which the United States currently ranks no higher than 10th overall in a global classification of countries that guarantee the highest contribution to innovation, and in 2020 the US may

well be overtaken by China. The AEIC underlines that going back to making significant investments in the sector, for example investing a share equal to 1.6% of total energy sales in an increasingly strategic and important sector like energy, is fundamental for the United States if the country is interested in conserving its leadership position as the nation with the highest level of technological and innovation know-how.

The US needs to invest more intelligently and in a strategic manner, relying on a long-term plan for the entire sector and moving forward with a number of specific, priority interventions: for example, supporting research and development institutions like the Advanced Research Projects Agency for Energy (ARPA-E), which focuses on projects that have the potential to make a significant impact, but are also considered high risk from a financial point of view, identified a portfolio of highly transformative technologies for the energy sector. The foundation also suggests supporting other entities like the Energy Innovation Hub or Energy Frontier Research, which

US federal government budget for research within the energy sector

Public Energy Technology
RD&D Budgets 2016



develop projects that require multidisciplinary contributions, partnering with the federal government, individual states, universities and businesses. Or again, stimulating strategic cooperation between private citizens – which have proven to be both strong and determined – and the government through innovative governance partnerships; or by elaborating regional programs that extend beyond individual state borders to influence much larger geographical areas, instituting an Energy Challenge Program for High Impact Pilot Projects.

The need for a systemic vision for innovation in the energy sector is the element that the US Department of Energy underlines most forcefully in its most important analysis and planning document, The Technology Review. The 2015 edition carefully analyzed scenarios for the period running from 2015 to 2019, highlighting several primary trajectories in the evolution of both American and global energy systems. The first important transformation trajectory concerns increasing interdependence between the different sectors that make up the national energy system. Generation, transmission and distribution, civil and industrial construction, the industrial and production sectors, gas and transportation are all areas that are proving increasingly interconnected, and change in one has a direct effect on the others. Providing support for this kind of change may lead to markedly higher levels of system performance, improving overall system efficiency and unveiling new market possibilities. Greater interaction between these sectors takes place alongside diversification within the energy sector itself: for gasoline, oil is joined by biofuels, hydrogen and electricity; within

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The United States currently ranks no higher than 10th overall in a global classification of countries that guarantee the highest contribution to innovation, and in 2020 the US may well be overtaken by China.

Information Technology and Innovation Foundation (ITIF), 2016

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the energy generation sector, renewables and natural gas are occupying an increasing share of the US market. Last but not least, connections with the ICT world, in other words the blending of technology and information tools within the energy system, are on the rise. Leaps forward within the ICT environment are acting as an engine, driving the energy sector toward an era of “systems by design.”

Other authoritative institutions share the same overall vision. According to the report “Public Energy Technology RD&D Budgets” published by the International Energy Agency (IEA) in 2016, the US federal government invested less than 2% of its overall 2015 budget in research within the energy sector. Government investment data recorded by the OECD state-by-state, sector-by-sector clearly demonstrates that in recent years, the US has invested more or less the same amount in energy research as it invested during the 1980s.

For the US, where growth in the production of unconventional gas has driven down the cost of energy and electricity in recent years, this may well prove to be the perfect moment to reverse the trend, making long-term investments in the energy sector that will allow the country to take concrete steps toward its priority goals of safety, efficiency and sustainability, as well as consolidate its leadership position at a global level – a position that analysts currently view as significantly threatened.

Scenario

The Latin American Scenario

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Over the course of the last decade, Latin America has been the protagonist of a true economic boom. From 2000 onward, overall growth rates in this part of the American continent have remained higher than the average forecast by the OECD (the Organisation for Economic Co-operation and Development). This boom has favored further expansion of the middle class, a segment of society that today includes an estimated 288 million inhabitants of Latin America: one out of every three citizens. The needs and consumer habits of this new social class, which aspires to a different quality of life, may well act as the engine driving an additional growth phase which, in order to be consolidated, must necessarily be accompanied by long-lasting structural reforms.

Latin America needs investment in its key sectors, from schools to infrastructures, all the way to energy. Already in recent years in the energy sector, investment data has registered a positive trend. It's not merely a question of quantity – though the general data available is truly significant, given that in 2015 investments in energy in Latin America totaled 6% of global investments in that sector – but rather of quality.

According to data supplied by IRENA, the International Renewable Energy Agency, investments were directed at a diversified energy portfolio, including hydroelectric, biofuels, solar, wind, geothermal and efficiency, as well as a broader number of countries than in the past: between 2005 and 2009, 70% of all investment was concentrated in Brazil; starting in 2010 the gap with other Latin American countries began to diminish. By 2015 only 40% of all investments followed the same route (7.1 billion USD, according to Bloomberg New Energy Finance, 2016). Today Mexico and Chile (+150% in 2014) have edged out Brazil in the top ten global energy markets for renewable energy.

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Latin America is in the top ten of the world's largest exporters of gas and oil, as well as in the rankings of countries with the greenest energy mix.

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The energy transition in Latin America

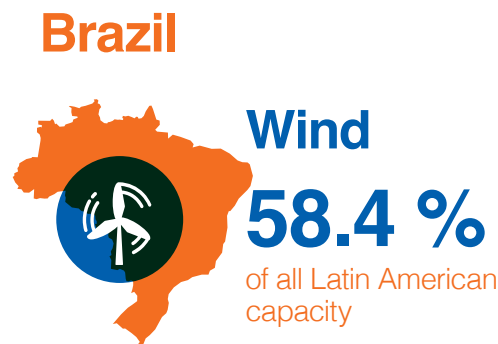
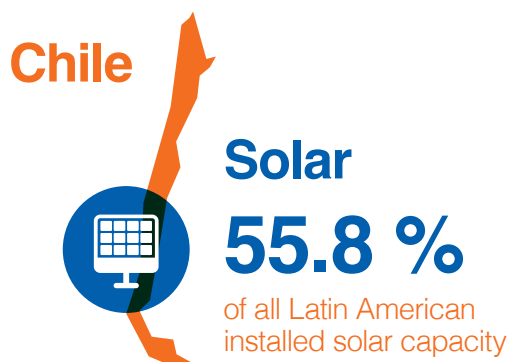
At the same time, Latin America is in the top ten of the world's largest exporters of gas and oil, as well as in the rankings of countries with the greenest energy mix, thanks to a record position in the hydroelectric sector and in production of biofuel. It's an important recognition, yet increases in domestic consumption (estimated to rise to 2,500 TWh by 2030, compared to the current 1,500 TWh), a need to guarantee safe supply and the impact of climate change are forcing Latin American countries to push forward with the energy transition as well; a push that is redesigning the source mix. The combination of all these factors is drawing attention to renewable production and the integration of green generation elements into the existing network. While historically the hydroelectric sector has driven renewable production around Latin America, today global warming is

encouraging greater diversification in energy sources. Water levels in Brazil's largest rivers are slowly but surely dropping due to the effects of higher temperatures, with an inevitable impact on productivity in hydroelectric facilities. The first blackouts due to lower productivity in Brazilian dams appeared already in 2001. But the problem affects other countries in Latin America as well: Colombia and Venezuela, for example, have had to deal with periods of drought and have been forced to impose restrictions on energy consumption among citizens. Overall, between 2000 and 2015, hydroelectric production across Latin America has dropped from 95% to 83%. Nevertheless overall renewable capacity (excluding hydroelectric) tripled during the period from 2006 to 2015, rising from 10GW to 36GW.

