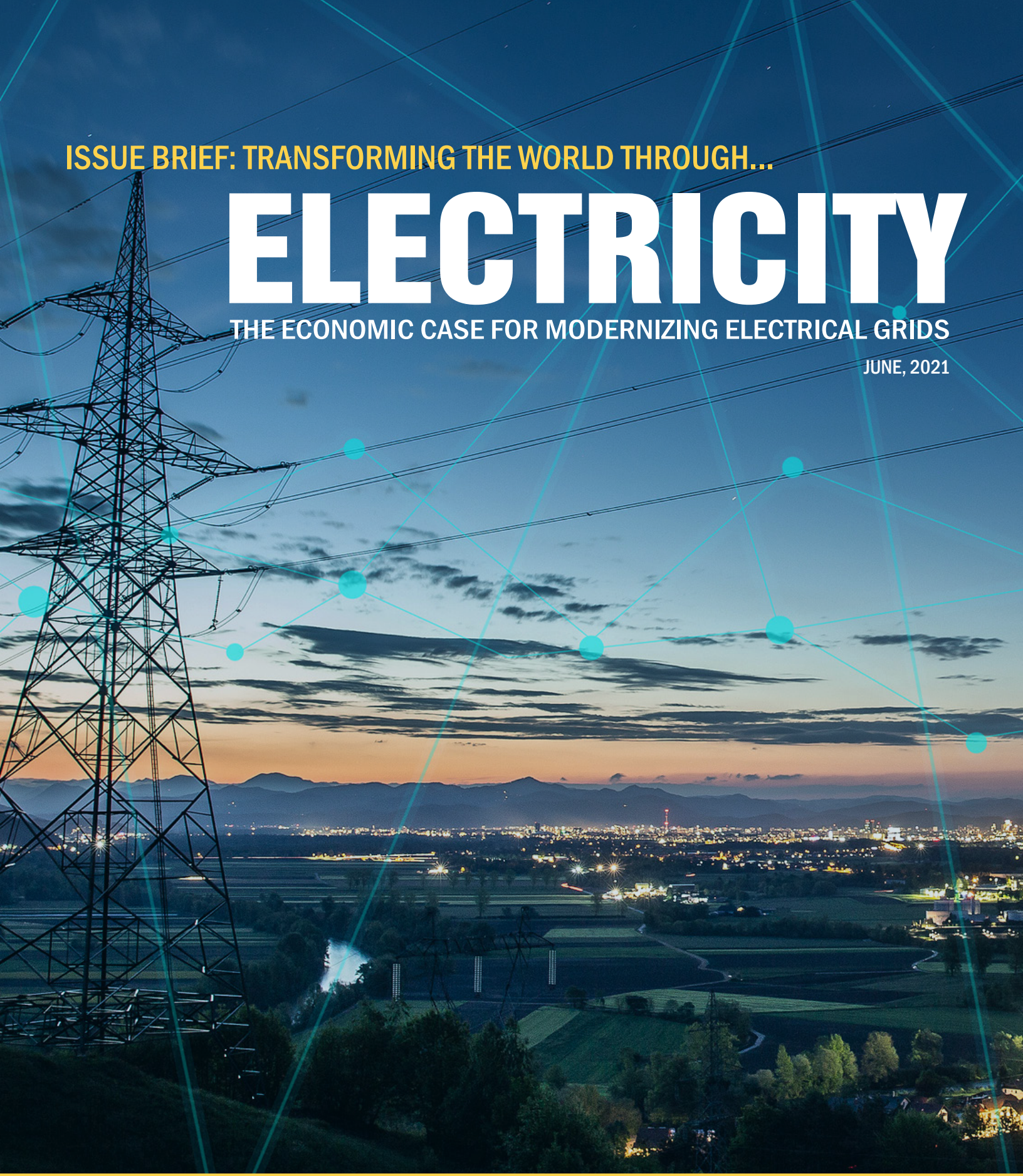

ISSUE BRIEF: TRANSFORMING THE WORLD THROUGH...

