

Securing Louisiana's Electric Grid from EMP

A Brief Educational Primer by the Center for Security Policy's Secure the Grid Coalition

Louisiana is vital to the National Security of the United States. Its electric grid must be protected against all hazards, including electromagnetic spectrum threats.



An Educational Primer: Securing Louisiana's Electric Grid from Electromagnetic Spectrum Threats

Section 1:

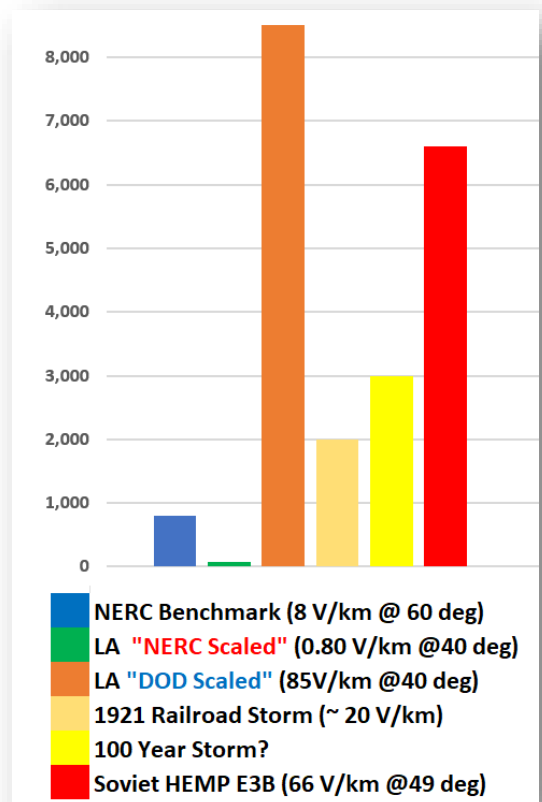
Louisiana's Role in America's National Security

1. The State of Louisiana is an exceptional and irreplaceable asset to the national security of the United States of America, its strategic geographic position, maritime transportation and logistics capacity, economic strength, strategic military and energy installations, and abundant energy resources form a critical foundation for the defense and resilience of the nation; and
2. Barksdale Air Force Base, home to the Air Force Global Strike Command, supports a bedrock of our national security – America's strategic nuclear deterrence – while Naval Air Station Joint Reserve Base New Orleans fortifies multi-service readiness in the Gulf of America region, both installations wholly dependent on the Louisiana electric grid to execute their missions; and
3. The NASA Michoud Assembly Facility in New Orleans, which is considered "America's rocket factory" and serves – according to NASA – as "the nation's premiere site for manufacturing and assembly of large-scale space structures and systems," directly advances America's supremacy in space – a domain of escalating strategic importance to our national and economic security – relies on uninterrupted electric power from Louisiana's electric grid to sustain its critical operations; and
4. Louisiana's control of the Mississippi River delta, anchored by the Port of South Louisiana—the largest tonnage port in the Western Hemisphere, moves more than 500 million tons of cargo annually, including grain, oil, and military hardware critical to the sustenance of the U.S. economy and its capacity to both trade and project power globally; and
5. Louisiana's production of 20% of the nation's crude oil and natural gas and refining of nearly 20% of America's fuel supply, contributes greatly to the energy security of the nation, and the sustainment of the U.S. military and defense industrial base, and the prosperity of the American civilian population; and
6. The U.S. Strategic Petroleum Reserve (SPR) assets in Louisiana constitute a vital national stockpile of emergency fuel, with systems such as high-volume centrifugal pumps and positive displacement pumps requiring uninterrupted reliable electricity to operate, such that a loss of the electric grid in Louisiana would severely impair America's ability to transport and refine fuel for military operations to project power globally and also to move fuel to and through major pipeline systems such as the Plantation and Colonial Pipelines – making the state's electric infrastructure a linchpin of national energy security and a prime target for disruption; and

Section 2:

