

EMP Point Paper – John Spence

1. **What is an EMP or HEMP.** An Electromagnetic Pulse (EMP) is a short burst of high magnitude electromagnetic energy. It may originate from a natural occurrence such as a Coronal Mass Ejections (CME), solar storm causing a geomagnetic disturbance (GMD) or a hostile state from a nuclear or non-nuclear detonation that creates radiated transient high-magnitude electric and magnetic fields and induced currents in the earth and in the electrical grid.

2. **Types of EMP.** EMPs are characterized as having three events, E1, E2, and E3

- E1 pulse event is by far the most devastating, resulting from gamma radiation Compton electron scattering that is emitted from a nuclear detonation in the upper atmosphere. This event can destroy the functioning of an interconnected electric grid as well as electronics in cars, airplanes, computers and control systems. It is much larger than that of typical lightning.

- E2 events follow the initial E1 event within a fraction of a millisecond, and are similar in magnitude to lightning strikes, so electronics can be protected by some surge protectors.

- E3 event is different in nature from the previous two in that it results from a time-varying distortion of the Earth's magnetic field, and would continue until the magnetic field stabilizes already stressed electronic systems for seconds or minutes. It produces harmful transients in grid electrical transmission lines, either buried or above ground, as well as communication systems, pipelines, railway transportation tracks. By generating odd harmonics in high voltage transformer cores, saturation occurs with subsequent overheating and failure.

3. **Threats.** Russia, China, North Korea, and Iran have already incorporated EMP attacks into their military doctrines. Russia and China could launch hypersonic ballistic missiles carrying EMP-weapons over the South Pole that could be difficult to detect. North Korea or Iran would also have capability to launch a SCUD missile from a freighter in the Gulf of Mexico and sink the ship to avoid attribution. Who do you retaliate against?

4. **Carrington Event (Sept. 1, 1859).** Telegraph capabilities were destroyed. Huge solar storm that would have destroyed much of our electric grid if it were to happen today. Geomagnetic storm occurrences are long overdue but likely to happen again. Major storm disturbances occur with a frequency of one every 150 years.

5. **EMP Impact.** A HEMP over the central US at the correct altitude would likely destroy the U.S. Electrical Grid. This would take many months or years to repair and result in societal collapse potentially leading to the deaths of 90% of the population; no water, no food, no transportation, no internet. Russia, China, North Korea, and Iran have already incorporated EMP attacks into their military doctrines. Also, both Russia and China have spent vast resources protecting their critical infrastructures from nuclear effects.

Testimony

Colorado House Bill 22-1249 Concerning the Creation of a Roadmap for Improving Electric Grids in the State

Protecting the electric grid in Colorado is critical to do as soon as possible in this time of impending nuclear war and an overdue solar superstorm. HB 22-1249 is a good start for microgrids but it is not enough, not timely and needs to be strengthened. For example, it needs to require immediate implementation of the **Colorado Critical Infrastructure Resiliency Initiative (CCIRI)** to protect the electric grid in Colorado from all threats including EMP! This initiative is more than a roadmap but a project that is ready to begin now and when completed would protect over 90% of Coloradoans from a long-term electrical outage or blackout. Suggest changing the term roadmap in the title to “strategy.”

Colorado may suddenly find themselves on the frontlines of a Cyber-EMP World War III.

Governors and State legislators of all 50 States of the United States must become proactive in protecting the electric grids within their States from electromagnetic pulse (EMP) and Cyber Warfare—since the federal government has failed “to provide for the common defense” against these existential threats.

The White House and Congress have tried to protect the nation’s electric grids and other life-sustaining critical infrastructures through executive orders and legislation. But federal departments, agencies, and regulatory bodies have all failed to make our nation safe from EMP and Cyber Warfare.

Russia, China, North Korea, other hostile nations or terrorists, may target an individual U.S. State for EMP or cyber-blackout as a demonstration of their power and to coerce Washington into surrender. For example, in April 2021, during the previous big crisis between Russia versus the U.S. and NATO over Ukraine, Moscow’s state-run TV broadcast to the world that: “War is inevitable...it will be a Cyber War.” Florida and its electric grid were specifically threatened with a state-wide blackout, to deter the U.S. from helping Ukraine. In January 2022, during the current international crisis over Ukraine, a member of the Russian Duma (equivalent to U.S. Congress) proposed warning Washington that Moscow is serious about nuclear war over Ukraine—by launching a hypersonic warhead to detonate on or over the Nevada nuclear test area that could blackout Nevada, Colorado or the entire Western Grid.

Electromagnetic Pulse (EMP) Protection for the State of Colorado

An electromagnetic pulse (EMP) from a solar superstorm or nuclear or non-nuclear weapon poses an existential threat to the people of the United States and the citizens of Colorado:

–A rare but inevitable solar superstorm, like the 1859 Carrington Event, can blackout electric grids and life-sustaining critical infrastructures worldwide, putting at risk the lives of billions. NASA estimates the likelihood of recurrence of another Carrington Event is 12% per decade.

–Russia, China, and North Korea all have capability to make a nuclear EMP attack against the United States, and all have plans to do so as part of their military doctrine for Cyber Warfare. Iran, the world’s leading sponsor of international terrorism, is nearing the capability to make nuclear weapons, according to some analysts already has nuclear weapons and the capability to make a nuclear EMP attack, which is also part of Iran’s military doctrine for Cyber Warfare.