Diversifying means examining all the available energy sources, first and foremost those that can take advantage of mature and increasingly affordable renewable technologies: solar and wind. According to data reported by “La RED del Futuro” (Renewable Energy Development of the Future, a strategic document produced by the IDB, or Inter-American Development Bank, that delineates three potential energy scenarios from here to 2030), installed solar capacity has increased considerably over the past five years. At the end of 2017 totals stood at 3,700 MW, or 0.9% of total installed capacity for electricity generation.

Chile has played a key role: today the country can boast 55.8% of all Latin American installed solar capacity. Wind production, on the other hand, is present primarily in Brazil, where facilities that account for 58.4% of total capacity in the region are already up and running. Mexico (19%), Chile (7.2%) and Uruguay (6.4%) follow and can boast important availability, though they still remain far behind. Overall, wind production in 2017 rose to 19,720 MW (5% of overall electricity generation capacity). Clearly these numbers relegate wind and solar to a marginal role, but they

Renewables main actors



also represent an enormous potential that has yet to be leveraged fully.

The Chilean paradigm

Chile is a perfect paradigm for the current situation in place across Latin America. Deep in the Atacama Desert, an area that boasts one of the highest levels of solar radiation (sunlight) in the world, Chile has built the Atacama 1 Concentrated Solar Power plant. Taking full advantage of this facility's potential could on its own allow all of Latin America to handle its own energy needs in a sustainable manner: a godsend that is now being leveraged fully. In November of 2017, the connection between the country's two distribution networks – SING in northern Chile and SIC in the center of the country – was activated, making it possible to bring energy produced at Atacama 1 all the way to Santiago. The facility marks an important achievement, one with the potential to play an even more important role considering that Atacama 1 could also serve Argentina, Ecuador and Peru. Furthermore energy produced in the Peruvian deserts could be carried as far as Brazil and Bolivia.

The Baja California paradox

The situation in Baja California, in Mexico, is equally paradigmatic. Baja California is one of Mexico's regions with the highest energy potential, especially in wind power. Paradoxically,

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Production in the region remains even more complementary when examining Latin America from a seasonal point of view, considering the continent over the course of a year

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today the area remains unconnected to the national network, while a large portion of renewable generation has been diverted to US states California and Arizona. Mexico's department of energy didn't announce a tender to create an HVDC transmission line from Mexicali to Hermosillo (1,400 km for 1,500 MW) until the winter of 2017. This line will finally make it possible to bring renewable generation produced in Baja California into Mexico's national energy network. The project is part of Mexico's infrastructural development plan, which relies heavily on renewables and integration. Titled PRODESEN, or the National Electric System Development Program), the program calls for overall investments totaling 110 billion USD: of these, roughly 20 billion will be destined for transmission and distribution infrastructure.

Integration and cooperation between energy production sources

The severity and urgency of climate change is forcing everyone to consider integration of new sources of energy production from every possible point of view. Modernizing existing networks, creating new connections, establishing regional interconnections, smart grids and even making shared tariffs and regulations conform from one region to the next are all elements of an overall strategy that needs to focus on the development of an entire area, rather than that of individual countries within that area.

Geographic integration, through the creation of international HVDC transmission networks that carry energy to consumption centers inside the area, as well as timed integration, which will balance out the inherent variability of generation from different renewable sources both within the span of a single, 24-hour day as well as through annual seasons, remain at the top of the list. Large-scale nocturnal wind production in Brazil can be balanced out by the equally significant solar production from sites in Chile, Peru and Bolivia during daylight hours.

Production in the region remains even more complementary when examining Latin America from a seasonal point of view, considering the continent over the course of a year. If managed correctly, this complementary element represents a real opportunity for the integration of electric markets, offering considerable benefits from economic, environmental and security points of view when it comes to energy supply. IRENA's Renewable Energy Market Analysis document underlines how experience accumulated in hydroelectric in terms of storage will prove essential, making it possible to develop systems that provide an option for contrasting variability over the short term, as well as accumulate excess production overall. Geothermal and bioenergy need to be incorporated into this system of synergies between different sources.

Potential scenarios

According to the RED document, there are three possible future scenarios for development. The first, most basic scenario forecasts a static situation in which there

are no new elements innovative enough to significantly change the current scenario. This first scenario is based on official documents concerning energy plans underway in various different countries, and is characterized by low penetration of renewables (rising from the current 65% to a tepid 70.8% by 2030), and low integration of the international network. The second scenario, titled “RE+” (Renovables, or Renewables), calls for achieving 80% energy production from renewable sources by 2030 (including a 9% reduction in fossil fuel-based energy production and 14% growth in wind). The third and final scenario – “RE+CO” (Renovables Conectada, or Connected Renewables) puts the issue of connection and integration of network infrastructures front and center, highlighting how careful organization and planning of regional interconnections can produce even greater results in terms of reducing emissions: -14.7%

“The results of this study tell us that through a strategic energy plan like the one that emerges from the RED paper, it will be possible to harmonize the two key mandates of our agenda when it comes to development across the region: regional interconnections and the fight against global warming,” said Ariel Yepez, director of the Inter-American Development Bank's energy division.

Even with a substantial increase in consumption, sustainability and energy independence remain achievable goals, as long as the parties involved are willing to tackle challenges together. It's an approach that may prove to be a winning formula in many other areas of the planet as well.



Future & Technology

The Future Is Already Here

With 750,000 new electric vehicles hitting the streets in 2016, the total global fleet has risen above two million vehicles, prompting infrastructure concerns all over the world.

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The electric vehicle sector seems to set new records almost every year. Despite a dip in growth compared to the previous year (2016 registered 60% growth, slightly lower than the 77% registered in 2015 and 85% in 2014), a number of different indicators show that Electric Vehicles, or EVs, remain one of the modern economy's most dynamic markets, and continue to display extensive growth opportunities. As we highlight in this issue of EJ, the market is dominated by two major players – China and the United States – followed by a group of other European countries that are making leaps forward and have activated innovative policies, but which for obvious reasons cannot yet compete with the leaders in terms of overall numbers.