Electromagnetic Spectrum Threats to Louisiana's Electric Grid

7. The electric grid of Louisiana, integral to every facet of its national security contributions, faces existential threats from electromagnetic spectrum threats such as solar weather [through coronal mass ejections (CMEs) that cause geomagnetic disturbances (GMDs)], high altitude nuclear electromagnetic pulse (HEMP), and intentional electromagnetic interference (IEMI) attacks, capable of crippling electric power systems, plunging military bases, defense industrial sites, refineries, ports, and Louisiana communities into chaos, and jeopardizing the security of the United States; and
8. The devastating potential of a major solar storm, evidenced by the 1859 Carrington Event, which disabled telegraph systems, and modern simulations projecting trillions in economic losses and prolonged blackouts—demands preemptive action to harden Louisiana's grid against such inevitable and catastrophic risks; and
9. The high voltage transformers sustaining the Louisiana electric grid are extremely hard-to-replace, some with production lead times as long as 4-6 years, are critically vulnerable to ground-induced currents (GIC) which can be generated by a geomagnetic disturbance (GMD) caused by solar weather or a high-altitude electromagnetic pulse (HEMP), and that these currents can cause catastrophic damage, threatening the operation and even future restoration of Louisiana's electric grid – and with it the state's military, energy, and industrial sectors; and
10. The federally approved protection standard (TPL-007) against harmful ground-induced currents (GICs) only requires protection at a “benchmark” level of 8 volts per kilometer and a “scaling factor” which requires protection of 0.80 volt per kilometer in Louisiana. As can be seen in the graphics at right, this level of protection is transparently defective when compared to past solar storms such as the 1921 Railroad Storm and 1859 Carrington Event (a larger storm than 1921 for which we have no GIC data) or the GICs generated by high altitude EMP such as the Soviets achieved at 66 V/km. For this reason, DoD and the Congressional EMP Commission concluded: “a realistic unclassified peak level for E3 HEMP would be 85 V/km for CONUS” – which is 100x the protection currently required in LA.



11. In 2013, renowned insurer Lloyd’s of London reported the following: “A Carrington-level, extreme geomagnetic storm is almost inevitable in the future” and “the duration of outages will depend largely on the availability of spare replacement transformers,” highlighting the acute vulnerability of Louisiana’s grid due to its reliance on these large, long-lead-time transformers; and
12. On March 28, 2017, the Committee on Homeland Security and Governmental Affairs of the U.S. Senate (and its Subcommittees for The One Hundred Fourteenth Congress in Report 115-12) stated the following: “The United States depends on its critical infrastructure, particularly the electric power grid, as all critical infrastructure sectors are to some degree dependent on electricity to operate. A successful nuclear electromagnetic pulse (EMP) attack against the United States could cause the death of approximately 90 percent of the American population. Similarly, a geomagnetic disturbance (GMD) could have equally devastating effects on the power grid,” implicating America’s electric grid as a critical point of vulnerability; and
13. In September 2020, the Foundation for Resilient Societies stated in its report “Estimating the Cost of Protecting the U.S. Electric Grid from Electromagnetic Pulse” that: “E3 and GMD protection should be prioritized because they threaten large power transformers—expensive assets with long lead times—and, GMD is a natural phenomenon that cannot be deterred. Lloyd’s of London estimates of the economic cost of a Carrington-class solar storm on the North American electric grid at between \$0.6 and \$2.6 trillion based on the value of the load lost (VLL). By this conservative assessment, the value at risk could be over 500 times the cost of E3/GMD hardening,” providing a compelling cost-benefit rationale for immediate action by the state to immediately protect Louisiana’s high voltage transformers;
14. Nations hostile to the United States—Russia, China, North Korea, Iran, as well as terrorist organizations—view the Gulf of America as a strategic launch point for a EMP attack to cripple the United States, exploiting its proximity to critical energy infrastructure, military bases, and population centers along the Gulf Coast, with military doctrines explicitly incorporating EMP strikes as a means to neutralize U.S. power projection; specifically:

