

Editor's Letter

Richard M. Krieg, PhD

The issue begins with a Dedication to *William R. Harris* (1941-2021), who died of COVID-19 complications on April 21, 2021. As we note, Bill was a close friend of the Journal and a pioneering thought leader in critical infrastructure resilience.

The year that Bill was born marked the bombing of Pearl Harbor and the United States' entry into World War II. In the intervening years, and partly due to the technological challenges of that war, the United States remains at forefront of many technologies driving critical infrastructure systems. Yet vulnerabilities inherent in those systems and a mounting threat environment put the nation at risk. In recent years, for example, an increased tempo of cyberattacks have occurred in the Energy Sector, Communications Sector, Defense Industrial Base Sector, Critical Manufacturing Sector, and the Government Facility Sector. The complexity of these systems is such that lower frequency high impact natural events including, but not limited to, electromagnetic threats to system electric and electronic components could produce cascading, long-term critical infrastructure damage.

In the Editorial, "Emerging Infrastructure Policy of the Biden Presidency and the 117th Congress," I review features of the major infrastructure packages currently in the foreground. While the *Journal* will be published further into the legislative cycle, the massive funding thus far proposed coupled with increasing infrastructure threats warrants early commentary on critical infrastructure resilience needs.

The *Editor's Interview with Brigadier General (Retired) Guy Walsh*, inaugural Executive Director of the University of Texas at San Antonio National Security Collaboration Center (NSCC), was an opportunity to probe the thinking of a seasoned, agile leader in countering the elusive CI cyber security threat. Following a 31-year Air Force career, the National Security Agency (NSA) director and commander of U.S. Cyber Command chose him to operationalize cyber as the newest combat organization in the Department of Defense. Within a wide-ranging interview, General Walsh describes the complexity and challenges in cyber security planning, the requirements for an effective national response, and the strategies and partnerships that NSCC has underway on national security, and global defense issues.

George Baker, in "Electromagnetic Pulse Resilience of United States Critical Infrastructure: Progress and Prognostics," notes that the Department of Defense's past and ongoing success in assessing, prioritizing, and protecting military systems from electromagnetic pulse (EMP) has improved the ability to mount civilian CI resilience programs under Presidential Executive Order 13865. A nuanced

overview of U.S. electric grid operations and the factors necessary to meet the grid's electromagnetic security challenges are presented. The role of microgrids as an electric power EMP resilience tool is discussed along with how communication and data network monitoring and control increase the grid's vulnerability to both EMP and cyber debilitation. Finally, Dr. Baker points to remaining challenges, the importance from a cost containment perspective of defining a minimum essential set of grid systems and network nodes requiring protection, and the need to establish EMP protection incentives and cost recovery mechanisms.

From the standpoint of loss of life, the 2021 Texas power outage was one of the most serious lapses in electric service provision in U.S. history. In "The 2021 Texas Electric Grid Failure: Causes, Consequences and Cures," *Thomas Popik* and *Richard Humphreys* provide an incisive analysis of the technical causes of the blackouts and the impact of electricity shortfalls caused by generation plants whose varied energy sources became unavailable—natural gas fired, coal-fired, nuclear, wind, and solar. The authors describe Texas' "Energy-Only" market and examine the sequence of events leading to and occurring during the rolling blackouts. In addition to other solutions, the article advocates for a cost-of-service model that could reduce the probability of future backouts while avoiding the financial losses and human casualties under the State's current market-based system.

In "Building a Resilient Telecommunications Sector in Puerto Rico in the Aftermath of Hurricanes Irma and Maria," the RAND Corporation's *Amado Cordova*, *Karlyn Stanley*, *Ajay Kochhar*, and *Justin Hodiak* describe the hurricanes' impacts on the island's telecommunications sector, the methodology used, and 33 courses of action (COAs) developed by their team for sector recovery. RAND operates a Homeland Security Operational Analysis Center (HSOAC) providing independent analyses of homeland security issues which, among other functions, supports federal agencies in evaluating and funding recovery actions. In specific areas, RAND provided support to the island to complete a disaster and recovery plan to Congress in August 2018 required by the Bipartisan Budget Act of 2018. The FEMA-sponsored research was noteworthy for its sophistication and the systematic way that technical and non-technical data were assembled. Strides made by Puerto Rico in network repair and restoration are assessed. However, for multiple reasons, including but not limited to marked delays in fiscal support, the island's telecommunications sector remains vulnerable to natural disasters.

A.C. Wells, *J.B. Klenzendorf*, and *W.G. Myler*, in "A Strategic Approach to Flood Frisk Management," examine the issue of extreme flooding, flood risk infrastructure (considered critical infrastructure because its individual or systemic failure can cause significant loss of life as well as economic disruption) and how flood risk management relates to Presidential Policy Directive 21 (PPD-21), Directive on Critical Infrastructure Security and Resilience, and the Department of Homeland Security (DHS) National Infrastructure Protection Plan (NIPP). The

authors point to the desirability of practicing “flood risk management” instead of “flood control.” Following an examination of local, state, and federal functions in this arena, they propose structural changes at the federal and state levels to upgrade the response to extreme flooding.