The American continent and the global scenario

In 2016 sales of EVs in the US grew 22% compared to the previous year (86,000 units), increasing the number of vehicles in circulation to 563,000 overall. According to forecasts published by the Rocky Mountain Institute, by 2020 there

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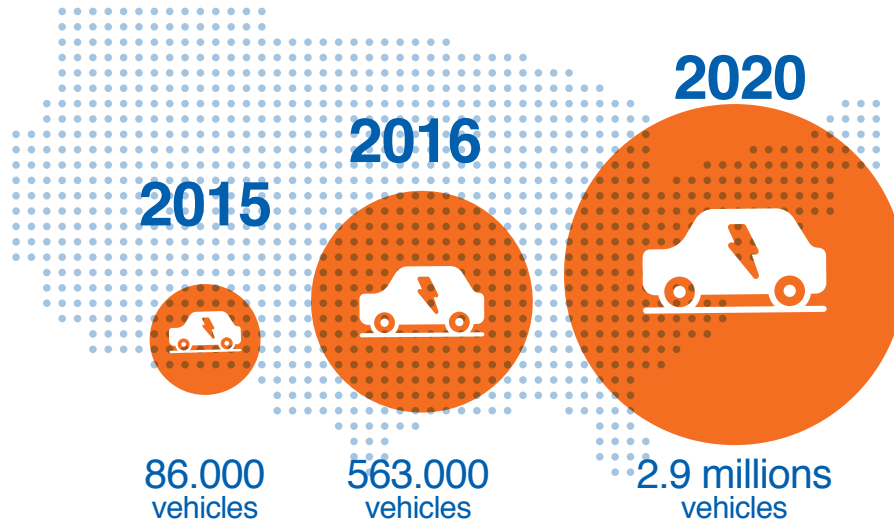
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may be as many as 2.9 million vehicles in circulation in the US alone. Led by Amory Lovins, the institute has also estimated that this will lead to an increase in demand for electric energy equal to 11,000 gigawatt/hr (equal to an increase in sales of electric energy of roughly 1.5 billion dollars). Growth can also be seen in Canada, where in 2017 the number of EVs in circulation rose to 50,000 overall, for a 68% increase over the previous year. Although the data is important, analysts remain unsatisfied: despite this record growth, sales of EVs still represent no more than 1% of all vehicles sold.

China remains the most important market for electric vehicles, with 648,000 vehicles on the streets, as well as an area experiencing rapid growth: in 2016, 40% of all electric vehicles were sold in China, and with over 200 million 2-wheeled electric vehicles, 3 million “low speed” electric vehicles and 300,000 electric buses, China remains solidly out ahead as world leader for the entire sector.

Data for the European Union shows a total of 517,000 electric vehicles on the streets of member countries. While it's difficult to imagine that the EU can compete with the US and Chinese markets in terms of absolute numbers, the continent can

Sales of Electric Vehicles in the US



nevertheless claim several firsts: data from individual countries shows that 29% of all vehicles on the road in Norway are electric, followed by Holland (6.4%) and Sweden (3.4%); while China, France and England follow with 1.5% each.

Generally speaking, however, another statistic jumps to the fore: 95% of sales of electric vehicles are concentrated in just ten countries: China, the US, Japan, Canada and six European member states (Norway, Sweden, Holland, France, England and Germany).

US vs. EU: different models, different policies

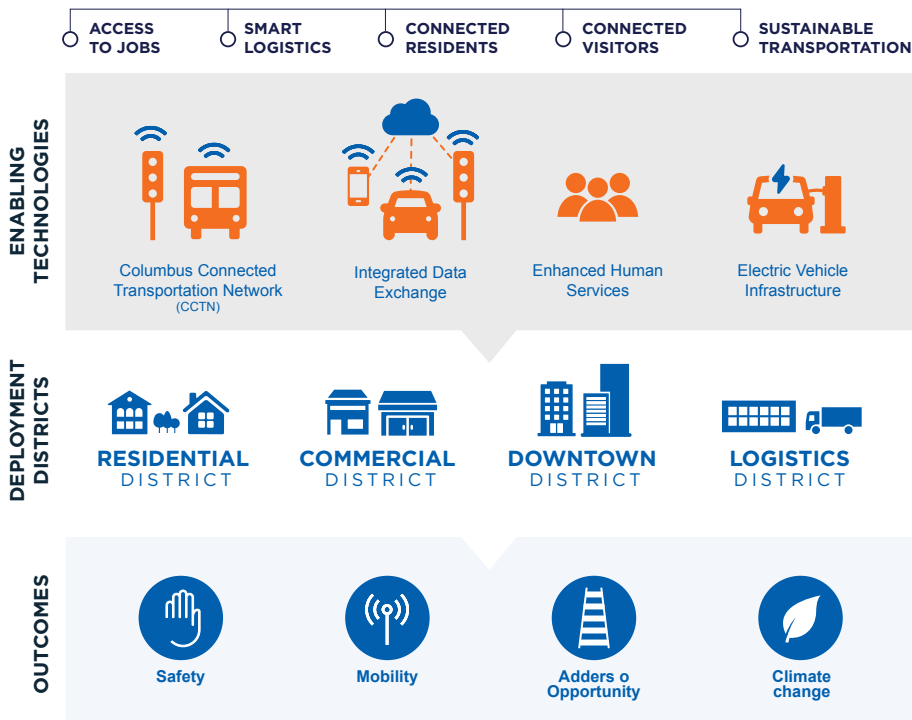
Currently in the US individual states are creating more policies for new forms of transportation than the federal government. In Colorado, state incentives total 80% of the cost of electric vehicles. California has moved to address various legal aspects connected to the creation of recharging infrastructures in condominiums, apartment complexes and garages. One particularly interesting initiative – born of an inter-governmental

partnership – is the creation of the West Coast Electric Highway: a collaborative effort to create a highway connecting the states of Washington, Oregon and California, with electric recharging stations positioned every 40 to 80 kilometers.

In order to “convert” a larger number of states to electric vehicles, it will be important to take full advantage of the contribution that these new infrastructures can make to improving integration of renewables into the overall energy supply system. Recharging stations can be used within a smart grid to rebalance peaks in supply and demand – which rarely coincide – as well as to accumulate excess electric energy. This is a central issue for cities like San Francisco, where already today one-third of all electricity comes from renewables, and most transportation is done in private vehicles. It is equally central for California as a whole, where experts are betting heavily on solar: investing in intelligent systems that make it possible to optimize charging times and keep consumers informed in real time about prices is a central theme for the widespread diffusion of electric vehicles.



The city of Columbus, Ohio won the US Department of Transportation's Smart City Challenge



In Europe the European Commission, through its Clean Mobility Package (November 2017), is attempting to further orient environmental and mobility policies for individual member states, although advancements for the continent as a whole remain central to European plans. The European Union, for example, established the Trans-European Transport Network (TEN-T) program, investing in various projects including the pilot deployment of 115 high-power recharging points along central European roads to make it easier for electric vehicles to travel long distances. In Europe, private companies are doing their part as well: Tesla, for example, offers a network of fast-charging points across Europe, free-of-charge for owners of certain models. Such free charging points are designed to provide an early incentive for consumers to purchase electric vehicles.