A. Russia:

1. Russia has a robust history of expertise in electromagnetic pulse (EMP) technology, rooted in Soviet-era nuclear research and testing. Russia conducted numerous high-altitude nuclear tests, confirming EMP effects on civilian electric infrastructure over vast land areas, including present-day Kazakhstan (centering their HEMP test site at the exact geomagnetic latitude and longitude of Washington D.C. on the other side of the earth).
2. Russian military doctrine integrates EMP as an asymmetric tool to disrupt U.S. and NATO command-and-control systems, and Russia continues advanced nuclear weapons research and missile development, including nuclear-capable systems like the Kalibr (basis for Club-K).
3. The Russian Club-K missile system, unveiled in 2010, has been designed to be concealed within standard shipping containers and as a mobile weapons platform deployable on ships, trucks, or railcars, making it indistinguishable from ordinary

commercial cargo until activated. It includes a universal launching module, satellite-guided targeting, and autonomous power, enabling launches without external support. If paired with a nuclear weapon it could be employed in the Gulf of America or within the United States if smuggled through a U.S. port – making it an ideal surprise attack platform for an EMP strike.

B. China:

1. The People's Republic of China (PRC) has developed significant expertise in electromagnetic pulse (EMP) through high-altitude nuclear detonations, including the world's last atmospheric nuclear test on October 16, 1980.
2. The People's Liberation Army (PLA) has since refined this knowledge through simulations and missile programs, capable of delivering nuclear warheads to EMP-relevant altitudes. Chinese military doctrine, as outlined in texts like *Science of Military Strategy* (2013), emphasizes "non-contact" warfare, with EMP identified as a key asymmetric tool to paralyze adversaries' electronics-dependent systems, particularly targeting the U.S., reflecting decades of strategic planning.
3. By flying a high-altitude balloon over and across the entire continental United States in 2023, defense experts have warned that China could have been conducting a "dry run" for a known EMP attack vector – the use of a high-altitude balloon. [The U.S. itself tested high altitude nuclear detonations via balloon twice as part of "Operation Hardtack II" in 1958.]
4. There are also national security concerns that China could exploit pre-positioned cyber and physical hardware vulnerabilities in the supply chain of energy resources imported by American electric utilities (ranging from transformers to inverters to crypto mining infrastructure) to cause surges of electricity and electromagnetic energy in ways that could disable the electric grid, even without the use of a nuclear weapon or a radio frequency weapon.

C. North Korea:

1. The Democratic People's Republic of Korea (DPRK) has conducted six confirmed nuclear tests (October 2006, May 2009, February 2013, January and September 2016, and September 2017), the last of which was a successful hydrogen bomb test where the state run Korean Central News Agency (KCNA) quoted Supreme Leader Kim Jong Un as saying, "The H-bomb, the explosive power of which is adjustable from tens of kilotons to hundreds of kilotons, is a multi-functional thermonuclear nuke with great destructive power which can be detonated even at high altitudes for super-powerful EMP attack according to strategic goals."
2. North Korea possesses ballistic missiles which can reach the United States but would more likely attempt to attack the U.S. via the Gulf of America due to the much shorter flight time from an offshore freighter. North Korea may have already rehearsed moving surface to air missiles off the coast of Louisiana in 2013 when its freighter, the "Chong Chon Gang" was intercepted in Panama after transiting the entire Gulf and found to conceal nuclear-capable SA-2 missiles beneath thousands of pounds of sugar.

3. North Korea has also launched two satellites into orbit over the United States (KMS-3-2 and KMS-4, launched in 2012 and 2016) which has been interpreted by some senior national security analysts as a potential vector of attack for an EMP strike using the Soviet Union's concept of a first-strike attack technique by launching into orbit a device that appears to be a peaceful satellite in a polar trajectory from south to north over the U.S. but that would contain a nuclear device for EMP attack.

