Exponent®

THOUGHT LEADERSHIP

PUBLISHED 1Q 2021

Emerging Electrification

Risk mitigation strategies for battery storage in Latin America

February 11, 2021

After decades of relying on fossil fuel and hydroelectric power generation, utilities in Latin America are embracing solar and wind energy to reduce emissions, diversify energy supply, and increase the reach and reliability of existing energy grids. Lithium-ion battery energy storage technology can play a key role in Latin America's energy transformation, helping to close the gap between intermittent energy generation and energy use—a critical step toward making renewable energy a feasible alternative to fossil fuels. As with all utility investments, Latin American owners and operators need to build strategies to mitigate safety and performance risks when purchasing and implementing battery energy storage systems. Doing so can help improve existing energy systems while ensuring the safety and performance of renewable energy infrastructure.

How Lithium-Ion Battery Energy Storage Can Improve Grid Reliability

Today, over 20 million people in Latin America lack access to electrical power. Numerous efforts are currently underway to expand utilities' geographic reach in as safe and reliable a manner as possible. Many of these efforts include solar, wind, and geothermal energy, given the availability of these renewable energy sources in the region and ongoing reductions in cost. These renewable energy sources require storage systems to provide a buffer between intermittent energy generation and consumer demand. As the cost drops, battery energy storage will become an increasingly attractive solution for Latin American rural electrification.

Batteries can be an excellent resource to improve the reliability of both microgrids and grid extensions, two key strategies for expanding utility access to hard-to-reach populations. Lithium-ion battery technology currently constitutes more than 90% of the global grid battery storage market. Their large energy storage capacities, high efficiencies, and quick charge/discharge potential provide advantages over other energy storage technologies. The intermittency of the grid in certain areas of Latin America and the availability of renewable energy coupled with these beneficial characteristics make lithium-ion battery technology an attractive energy storage option for Latin America.

Mitigating Safety and Performance Risks

By mitigating risks to the safety, performance, and reliability of battery energy storage systems, Latin American utilities can help protect their economic investment and ensure the safety of utility operators and local communities. A critical first step is selecting a battery storage system that meets the utility's performance requirements. Utilities should consider a battery's energy rate, power rate, and safe operating range when making a purchasing decision. The utility's control system must be able to support these parameters to avoid premature battery failure.

Once a battery system has been selected and implemented, utilities should routinely monitor it for safety and performance risks. As battery failures

can occur within the battery cell, the battery pack, the battery management system, or elsewhere, it is important for utilities to evaluate both the individual battery components and the system as a whole. Since the Latin American market has not yet established local safety standards in this area, utilities seeking to implement battery storage systems should consider following best practices from the National Fire Protection Association (NFPA 855), the Institute of Electrical and Electronics Engineers (IEEE 1679, 2030), and Underwriter Laboratories (UL 9540). Standards from these organizations have helped North American utilities mitigate safety and performance risks for more than a decade.

Benefits of Third-Party Partnership

Latin American utilities may benefit from partnering with North American battery experts as they evaluate the acquisition of different energy storage options. We can help optimize the safety and performance of their battery energy storage technology. Our team at Exponent has expertise in energy storage, fire and explosion mitigation, and renewable energy infrastructure. In addition to participating in NFPA, IEEE, and UL committees for standard development, we have investigated some of the most significant energy storage incidents that have occurred over the past ten years. We also have extensive real-world experience with performance testing lithium-ion batteries at the material, cell, and pack levels. Our current clients include battery cell manufacturers, designers and integrators of energy storage systems, and some of the largest utilities in North America

How Exponent Can Help

Exponent's multi-disciplinary team of engineers and scientists has deep scientific and practical understanding of lithium-ion batteries, utility infrastructure, and related safety and performance standards. We can help Latin American utilities select, test, and implement battery energy storage technology to increase the reach of existing energy systems and ensure the safety and reliability of renewable energy infrastructure.

Sergio Mendoza, Ph.D.
Materials & Corrosion Engineering
Senior Associate
Natick
(508) 652-8523
smendoza@exponent.com

Alfonso F. Ibarreta, Ph.D., P.E., CFEI
Thermal Sciences
Managing Engineer
Natick
(508) 652-8551
aibarreta@exponent.com

Quinn C. Horn, Ph.D., P.E.
Materials & Corrosion Engineering
Principal Engineer
Natick
(508) 652-8571
qhorn@exponent.com

May Yen, Ph.D.
Thermal Sciences
Associate
Natick
(508) 652-8591
myen@exponent.com

Timothy J. Myers, Ph.D., P.E., CFEI
Thermal Sciences
Principal Engineer & Office Director
Natick
(508) 652-8572
tmyers@exponent.com