The US and Latin America, where cities are protagonists

The centrality of cities in defining new approaches is clear to everyone, and

“Data for the European Union shows a total of 517,000 electric vehicles on the streets of member countries.”

their role is becoming increasingly important for driving change. In the US, one particularly interesting initiative has been launched directly by the Department of Transportation: the Smart City Challenge, which places no fewer than 78 cities in competition to earn a total 350 million USD destined for innovative initiatives, capable of creating a “first-of-its-kind smart transportation system.” Responses to the competition exceeded the department’s expectations: from Albuquerque to San Francisco, Providence to Portland, Seattle to Denver the competition hit a central nerve with urban policies both for small, provincial cities as well as for international megalopolises. Among the 78 candidates, the commission identified seven finalist cities (Austin, Columbus, Denver, Kansas City, Pittsburgh, Portland and San Francisco), ultimately selecting Columbus, Ohio as the winner. According to the commission, Columbus supplied the most challenging and intriguing proposal, based on a holistic vision that is all encompassing and integrated with a new transportation system. By way of comparison, it is interesting to take a look at a completely different reality: Mexico City. Today the Mexican

V2G and players

Projects designed to favor a complete integration of V2G



capital's energy mix is based primarily on fossil fuels, but its goals – as laid out in a national energy plan – are to achieve 35% production from renewables by 2024. This objective inevitably affects transportation as well, and has to take into consideration its citizens' daily activities. There are few private vehicles and little public transportation: Mexico City runs primarily on colectivos and peseros – minibuses and taxis designed for small groups of people. For this reason, government incentives and policies tend to favor the complete substitution of colectivos currently on the road with cleaner, more modern electric vehicles, as well as organizing a network of recharging stations that places servicing taxis and group vehicles front and center.

The future of electric vehicles

But the most innovative scenario, one truly capable of radically transforming the system overall, is known as the Vehicle to Grid (V2G) system, and promises to regulate demand and supply in the most efficient manner possible, especially when it has to manage contingent production like that of renewables. The V2G system is a two-directional interface for the electric system that makes it possible to use car's batteries to warehouse excess energy

production, putting it back into the network when needed.

As in other countries, in the US demand for V2G is destined to grow in lockstep with a decrease in implementation costs for its inherent technology. Already a number of different players, for example the University of Delaware and private companies like Autoport Inc., have initiated projects designed to favor a complete integration of V2G. Even the US Air Force has initiated one of the world's biggest V2G projects on Los Angeles Air Force Base, where the largest electric vehicle fleet on a federal facility (42 vehicles including Nissan Leafs, VIA plug-in hybrid vans, Ford C-Maxs and Chevy Volts) is located.

But the well-organized US Air Force has underlined the complexity of this effort, from high regulatory barriers to complex interconnection requirements. Meanwhile Europe is once again experimenting: in Berlin, for example, the Euref campus is now hosting integrated V2G stations within the local micro-grid; while Great Britain is investing in the program "Vehicle to Grid Britain," with the aim of developing "driver-centered business models to support a rapid roll-out of V2G technologies, allowing millions of electric car batteries to become a vital part of the U.K. energy system."

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The most innovative scenario is known as the Vehicle to Grid (V2G) system, and promises to regulate demand and supply in the most efficient manner possible, especially when it has to manage contingent production like that of renewables.

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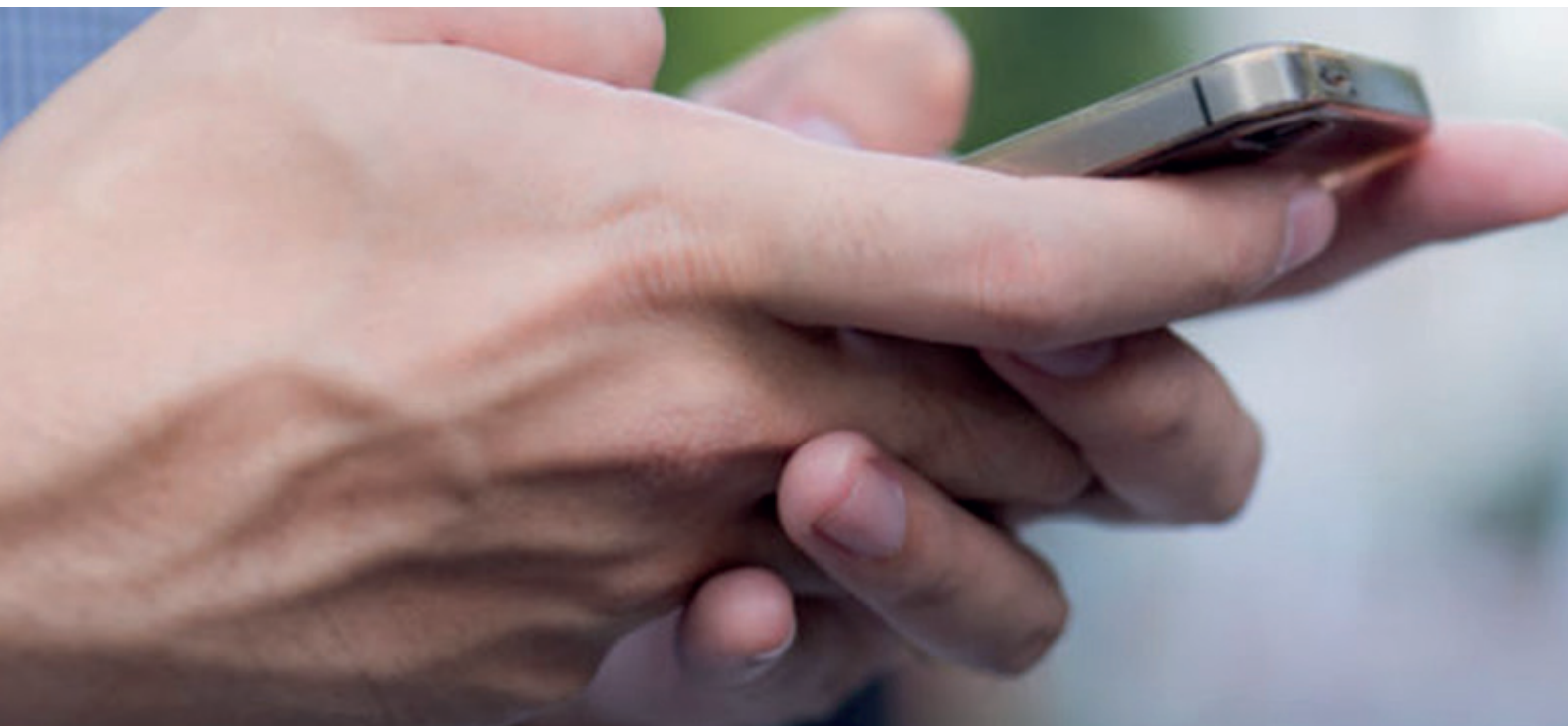


Interview

A World of Opportunity

Mark McGranaghan, Vice President of the Integrated Grid Sector for the Electric Power Research Institute (EPRI)

Mark McGranaghan, Vice President of the Integrated Grid Sector for the Electric Power Research Institute, one of America's foremost research institutions, has no doubts: utilities face major challenges laying ahead, but "this is an exciting, fast-paced time for the energy industry."





Mark McGranaghan
*Vice President, Integrated Grid
of EPRI*

Mark McGranaghan is Vice President of the Integrated Grid Sector for the Electric Power Research Institute (EPRI).

He leads the teams responsible for EPRI's research involving technologies, systems, and practices for the power distribution system and customer systems, as well as the related information, communication and cyber security infrastructure and systems.

Mark has been with EPRI since 2003 and has had a strong influence on EPRI's research in the areas of power quality, advanced distribution systems, and the smart grid. He has worked closely with government and industry research organizations, both in the United States and around the world. Prior to joining EPRI, Mark was with Electrotek Concepts (1998-2003) and McGraw-Edison/Cooper Power.