ELECTRICITY

THE ECONOMIC CASE FOR MODERNIZING ELECTRICAL GRIDS

JUNE, 2021

CAS

The Free-Market Voice for America's Consumers

DEPENDABLE ELECTRICITY DRIVES PROSPERITY

Electricity transformed the world, accelerating the industrial revolution and bringing previously unimaginable levels of prosperity to nations across the globe. More than any other factor, universal access to reliable and affordable electricity is what separates the world's most advanced nations from those that are still developing.

With each passing day, more of the products and services upon which everyone relies depend on electricity. The generation and reliable delivery of electricity is essential to the growth of every nation's economy. Conversely, **an interruption in electric service can bring devastating consequences**, not only to the businesses directly affected, **but to wholesale economic activity**.

With each passing day, more of the products and services upon which everyone relies depend on electricity.

Demand for electricity, among both developed and developing nations, **continues to rise**. It is the inevitable side effect of the prosperity driven by electricity. As electricity fuels economic growth, that growth fuels the need for more electricity. Keeping pace with demand requires both robust levels of generation and a delivery system equipped to handle the greater need.

ELECTRICAL GRIDS ARE THREATENED ACROSS THE WORLD

An increasingly tenuous level of reliability in the grids that provide electricity to the world poses a genuine threat to the future of prosperity to both advanced and developing nations alike. Despite what has been up to now outstanding reliability, examples of **failure in aging and over-stressed grids** have been on full display in recent years.

The result of a record-breaking freeze engulfing the state, Texas's recent electricity crisis revealed a fragility in that state's delivery system for which it was clearly unprepared. The Lone Star State is **not alone in experiencing devastation** wrought by an unexpected prolonged interruption in service.

California

In California, brownouts and rolling blackouts have gone from an exceptional occurrence to a near-regular seasonal event that has implications beyond even the serious economic impact on its residents. Electrical outages measurably impeded and hamper economic growth.

Puerto Rico

It took Puerto Rico **nearly a year to restore electricity to the entire island** after it was ravaged by Hurricane Maria in 2017. After enduring a devastating human toll from that catastrophe, the Caribbean island's **economy has yet to fully recover** from the extended outage. Although electricity has returned to Puerto Rico, absent substantial upgrades to its grid the island remains susceptible to repeating that disaster when another significant hurricane hits.

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The island commonwealth wisely chose not to merely repair its existing grid, but instead enlisted LUMA Energy to develop and implement a comprehensive overhaul. PREPA, the Puerto Rico Electric Power Authority, is **reorganizing itself with private sector expertise and innovation**, modernizing its infrastructure to prevent future catastrophes. This is an essential transformation, without which Puerto Rico would remain vulnerable to extreme weather events and other service interruptions resulting from an obsolete grid and outdated management.

It may have taken a category 5 hurricane for Puerto Rico to make the necessary changes to ensure reliable delivery of electric service, but they are not alone in learning that the lack of an adequate grid can have the effect of thwarting economic development.

Africa

A study published by the World Bank in 2018 concluded that **grid inadequacies in Africa constrain business creation**, reduce productivity and output, and diminish the trade potential of that continent's business enterprises.

Japan

The inadequacy of the existing grid is not the only challenge affecting the delivery of electricity. Earlier this year in Japan, a sudden cold snap coincided with an interruption in deliveries of liquid natural gas (LNG), which fuels 20% of that nation's generated electricity. The dramatic increase in demand coupled with the sudden shortage of supply **resulted in 700% spike in electricity rates** for a brief period.

China

China, too, has not been immune from this challenge. Relying predominantly on coal as its fuel for electricity generation, that nation is **especially susceptible to increases in coal prices**, resulting in price spikes during winter months.

United States

For the United States and much of the industrial world, an aging and over-stressed grid poses the greatest threat to the long-term reliability and affordability of electricity delivery. Outdated, inefficient, inadequate and inflexible grids are ill-equipped to compensate for sudden surges in demand, fuel price spikes, or unfavorable or destructive weather.