D. Iran:

1. The Islamic Republic of Iran, the largest state sponsor of terrorism, is adept at asymmetric warfare and has demonstrated a keen interest in EMP as an asymmetric method of attack against both Israel and the U.S.
 2. On July 21, 2015, during the Electric Infrastructure Security Summit in Washington, D.C., Congressman Trent Franks stated, "The Iranian military textbook Passive Defense, recently translated by the Defense Intelligence Agency's National Intelligence University, describes nuclear EMP effects in detail and advocates in more than 20 passages an EMP attack to defeat decisively an adversary."
 3. In 2015, Iran launched cruise missiles from warships in the Caspian Sea targeting Syria, demonstrating ship-based missile capabilities which could threaten the United States via the Gulf of America.
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15. The U.S. Air Force Electromagnetic Defense Task Force (EDTF), established in 2018 and comprising 135 military and civilian experts, issued authoritative warnings about the threat of electromagnetic pulse (EMP) attacks against the United States, concluding that an EMP attack—whether from a nuclear detonation or other electromagnetic spectrum (EMS) threats—poses a "clear and present danger" to the nation's critical infrastructure and military capabilities – warnings underscored by General John E. Hyten, commander of U.S. Strategic Command (USSTRATCOM), who in 2017 stated "the EMP pulse is a very dangerous threat and it's a realistic threat."
 16. Louisiana's three nuclear power plants—Waterford 3 Steam Electric Station in Killona, River Bend Nuclear Generating Station in St. Francisville, and Grand Gulf Nuclear Station in Port Gibson, Mississippi, which impacts Tensas Parish—face severe risks of radiation leaks if their safety systems, particularly their spent fuel storage pools, lose electric power due to EMP or solar weather events, as warned by the U.S. Air Force Electromagnetic Defense Task Force (EDTF) in its 2018 and 2019 reports, which note that protracted blackouts could cause spent fuel pools to "go Fukushima," releasing massive radioactivity across vast regions, a threat exacerbated by the plants' limited emergency power supplies for which the NRC only requires seven days-worth of diesel fuel; and
 17. Both Democratic and Republican Administrations have recognized the hazards associated with solar weather and HEMP and have issued authoritative directives recognizing these threats, including but not limited to the following presidential executive orders and congressional actions, which collectively mandate a national response and provide a compelling precedent for Louisiana's action:

- a. **Presidential Policy Directive 21 (February 12, 2013) – Critical Infrastructure Security and Resilience: Issued by President Barack Obama**, this directive identifies energy and defense as critical infrastructure sectors, assigning Sector-Specific Agencies to enhance resilience against all hazards, reinforcing the federal expectation that states like Louisiana protect their vital systems;
 - b. **Executive Order 13744 (October 13, 2016) – Coordinating Efforts to Prepare the Nation for Space Weather Events: Issued by President Barack Obama**, this order directs federal agencies to mitigate the effects of solar weather on critical infrastructure, emphasizing the need for resilience against geomagnetic disturbances that threaten electric grids, satellites, and communication systems, a policy directly applicable to Louisiana’s energy and military assets;
 - c. **Executive Order 13865 (March 26, 2019) – Coordinating National Resilience to Electromagnetic Pulses: Signed by President Donald J. Trump**, this landmark order establishes the first comprehensive whole-of-government policy to protect against both natural and man-made EMPs, including nuclear high-altitude EMPs (HEMP) and GMDs, mandating risk assessments, mitigation strategies, and grid hardening;
 - d. **National Defense Authorization Act for Fiscal Year 2020, Section 1740 (December 20, 2019): Codifying elements of Executive Order 13865**, this congressional action reinforces the federal mandate for EMP resilience, directing the Department of Homeland Security and other agencies to coordinate preparedness and response;
18. Despite the above executive orders and laws, the various federal agencies tasked by the federal government to begin implementing grid protection against electromagnetic threats have failed to act with the urgency and scale required, lagging far behind the escalating pace of these existential risks, thereby necessitating immediate regulatory intervention by state governments to enforce comprehensive grid protections; and
19. On January 11, 2021, “The National Security Council recommends that U.S. electrical systems and other critical infrastructure elements can be assessed for disruption and damage susceptibility up to the benchmark HEMP waveforms characterized by peak electric field strengths of 50 kV/m for E1, 100 V/m for E2, 80 V/km for E3a (blast), and 50 V/km for E3b (heave), respectively,” establishing a far higher standard of resilience that Louisiana must adopt to protect its grid against the full spectrum of EMP threats; and
20. The Department of Homeland Security’s Resilient Power Working Group, in its 2022 report “Resilient Power Best Practices for Critical Facilities and Sites,” recommends the deployment of electromagnetic shielding, surge protection devices, and redundant power systems to safeguard critical infrastructure against EMP and GMD threats, providing helpful solutions for Louisiana to fortify its electric grid and avert catastrophic outages; and