Mark has BSEE and MSEE degrees from the University of Toledo and an MBA from the University of Pittsburgh. He has taught seminars and workshops around the world and is very active in standards development and industry activities. He is an IEEE Fellow.





1. Good morning Mr. McGranaghan. Let's start by taking a broad view... What would you identify as the main emerging trends in the US energy sector?

Mark McGranaghan: There are a lot of interesting trends underway right now. One of the most important is establishing the value of distributed resources. There is a trend toward higher penetration, especially PV. Much of this tends to be distributed and can include energy storage, which has important implications for system planning and operations at distribution and transmission levels.

Another key trend is the importance of considering the customer as a resource. Integrating customer resources with grid planning and operations is part of the distributed resource picture. This involves IoT technologies and platforms for integration, as well as the technologies themselves – smart thermostats, water heaters, smart inverters, etc. It means we need to understand the customer in order to optimize system planning and operations.

In the same vein, I would also mention the trend of looking at entire communities as a grid resource. Optimizing energy use at the community level involves all energy sources and can involve a number of objectives, including increased use of renewables and clean

energy, resilience and energy efficiency, and integration with a wide range of smart city and community concepts. Another key trend is electrification. The electricity supply is becoming decarbonized, but meeting overall energy system goals for decarbonization means that more and more of the energy picture will need to become electric. The first step is undoubtedly electric transportation, but heat pumps and many industrial process opportunities will have a huge impact as well.

In terms of systems, the advent of artificial intelligence, or AI, marks an important step forward and a huge consideration for the grid. Advanced analytics and sensors are already beginning to take advantage of AI for a wide variety of applications, which we anticipate will result in far-reaching changes in planning, operations, and grid protection.

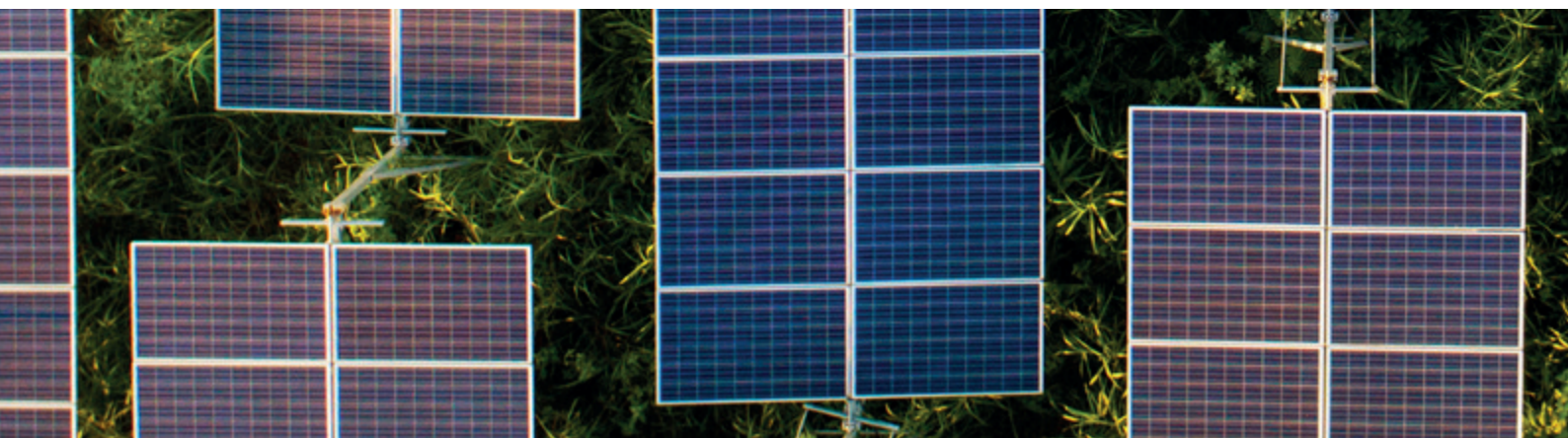
A final and very important trend is one ubiquitous communication infrastructure. It's a backbone that provides the foundation for many of these changes as a key element for advancing energy system integration.

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Another key trend is the importance of considering the customer as a resource

Mark McGranaghan

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2. What are the most disruptive technological breakthroughs you see underway in the power sector? Where would you suggest investing in order to take advantage of the current big wave of innovation?

MM: While we can't advocate for specific technologies and investment, we do inform on the breakthroughs making a difference. And one can't talk about technological breakthroughs without mentioning advanced sensors and the widespread availability of wireless communications, including peer-to-peer capabilities – I'm talking about 5G here. I'd also include AI in this list, as well as power electronics, because higher power ratings and lower costs for advanced power electronics components like Silicon Carbide and related technologies create a vision of power electronics everywhere. I'd also mention complete customer integration through cloud services – utility

and third-party-provided platforms. But it's hard to stop there. There are so many important technological breakthroughs worth mentioning right now. Unmanned aerial vehicles, for example, including beyond line-of-sight operation for system maintenance and management. Or extremely accurate GIS, or Geographic Information Systems, which greatly facilitates augmented reality applications. Last but not least, I think you have to include microgrids and local community energy optimization and resiliency, combined with overall grid management. These technological breakthroughs and others like them make it an exciting time to be in the energy business!

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3. What are the biggest challenges US utilities are facing in this new energy landscape? How are they managing such a massive transformational process within the sector?

MM: The biggest challenge is the pace of technology advancement. It's hard to keep up with advancements while maintaining a traditional grid for reliability and resiliency. Another major challenge can be found in regulatory lag and uncertainty, both of which make it difficult to invest in and utilize the advanced technologies.

Customer expectations are moving with the pace of technology and utilities have to keep up in order to provide the flexibility and range of services that customers expect as part of energy optimization. Finally, cyber security has risen to the top of every utility's list of concerns. Cyber

security is a "moving target." It is almost impossible to keep up with, especially as we move toward a more distributed architecture. That's why it is important we do everything we can to overcome the challenges presented by cyber threats.

Just understanding where you stand with respect to your cyber security programs and technologies is a big step. EPRI is working on cyber security metrics to help utilities gain an understanding of their cybersecurity "postures" – this has turned out to be a very important effort with broad participation.





4. From your perspective, what are the major differences between the US and European approaches toward the energy transition? What can the US experience teach Europe? How might the US power system benefit from European best practices?

MM: The biggest difference is the total focus on using market approaches in Europe. The U.S. has many different business and market models for the electric infrastructure, and some of the most important innovations and advancements come from public utilities that are operating an integrated system for the benefit of the consumer. Traditional market approaches are becoming increasingly strained by distributed systems, resiliency concerns, and flexibility needs for integrating renewables.

The other area of difference is Europe's stronger focus on standardized solutions. This has advantages for interoperability (for example, the IEC 61850 standard and the Common Information Model), but can also introduce delays while we work on the standards. Understanding the advantages of standardized solutions while creating an environment that leaves room for agility and flexibility is a challenge that might involve some mix of both European and North American approaches.



Traditional market approaches are becoming increasingly strained

Mark McGranaghan



5. What do you think should be the role of a major research institution like EPRI in the energy transition? What is the institute's strategy for maintaining its position as an innovation enabler for the entire US energy industry?