Europe

Europe is responding to this challenge. The European Union has committed to implementing a "smart grid" infrastructure before the end of this decade. Establishing a comprehensive approach to upgrading its grid with smart metering, distribution automation, and battery storage, the **EU is investing over $130 billion** in grid modernization efforts.

South Asia

South Asia is making its own investment in updating that region's delivery grid, **putting more than $25 billion into its plans** to prepare for future needs.

THE WORLD'S FUTURE OF ELECTRICAL GRIDS

To maintain current economic growth, spur future opportunities, and ensure security, these **improvements to electricity delivery are necessities, not luxuries**. It is projected that global demand for electricity, driven by burgeoning needs in developing nations, will **increase more than 40% this decade**. Even the United States is anticipated to **experience a 19% jump in demand** by 2030.

If not addressed soon, the inadequacies of existing outdated grids will only become more apparent and the implications of those shortcomings more severe. The **origins of design of the United States' current grid are rooted to the 1960s**, when America was completing its electrification of remote rural areas. Built to meet the demands of a regulatory structure instituted during the New Deal, our nation's grid is **not equipped to meet endlessly increasing demand**.

As evidenced by commitments to upgrades in Europe and Asia, the challenge of updating the electric grid delivery system is being met by some nations. It makes sense to address the grid's **outdated technology, insufficient storage capacity, and susceptibility to natural disasters and cyber threats**. New grid technologies hold the promise of resolving these vulnerabilities, setting the stage for energy security and removing a threat to future economic prosperity.

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WHAT MUST WE BE DOING TO ENSURE THE GRID DOESN'T BECOME A LINGERING LIABILITY INSTEAD OF AN ENDURING ASSET?

FIRST

The commitment to investing in necessary upgrades must be sufficient and must be fulfilled. European and Asian nations are spending to modernize their grids. Here, public and private investments estimated to exceed $500 billion are being made to deliver needed upgrades, including the building of a technologically advanced digital grid.

Puerto Rico spent over $3 billion to bring power back to its residents after Hurricane Maria after months in the dark. Now, the island is investing billions to bring long-overdue upgrades to its electricity infrastructureand better enable a renewable energy future.

To resolve the deficiencies – and resulting unavailability – of electricity in parts of Africa, the World Bank is coordinating international assistance for some of the less prosperous nations on that continent.

SECOND

Second, with a goal of building a more modern and reliable grid capable of serving consumers and the economy, any long-term solution must include a broad mix of energy sources. While there is much excitement and advancement in renewables, costs and available technology mean that fossil fuels will still provide the most of the global energy needs over the next 20 years.

Keeping fossil fuels as a major component of the world's energy mix is eminently practical and necessary in some circumstances. Battery storage capacity is essential to ensuring renewable sources are reliable, but the supporting technology has not advanced to sufficiently ensure the reliability of renewables on a large scale at a low cost today.

Natural gas continues to increase its share as a source for generating electricity. Japan's challenge with a snap shortage earlier this year notwithstanding, it has proven to be a clean and reliable source. Natural gas is also critical to establishing a stable and modern grid for industrialized and developing nations.

THIRD

Finally, advances in technology hold the greatest promise for providing necessary improvements and upgrade to grids. "Smart grids," which incorporate technology to ensure more efficient distribution of resources, have the ability to reduce the costs to consumers by adapting to and compensating for short-term changes in demand.

Countries facing challenges in adequately providing service to remote areas – a major challenge in developing nations – could interconnect grids to fulfill needs that transverse borders. "Grid edge," which encourages utilities to adopt a holistic approach to addressing its operations, has benefitted utilities large and small in determining the technology and improvements they need to adopt to strengthen their infrastructure.

Updating the grid is essential to the economic growth and long-term prosperity of the entire world. It will also provide greater energy security against numerous threats. And of greatest importance, an updated and upgraded grid will offer consumers reliable and affordable electricity now and for generations to come.

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