21. Numerous companies and engineering firms, including those based in Louisiana, possess the expertise and technology to provide protection solutions for solar weather, High-Altitude Electromagnetic Pulse (HEMP), and Intentional Electromagnetic Interference (IEMI), offering a diverse array of innovative tools and services; and the state should actively seek input and collaboration with as many of these experts and corporations as possible, both within Louisiana and beyond, to create a competitive environment that drives down the costs of protective measures and accelerates the deployment of hardening solutions across the Louisiana electric grid; two examples of immediately available solutions to protect transformers include:
- a. **EMPRIMUS SolidGround:** Emprimus’s SolidGround® neutral blocking device (NBD) provides a proven, cost-effective solution to protect critical high-voltage transformers, large power generators, high-voltage breakers and other grid components from harmful stray DC and ground-induced currents (GICs) caused by geomagnetic disturbances (GMD) and EMP E3 pulses. SolidGround® is automatic and blocks GIC at the point of entry before it enters the power grid, ensuring the safe operation of grid components during such events. This capacitive system, installed on the neutral to ground connection of high voltage transformers (115kV–765kV), blocks GIC, prevents half-cycle saturation, harmonic distortion, and VAR consumption which threaten grid stability and cause an estimated \$10 billion in economic loss each year in the U.S. SolidGround® has been rigorously modeled, studied, tested and validated by the industry on the live grid by Idaho National Labs (INL), Defense Threat Reduction Agency (DTRA), Electric Power Research Institute (EPRI), Department of Energy (DOE), American Transmission Company (ATC), Western Area Power Administration (WAPA), and Tennessee Valley Authority (TVA). SolidGround® offers Louisiana a field-proven technology to safeguard its critical grid infrastructure with over 10 years of continuous operation on the U.S. power grid, performing as designed, automatically blocking GIC with no negative effects to the system, and
 - b. **SIPROTEC EMP:** Texas’ CenterPoint Energy, in collaboration with Siemens and ETS-Lindgren, has developed the SIPROTEC EMP digital protective relay system, an innovative solution that can be deployed in substation control houses to protect against High-Altitude Electromagnetic Pulse (HEMP) E1 and Intentional Electromagnetic Interference (IEMI), offering a scalable, cost-effective option—estimated at five times less than traditional HEMP E1 / IEMI mitigation solutions for substations; and
22. Louisiana’s neighboring state of Texas, under Governor Greg Abbott, recently issued Executive Order GA-49 on November 19, 2024, which seeks to address electromagnetic spectrum threats by directing the Texas Department of Emergency Management (TDEM) to “assemble relevant state agencies to develop and evaluate emergency planning and response procedures related to electromagnetic spectrum threats” and “recommend policies and best practices to protect critical infrastructures from such threats,” providing a compelling regional precedent for Louisiana to adopt swift and decisive executive action to safeguard its electric grid from similar vulnerabilities; and

23. Louisiana stands to reap significant economic benefits by signaling to the nation and the world its aggressive measures to protect its electric grid, positioning itself as a beacon of resilience and a key contributor to America's energy security; and this energy-rich state could capitalize on the high demand and short supply of electric transformers by expanding production, addressing a critical national vulnerability; and further, Louisiana's manufacturing capabilities could produce specialized steels essential for both transformer production and for nuclear power applications, bolstering both domestic energy infrastructure and export markets; and these economic opportunities are directly tied to the resilience of the state's electric grid, which underpins all industrial activity; and
24. President Donald J. Trump's Executive Order signed on January 27, 2025, titled "Iron Dome for America" and later rebranded as the "Golden Dome," directs the Department of Defense to develop a next-generation missile defense shield to protect the United States from ballistic, hypersonic, and advanced cruise missile threats; that this will require early warning systems and interceptors; that some of these should be strategically focused on the southern United States, including sites in Louisiana due to its proximity to the Gulf of America—a known vector for potential attacks—and that for the Golden Dome concept to effectively operate from Louisiana, the state's electric infrastructure must be resilient to ensure uninterrupted power for missile defense operations critical to national security; this justifies investment by the federal government in protecting the electric grid of Louisiana; and
25. Just as Louisiana was pivotal to victory in World War II through the production of Higgins boats that enabled Allied landings, today's wars are waged against critical infrastructure, offering Louisiana the chance to render the same patriotic service to America in this high-risk global environment by safeguarding and enhancing the nation's energy backbone; and
26. Failure to act decisively exposes Louisiana's military bases to operational paralysis, its energy sector to collapse, its ports to stagnation, and its people to peril—potentially condemning millions to death as projected by the Congressional EMP Commission and by U.S. Senate reports—thereby undermining the United States' ability to defend its interests and respond to crises at home and abroad.