MM: EPRI's role is definitely evolving. We're doing more R&D around the application of new technologies than we have in our history and it's exciting because the industry is becoming more innovative and technologies are being developed at a rapid pace with plenty of investment.

The key word at EPRI is collaboration – focusing on challenges where utilities working together can accomplish more than an individual utility might accomplish working alone. Collaboration in this sense can cover much territory. One example of this in play is how EPRI engages in interoperability and standards, working with organizations like IEEE, IEC, CIGRE, etc. Another area is data, which remains the key to successful

analytics and AI applications. It will be critical to assemble industry-wide databases to help train AI systems and develop new applications. In the same vein I'd mention application knowledge for new technologies. The lessons learned from initial trials and deployments are critical and the entire industry can benefit from sharing information with one another. And I'd mention open source software and tools; from a collaborative standpoint these involve providing and facilitating fundamental platforms and tools so that innovators can build off of them in an open manner.

A critical value proposition is just information sharing in general. With technology moving at such a breakneck

pace, there is a growing need for experts who can facilitate assessment of technologies and information sharing. Last but not least, I would emphasize the importance of supporting new technology ventures. IncubatEnergy (www.incubatenergy.org) is a perfect example of this, as it coordinates the interface between new technology providers and potential utility applications through incubators and accelerators around the world.

Overall this is an exciting, fast-paced time for the energy industry. There's a world of opportunity out there, and an organization capable of supplying a collaborative approach to dealing with and adopting new technologies can leverage more of them than ever before.



Industries & Countries

Up Next: EnerNex

While experimentation and innovation in Italian and European electric sectors are largely still in their infancy, they have already reached significant levels in the United States. Today innovation continues unabated in the US electric sector, and it still makes sense to invest in order to catch a ride on its growth curve.

An example? According to data provided by Select USA in 2016, the federal program that supports industrial investment, investments in the US energy market stood at 276 billion USD. Production from renewable resources is experiencing constant growth (Select USA estimates it will reach 50% of all electric energy production by 2030) and investments in smart technologies remain among the highest in the world (14.4 billion USD in 2017, according to Bloomberg New Energy Finance). It is the birth of what's known as the Advanced Energy Economy, a term that encapsulates the entire ecosystem of merchandise, services and technologies that support the transmission, distribution, storage and consumption of energy in the American market, worth roughly 200 billion dollars.

Market size is not the only attraction: its complex articulation; dynamicity; the central role played by innovation; its close connection with advanced research; the role of demanding consumers, always on the lookout for new offerings and proposals, all combine to make this energy market extremely competitive and challenging.

It's a market that anticipates trends and determines new development dynamics.

CESI's debut in the North American market as a leading player, through the acquisition of EnerNex in June 2018, represents a new, fundamental step in the company's development strategy. First established in 2003, EnerNex has built an increasingly solid position within the US market. Today the company is considered one of the most reliable and innovative research, engineering and technological consultancies for the energy sector. The US Department of Commerce's National Institute of Standards and Technology (NIST), Southern California Edison, Hawaiian Electric Companies, Duke Energy, Con Edison, Xcel Energy and The Electric Power Research Institute (EPRI) are just a few of the notable companies that have placed their trust in EnerNex's services.

CESI's decision to acquire EnerNex was based on its unique identity and history, as well as its skills, know-how and technologies. The union will allow both companies to present the market with a complete offering of solutions for the energy transition challenges. This enlarged offering boasts the skills matured within CESI, for example in the fields of HVDC, renewables integration into existing energy systems and of testing (smart meters market in particular). In addition, the new offering includes EnerNex's leading capabilities in grid modernization, cyber security and power

systems consulting. Put together, the two companies provide a complete and distinctive set of solutions.

"CESI has always offered its clients tailored services, no matter where in the world they're located," says Matteo Codazzi, CEO of CESI. "Thanks to the acquisition of EnerNex, we have further strengthened our capabilities to fully support our clients in winning the energy transition challenges."

We're convinced that the entire CESI Group, and as a result the international market, will gain direct advantages from

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CESI is helping utilities understand the flexibility that electric vehicles can provide to the network, and how to create financial value from it

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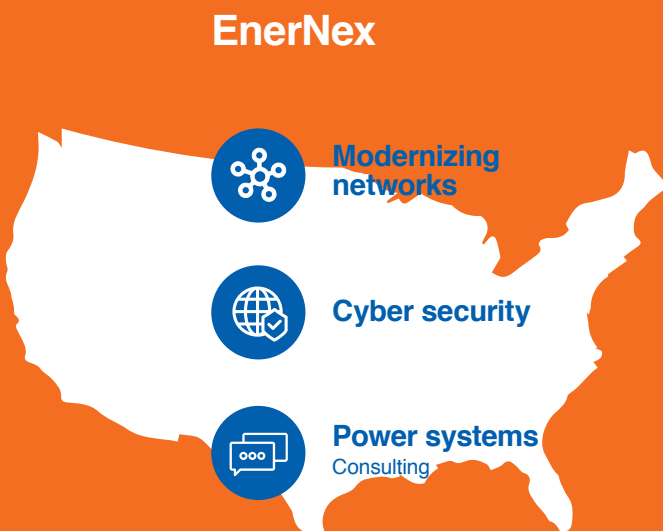
CESI's debut in the North American market

A unique opportunity



to merge approaches

BEST PRACTICES: EUROPE AND THE US



JUNE 2018

CESI ACQUIRES
ENERNEX

CESI's acquisition of EnerNex represents a unique opportunity to merge approaches, technologies and best practices from both Europe and the US: a chance to create new, different models for market interventions. Two operational spheres are already emerging. By 2020, for example, all the new homes in California will be required to have solar panel roofs. EnerNex is already collaborating with California utility companies to perfect a network integration system to serve these numerous new distributed energy production points guaranteeing flexibility, efficiency and earnings. At the same time, CESI is providing guidance on understanding and optimizing the flexibility that electric vehicles can provide to the network, and how to create financial value from it.

"Thanks to this deal," says Jeffrey Lamoree, CEO of EnerNex, "we'll be able to supply our clients with the best technology and know-how from both North American and European markets. In addition this partnership allows us to offer our expertise and services to emerging markets around the world that are facing complex energy issues."
–Jeffrey Lamoree, President and CEO at EnerNex, jeff@enernexus.com

For further information on this topic, please contact:

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Boundless & Complex

The enormous potential of energy in Latin America

For further information on this topic, please contact:

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Tests conducted by CESI in Chile

Dam monitoring systems



Improving



Efficiency



Productivity

Chilean Dams

- ① Melado
- ② Rapel
- ③ Ralco
- ④ Pangué



The energy scenario in Latin America is undoubtedly one of the most complex and fascinating the world has to offer. On one hand, the southern half of the continent can boast a wealth of important energy resources and increasing demand; on the other the locations of these resources, set far from centers of consumption in hard-to-reach areas, combined with a lack of interconnection strategies and infrastructures, make it extremely difficult to take full advantage of this wealth.