–Non-nuclear EMP weapons, also called Radio-Frequency Weapons, are readily available, can be made or purchased by terrorists, criminals, or unstable individuals, and used to blackout electric grids.

–The Congressional EMP Commission found that protecting against the worst threat—nuclear EMP attack—will mitigate all lesser threats, including solar storms, non-nuclear EMP weapons, cyber-attacks, physical sabotage, and severe weather including hurricanes. The EMP Commission recommended following an “all hazards” strategy, protecting electric grids from EMP and other threats whenever possible.

The Colorado Critical Infrastructure Resiliency Initiative (CCIRI), which was provided to Governor Polis and his energy advisors, would protect the electric grid and other critical infrastructure from all threats, including devastating nuclear and space weather Electromagnetic Pulse (EMP) events, that could damage or destroy the electrical power grid for months, if not years. Here are the top four features of the project.

1. The CCIRI directs the power and utilities to work with the Department of Defense (DoD) engineering community, that has experience hardening power grids and allows flexibility for power and utility companies to recoup their expenses for grid resiliency protection.
2. Collectively the CCIRI team of power and utility network designers and Electromagnetic engineering hardening experts will develop a minimal architecture to achieve 90% Rolling Brown Out (RBO) operational capability.
3. CCIRI leverages hundreds of millions of dollars of lessons learned and proven technologies transferred from the DoD into the civilian sector.
4. CCIRI develops the design solutions needed to secure the state’s power generation, transmission, and distribution grid, natural gas network, water (clean water supply and wastewater treatment) facilities, and the state’s 5g telecommunications network. Meaning real solutions, hardware maybe even kits... no studies or discussion groups that to date have been a waste of time.

Please do everything in your power to make this electrical infrastructure project a reality.

Microgrid and home solar systems are an important and quicker solution for many rural and urban communities, and as backup to critical infrastructures for Electromagnetic Pulse protection, but only if done right. Some microgrids have been deployed in Colorado and millions of homeowners in Colorado have solar but it is not protected from EMP. The technology exists to protect these microgrids and home solar systems from an EMP. The military has been protecting critical assets and structures from EMP for many years. Also, one commercial solar company hardens their systems to or exceeding military EMP protection standards. On the other hand, microgrids and home solar systems deployed in Colorado are generally not protected from EMP and homeowners don't know how to get them protected or even if they can afford to do so. Can the Governor and state legislators encourage or require solar companies to protect their existing and new solar systems from EMP? EMP threat is a clear and imminent danger and protecting existing microgrid and home solar systems could be a "quick fix" to protect a lot of Coloradians!

In summary, I recommend amending Colorado House Bill 22-1249 to begin implementing the **Colorado Critical Infrastructure Resiliency Initiative (CCIRI)** project now and also start some EMP hardened microgrid energy demonstration projects using money available for this purpose from the National Infrastructure Investment and Jobs Act. This would support the "roadmap idea" and results from these projects would be very useful in determining what microgrids works best in Colorado! Hardening of home solar systems would also be another way to protect the lives of many people in Colorado.

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6. **History.** There have been many warnings. However, not sufficient hardening of the grid has been accomplished to protect the American people. **Operation Starfish in 1962** evaluated impacts of a high altitude nuclear explosion. A **Congressional EMP Commission** was created in 2001 and predicted the threat in 2004 and 2008 reports. Far more needs to be accomplished to harden the U.S. electrical grid and to protect its citizenry. **GAO Reported in March 2016** that the U.S. government was unprepared to protect us. Specifically, “DHS and DOE, in conjunction with industry, have not established a coordinated approach to identifying and implementing key risk-management activities to address EMP Risk”

7. **Cost.** The cost to protect the American Homeland is affordable (approximately \$10-\$20 billion over 3-5 years). An estimate in 2008 was \$2 billion to harden the grid’s critical nodes.

8. **Solution.** The Federal and State governments, local communities, and utilities need to act quickly to save the day! A Manhattan type project is needed for EMP protection. Read *One Second After* by William Forstchen

9. **States like Colorado** can do a lot to protect the electric grid within their boundaries and encourage EMP protected microgrids to safeguard critical resources such as local communities, water, and wastewater. For example, recent Colorado Legislation (SB 21-072) concerning the expansion of electric transmission facilities requires mitigation of any threats in the Colorado Energy Assurance Emergency Plan (CEAEP). These threats include EMP and GMD!

10. **Colorado EMP Task Force Activities:** Public awareness, Legislative activities, Evaluations of Water and WasteWater Projects, Pilot Microgrid Project, Technical Evaluations of Grid Vulnerabilities, and Higher Education Program Underway.

Rangely Education Program and Microgrid Project

The purpose of the EMP Educational Program in Rangely, Colorado is to serve as a program to develop professionals at Colorado Northwestern Community College who can adequately address the need to develop, build, and provide ongoing repair for electrical systems, transformers, and infrastructure to ensure survival of those components against all-threats including, but not limited to: (1) Geothermal storms, (2) Climate emergencies, (3) Terrorism or purposeful destruction, and (4) Delivery of Electro-Magnetic Pulse Weapons.

The Rangely Micro-grid Project would be off grid, powered by a Cogency solar system design with waste heat stored geothermally for up to a year, and shielded by technologies developed by a military contractor with expertise in EMP protection.

EMP Preparedness Initiative Go Fund Me Site 503 (3) (c) Charity <https://gofund.me/9efa0cf4>