Section 3:

Recommended Actions to Secure Louisiana’s Electric Grid from EM Threats

The (26) points listed above in Sections 1 & 2 demonstrate Louisiana’s indispensable role to the national security of the United States and the justification to protect its electric grid against solar weather, nuclear EMP, and IEMI hazards.

The Louisiana Public Service Commission (LPSC) has the authority to explore immediate and comprehensive technological measures, policy mandates, and cost recovery mechanisms to harden the Louisiana electric grid against electromagnetic spectrum threats, including but not limited to:

1. The immediate deployment of neutral ground blocking devices (NBDs), as endorsed by the Department of Energy (DOE) and validated by the Electric Power Research Institute (EPRI), to block harmful GICs and protect critical transformers, reducing recovery times and ensuring operational continuity;
2. Placing urgent and immediate emphasis on providing EMP protection to Louisiana’s three nuclear power plants—Waterford 3, River Bend, and Grand Gulf—and their associated spent fuel storage facilities, implementing the U.S. Air Force Electromagnetic Defense Task Force recommendations to ensure resilient electric power so that reactor and spent fuel safety systems remain operational in the case of a protracted blackout caused by GMD or EMP.
3. The evaluation, adoption, and establishment of enforceable standards, timelines, and funding mechanisms for the installation of GMD, HEMP and IEMI-shielded systems —leveraging state, federal, and private resources—to achieve EM resilience that meets the National Security Council’s HEMP benchmarks for critical infrastructures, focusing first on the state’s most critical substations and grid control centers;
4. The evaluation and integration of EMP-resilient communications systems and networks that can be made available to the state’s electric utility operators and other critical infrastructure owners and operators, such as SEMPRES’s EMP-hardened cellular and data solutions and the Black Sky Emergency Communications and Coordination System (BSX) radio platform – to enable these facilities to communicate effectively during or immediately following a major solar weather event or EMP attack, ensuring coordination, response, and recovery capabilities when traditional systems fail;
5. The creation of a Louisiana (or regional Gulf Coast) transformer reserve to ensure rapid replacement of damaged transformers and minimize downtime for the Louisiana/Gulf Coast grid;
6. The development of all-hazards secure microgrids with resilient energy sources, as emphasized by the Resilient Power Working Group, to provide resilient backup power for critical facilities during prolonged outages;

The state of Louisiana and LPSC is strongly encouraged to:

1. Proactively explore and implement innovative funding mechanisms to finance these critical grid protections, including pursuing grant funding through the federal government utilizing budgetary savings recently achieved by the Department of Government Efficiency (DOGE), as well as creative cost recovery mechanisms such as slight electricity rate increases amortized over 30 years, a modest investment the population of Louisiana would support to ensure the resilience of the Louisiana electric grid;
2. To invite experts in the field of electromagnetic pulse (EMP) to provide comprehensive threat briefings to the leaders and engineers of Louisiana's electric utility industry, recognizing that Louisiana's electric grid is interconnected with the entire Midcontinent Independent System Operator (MISO) network and that the leaders of all utilities within the MISO footprint must also receive these briefings to fully grasp the scope and urgency of the threat;
3. To coordinate with regulatory bodies in these MISO states to undertake the same urgent steps to protect their interconnected systems from solar weather and EMP threats, ensuring a unified regional defense against these catastrophic risks; and
4. To make specific recommendations to the Governor of Louisiana on actions that can be taken by executive order to protect infrastructures against and prepare the state for solar weather and EMP threats, drawing inspiration from Texas Governor Greg Abbott's Executive Order GA-49.

The State of Louisiana and LPSC are strongly encouraged to establish a task force or working group to evaluate and guide the implementation of the above recommendations.