The theme of infrastructures is vital for this area, and must be examined in all its various facets, including from the point of view of global environmental challenges: efficiency and reduction of energy loss on one side; regional interconnections and network integration for the increasingly important contribution offered by various different renewable energy sources (solar, wind, geothermal) on the other, in addition to hydroelectric sources that are starting to feel the negative effects of climate change. “CESI has enjoyed an established presence in this area for some time now,” said Alessandro Bertani, Smart Grids Director of CESI Consulting, Solutions and Services Division. “Today we’re working alongside electric companies in several of the principal Latin American countries in order to take a systematic approach to overcoming these challenges. In many cases, our support is proving strategic.”

In detail, the projects underway right now are designed to evaluate the present status of distribution and transmission networks,

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The energy scenario in Latin America is undoubtedly one of the most complex and fascinating the world has to offer

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analyzing the causes, characteristics and entity of current energy loss, both technical and non-technical, of the most frequent and damaging network faults, conducting laboratory simulations and tests on protection and automation systems in order to verify and perfect algorithms that promise to raise the level of security and efficiency of the grids in such a way as to render them similar to the European ones and grant greater productivity to the system as a whole.

CESI’s expertise has proven particularly useful in projects connected with the realization or operational management of hydroelectric facilities. Tests conducted by CESI on monitoring systems for the dams at Melado, Rapel, Ralco and Pangué in Chile, just as flow studies for the Aconcagua River (also in Chile) have made it possible to optimize management and adapt the instrumentation utilized inside the facilities, improving efficiency and productivity overall.

A study commissioned from CESI by Enel Green Power proved particularly important from a technical standpoint. The study focused on the micro-grid project created in the Ollague village in Chile, which uses a hybrid system that includes integration of various different energy production sources – photovoltaic, wind, diesel generators – together with a battery power storage system (BESS). The entire micro-grid is connected to a low voltage network via an energy management system. CESI’s study called for a grid electrical power quality assessment, as well as a network transient analysis.



City Portraits

Resilient Energy Smart Cities

Does the term “smart city” mean the same in the United States as in Latin America? How does a smart city use energy in a sustainable way? What does “smart” mean for Rio de Janeiro, and what does it mean for Boston? We took a look at different city strategies, action plans and results, and discovered...



Botero Square, Medellín, Colombia

A group named Easypark has compiled most complete, detailed ranking of smart cities at the global level. This group, whose core business is the application of smart systems in order to manage traffic and thereby improve mobility for entire cities, evaluated the smart performances of no fewer than 4,500 cities around the world. In order to accomplish this, they analyzed a plurality of factors: from issues connected with mobility to economic ecosystems; from efficiency to building participation; from digitalization of citizen services to energy. Among the 100 cities that made it into the final rankings Boston, one of the highest-ranked cities in the United States, came in fifth. San Francisco came in seventh, while New York, the third American city to be ranked, came in quite a bit further down the list, at the twenty-fourth position, just ahead of Washington.

You would have to go to the very end of the list to find some of the main metropolises in Latin America, but despite their current positions, their actual achievements represent an important achievement for the entire South American region,

marking the start of a transformation that blends innovations in technology, energy, environmental and social services, guaranteeing higher living standards. Medellin, Mexico City, Bogotá, Rio de Janeiro, Buenos Aires, Montevideo, Santiago: these are the Latin American megalopolises that are betting the heaviest on smart tech, innovating first and foremost in sectors like air pollution, traffic, public transportation, safety and security, in addition to renewable energy sources.

Medellin is changing its skin

The second-largest city in Colombia in terms of population density, in the span of just a few years (starting in 2007) Medellin has radically transformed its identity, acquiring a record level of international prestige. In 2013 it was nominated “city of the year” by The Wall Street Journal, Citi and the Urban Land Institute, and today it is attracting young “digital nomads” from all over the world thanks to Corporation Ruta N (better known as “Ruta N”), a public joint venture created to inspire and encourage innovation in the city and

create favorable conditions for business and entrepreneurship. In fact, Ruta N acts as the technological, scientific and economic hub driving this new development. Initial investments in the smart grid sector began in 2010, and today the “MDE Medellin Smart City” plan represents yet another step forward along this path. In 2016 the city invested ten million dollars in this sector with the aim of developing a new energy ecosystem. One of the most effective experiments in this sense was the introduction of prepaid smart meters. Today over 120,000 of them have been installed, especially in low-income areas. This kind of intervention was subsequently transferred from electric meters to gas and water meters as well. From an efficiency point of view, Medellin is a pioneer in Colombia: Empresas Publicas de Medellin, the local multi-utility, guarantees a level of service quality – electricity, gas, water, distribution networks – that is equal to levels found in Western countries. The creation of an innovative suspended railway system, today considered an extension of the subway system that connects the city center to outlying areas, was a determining factor in the city’s transformation.

Initiatives in Medellin

Since 2010

Easypark
ranking

97th



Ruta N

Public joint venture
innovation HUB



10 million USD

Investments in
innovation



120,000

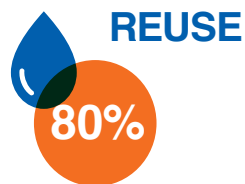
Prepaid smart
meters installed



50-year Neutral Carbon Rio strategy



86th Easypark ranking



Water consumed
Programs for mobility, efficiency and water resource management



Energy consumed across the city
Renewable and distributed production



Carbon dioxide emissions
by 2050

Rio de Janeiro: the resilient city

Jumping from 3 million inhabitants to 12 million today without any urban planning in place, the urban agglomerate of Rio de Janeiro is one of the most intricate anywhere: the city grew exponentially through the occupation of empty spaces, self-management of the favelas, without any basic services and with minimal infrastructures. Starting in 2000 large international events, the most recent of which was the 2016 Olympics, gave the city a chance to reorganize itself and initiate a profound structural reorganization. With the decision to participate in the C40 network (the first Latin American city to do so), Rio de Janeiro appears to have made a clear choice for its future and laid a concrete path toward intervention objectives and strategies aimed at making it one of the world's first truly resilient cities.

C40 is an international network that includes Austin, Accra, Barcelona, Boston, Buenos Aires, Cape Town, Caracas, Copenhagen, Durban, London, Los Angeles, Melbourne, Mexico City, Milan, New York City, Oslo, Paris, Philadelphia, Portland, Quito, Rio de Janeiro, Salvador, Santiago, Stockholm and Vancouver. All these cities are formally and concretely committed to radical emission-reduction policies. By adhering to the C40 Fossil Fuel Free Streets Declaration, in 2015

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Rio de Janeiro appears to have made a clear choice for its future and laid concrete strategies aimed at making it one of the world's first truly resilient cities

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Rio de Janeiro launched its own 50-year Neutral Carbon Rio strategy. The goal of the strategy is to achieve carbon neutrality by 2065. For this reason, the city has initiated specific programs for mobility, efficiency and water resource management with the aim of reusing 80% of all the water it consumes, preserving the flood plains and producing 30% of the energy consumed across the city through renewable and distributed production. Overall, the project aims to reduce carbon dioxide emissions by 80% by 2050.

Along this pioneering path to a resilient identity, Rio de Janeiro has found a new, in some ways unexpected partner as well: the World Bank. Using the World Bank's ESMAP platform, the local government has conducted an in-depth review of energy consumption in six public areas: street lighting; efficient energy consumption in government buildings; urban waste; the water system; transportation and electricity generation. The results of the review demonstrate that a systematic intervention on street lighting and public buildings by local government would lead to remarkable energy savings, lowering emissions considerably to 1,500 kt CO₂ in ten years.

Following this review, a newly drafted policy of interventions conducted to reduce consumption called for retrofitting initiatives for all public buildings. For the city's network of lights along streets and in public areas, the strongpoints of the





Christ the Redeemer, Rio de Janeiro, Brazil



Leonard P. Zakim Bunker Hill Memorial Bridge, Boston, USA

program included geo-referenced network mapping that catalogued each light, and the introduction of LED lighting.

Boston

Set firmly within the C40 network, today Boston is one of the cities on the front lines of the United States' battle against climate change and to promote energy production from renewable sources. In June 2018 the Mayor of Boston, Martin J. Walsh, took advantage of the annual convention of mayors of American cities (where 250 cities were represented) to launch a new initiative: a coalition of American cities dedicated to increasing the production of renewable energy within urban contexts. "Cities wield the power to create demand and transform the energy market," said Walsh during the convention, "and when we act together we can show the world that environmental stewardship and economic prosperity go hand-in-hand."

This initiative, which runs in a direction diametrically opposite the energy strategy delineated by Trump, has already attracted participation of equally prestigious cities like Los Angeles, Chicago and Houston. Its goal is concrete and based on the need to create an economy of scale that makes it possible to obtain innovative services and products at lower cost. The first step of the program involves conducting a deep investigation of a given city's energy needs in order to identify common needs and critical areas to address and subsequently transform into formal requests for energy services. Walsh's initiative repeats a preceding local experience during which MIT University, the Boston Medical Center and the Post Office Square Redevelopment Corporation were involved in the acquisition of energy from a solar plant in North Carolina.

Boston's choice was born of concrete needs. Within the city, electric energy production weighs heavily (35%) on CO2 emissions, and costs roughly 9 million USD per year. Boston is also experiencing a period

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A new initiative: a coalition of American cities dedicated to increasing renewable energy production within urban contexts.

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of economic growth that is translating into new buildings and offices (109 are currently under construction). Walsh's choice is determined by the willingness to achieve pre-established climate goals (to become carbon neutral by 2050) without slowing down economic growth. "Boston is in one of its largest building booms in its history," said Austin Blackmon, Director of the Energy Department, "and that means there are great opportunities for us to have a lasting impact on the future of our city."

But then Boston and Massachusetts can already vaunt a tradition of paying close attention to this issue: the city has the highest number of LEED certifications for building energy efficiency anywhere in the state, and Massachusetts aims to reduce GHG emissions by 80% by 2050 (synthesized with the formula 80x50). In addition to interventions aimed at rendering buildings more energy efficient and increasing electric mobility, Boston is also working on creating a local mini-network divided by district, establishing a system that would make it possible to integrate renewable production with distributed generation. The initiative Walsh recently launched would undoubtedly reinforce these efforts.

Conclusion

Traffic, consumption, digitalization of services, grids, reducing emissions, resilience... The issues facing cities today are the same all over the world, but the specific local conditions each city must grapple with mean that they need extremely different policies and action plans. Adoption of a flexible approach that starts with a correct interpretation of the context and data, united with the ability to build alliances and networks between different metropolises, remain the strongpoints shared by every plan under development, and stand as a guarantee for effectiveness tomorrow and beyond.

News & Events

Upcoming Energy Events

E-world

Feb. 5-7

📍 Essen,
Germany

staging-www.e-world-essen.com/en/for-visitors/scope-of-themes/

Exhibitors and visitors from more than 70 nations come together in Essen to exchange news and views on the latest market developments. The focus of the trade fair is on products and technologies in the areas of energy services, information technology and energy trade.

World Sustainable Energy Days

Feb. 27 - Mar. 1

📍 Wels, Austria

www.wsed.at/en/world-sustainable-energy-days.html

Energy efficiency and renewable energy are at the core of Europe's commitment to a clean energy transition that serves the needs of citizens, economic development and the environment. Achieving a smart, socially fair and sustainable energy system requires strong policies, competitive businesses and technology innovation. The World Sustainable Energy Days connect people and empower them to embrace the necessary change. The annual conference brings together more than 650 delegates from over 50 countries from business, the research community and the public sector.

Solar Middle East

Mar. 5-7

📍 Dubai, UAE

www.middleeastelectricity.com/en/exhibit/MEE-product-sectors/solar.html

Solar Middle East is the largest gathering of solar industry professionals in the Middle East & Africa, offering the most effective trade focused platform to international manufacturers and distributors looking to meet regional buyers.

CERAweek

Mar. 11-15

📍 Houston, Texas

ceraweek.com

CERAWeek is the premier annual international gathering of energy industry leaders, experts, government officials and policymakers and leaders from the technology and financial communities. 2019 marks the 38th anniversary of this influential event, ranked among the top five "corporate leader" conferences in the world. CERAWeek 2019 will provide new insights on the future of energy and an unparalleled opportunity to engage on the most urgent issues with decision-makers from around the world.

RECAM – Renewable Energy Central America

Mar. 12-13

📍 Panama city,
Panama

www.recamcongress.com

The Central America is home to 40 million people with annual economic growth of 3%. As the region scales up clean infrastructure investments in line with its Paris Climate Agreement commitments, green installed capacity has grown by 23% in recent year. For these reasons, RECAM is an unmissable event.

Energy Transition

Mar. 18

📍 Chatam House,
London, UK

chathamhouse.org/conferences/energy-transitions-2019#

The fourth annual Chatham House Energy Transitions conference will examine the new drivers of change, focusing on how different economies and industries can make the shift to a low-carbon energy future.



The Solar Show Africa

Mar. 26-27

📍 Johannesburg,
South Africa

terrapinn.com/exhibition/solar-show-africa/index.stm

The Solar Show Africa is Africa's largest solar conference and exhibition. During the last 22 years this event helped shape the regional energy market through sharing knowledge, educating the market and facilitating influential meetings.

Shaping a Better Energy Future

CESI is a world-leading technical consulting and engineering company in the field of technology and innovation for the electric power sector. With a legacy of more than 60 years of experience, CESI operates in 40 countries around the world and supports its global clients in meeting the energy transition challenges. CESI also provides testing and certification services to the power equipment industry, as well as civil and environmental engineering services.

The company's key global clients include major utilities, Transmission System Operators (TSOs), Distribution System Operators (DSOs), power generation companies (GenCos), system integrators, financial investors and global electromechanical and electronic manufacturers, as well as governments and regulatory authorities. In addition, CESI works in close cooperation with international financial institutions such as, among others, the World Bank Group, the European Bank for Reconstruction and Development, the European Investment Bank, the Inter-American Development Bank, the Asian Development Bank.

CESI is a fully independent joint-stock company headquartered in Milan and with facilities in Berlin, Mannheim, Dubai, Abu Dhabi, Washington DC, Knoxville, Rio de Janeiro, Santiago de Chile and Bogotá.

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