THINK AHEAD
Preparing for the Threat to Our Wired World
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An Electromagnetic Pulse Event Could Change Your Life in an Instant

An electromagnetic pulse (EMP) is a high-intensity burst of electromagnetic energy caused by the rapid acceleration of charged particles. An EMP event could disable the country’s electrical grid—shutting down nearly all communication, transportation, and service systems.

Nuclear weapons, radio-frequency weapons, or geomagnetic storms (often called solar storms) can all cause EMPs or EMP-like effects. For terrorists or rogue states not as dependent on electricity as the United States is, an EMP attack is a way to cause devastating damage. And, as the solar system enters a period of increased solar activity, it is really a question of when, not if, the next geomagnetic storm will occur.¹

Whether natural or man-made, an EMP event would have an effect on the magnetic field in the Earth’s atmosphere that could change the fabric of our society as we know it. We need urgent action in the face of this threat.

HOW DOES AN EMP WORK?

An EMP has three main components:

- An electromagnetic shock disrupts electronics, such as communication systems
- An effect similar to lightning rapidly follows, compounding the initial shock
- This lightning-like pulse flows through electric transmission lines, overloading and damaging power lines, fuses, and transmission distribution centers

In an EMP event, the damage to critical infrastructures and electronic systems is compounded because the EMP’s components occur within split seconds of each other.²
Why Is an EMP Attack a Problem?

In many respects, an EMP attack is a unique and unprecedented threat to the United States. Our society depends on electricity more today than it has at any point in history. An EMP would irreparably damage many critical systems:

- Food and water supplies would be disrupted
- Communications, transportation, and emergency services would be severely hindered
- Banking, finance, and energy sectors would be crippled
- Computers and electronics would not work

Disruption in these sectors would seriously complicate and delay restoration efforts. It could take days, weeks, months, or even years to restore the impacted systems to their original performance, depending on the scale of the event. The federal government and most states have not addressed the vulnerabilities of our critical systems to EMP events.

EMP-LIKE EVENTS HAVE HAPPENED BEFORE IN AMERICA

On July 13, 1977, two lightning strikes caused overloading in the electric power substations of the Con Edison power company in New York City. These lightning strikes, together the equivalent of only a tiny fraction of an EMP, caused a power failure throughout the New York area. This blackout lasted only one day, yet resulted in widespread looting and the breakdown of law throughout many New York neighborhoods.

The blackout cost approximately $346 million, and nearly 3,000 people were arrested during the 26-hour period. The New York Police Department was completely overwhelmed as it tried to preserve order. The social order degenerated so quickly that Time magazine called it a “Night of Terror.” Imagine what could happen in the aftermath of an EMP event, when cities could lose power for weeks and even months.3
On August 14, 2003, more than 200 power plants were shut down as a result of an electricity cutoff caused by cascading failure—after a software bug in computer systems in one of the Ohio’s power plants caused an initial blackout. The Northeast blackout affected Ohio, New York, Maryland, Pennsylvania, Michigan, and parts of Canada. Affected communities were advised to boil drinking water due to contamination from the failure of sewage systems and other health threats caused by the loss of water pressure. Many backup generators proved unable to manage the crisis.

Day one of the blackout brought massive traffic jams and gridlock when people tried to get home without traffic lights. Additional transportation problems arose when railways, airlines, gas stations, and oil refineries halted operations. Telephone lines were overwhelmed due to the high volume of calls, while many radio and television stations went off-air.

Overall, the blackout’s economic cost was between $7 billion and $10 billion due to food spoilage, lost production, overtime wages, and other related costs.4

### EMPs IN POPULAR CULTURE

Creative producers in Hollywood imagine a future that reveals some of the real risks EMP presents:

- **American Blackout** (Documentary, 2013) National Geographic’s look at cyber-terrorism and power-grid failure shows only one of the many consequences a successful EMP attack would have.

- **Red Dawn** (Film Drama, 1984) This Cold War-era classic considers what resources do you need if society breaks down.

- **Revolution** (TV Drama, 2012-2014) When an EMP event disables all electricity on Earth, chaos ensues.
Circuits blow and all electricity is down

Phone and internet services are down for weeks—or longer
SAFETY THREATENED IN THE HOME

Street lighting is dark

When burglar alarms are triggered, will anyone come to check them out?

Water and sewer service, which are run by computer systems, are unavailable
Food quickly rots without refrigeration

With only limited backup stock of nonperishable items, grocery stores are unable to meet the demand for food.
ATM machines lose power, making cash withdrawals impossible.

Even if the EMP’s effect is localized to one city (such as New York), stores close because of damage to financial and telecommunications services—possibly for weeks.
Even with backup generators, the electrical supply is disrupted.

Refrigerators storing medicine lose power.

Surges following an EMP may cause electrical fires.
LIVES THREATENED AT LOCAL HOSPITALS

Medical services collapse
Tragically, with electrical systems damaged and control towers unable to provide direction, many airplanes may literally fall from the sky.

Unable to communicate with control centers, even trains come to a halt.

Most of America’s 130 million cars and 90 million trucks are immediately disabled.
Losing GPS, media, weather-tracking, and other systems affects not only citizens—it throws emergency dispatch and even the military response into disarray.
Key Stats

1. The average U.S. city has only 3 days worth of food and health care provisions. Most Americans do not have enough batteries to keep flashlights working for any period of time, much less generator capabilities.⁵

2. The National Academy of Sciences estimates the cost of damage from the most extreme solar weather at $1 to $2 trillion, with a recovery time of 4 to 10 years.⁶

3. The last major geomagnetic storm occurred in 1921. Major storms are rare and occur approximately once every hundred years. If such a storm occurred today, it could interrupt power to as many as 130 million Americans.⁷

"Space weather can affect human safety and economies anywhere on our vast wired planet, and blasts of electrically-charged gas traveling from the Sun at up to 5 million miles an hour can strike with little warning."

—Joint statement by John P. Holdren, science and technology adviser to President Barack Obama, and John Beddington, chief scientific adviser to Prime Minister David Cameron⁸
Our Adversaries Are Not Timid

Our enemies are developing (or already have developed) capabilities that can deliver an EMP. The threat is real. Russian nuclear weapons have been optimized to generate enhanced EMP effects. Analysts have also identified Chinese military writings that discuss using EMP weapons in international conflicts. Both of these states have ballistic missiles of all ranges that would allow them to deliver an EMP attack.

An EMP weapon would be advantageous for rogue states like Iran and North Korea as well as stateless terrorist groups because they are less dependent on modern technologies and electronics. Russian scientists were reportedly helping North Korea develop an enhanced EMP weapon, and North Korea has been advancing ballistic missile technologies that could deliver an EMP attack.

The materials used to build non-nuclear EMP weapons can be easily acquired or manufactured by moderately developed terrorist groups with limited financial resources. Although the potential impact is more limited than from a nuclear weapons induced EMP, a non-nuclear EMP device could still inflict major damage.

Such weapons are radio-frequency devices—easier to maneuver, conceal, and deliver. A non-nuclear EMP device must be detonated close to the target and affects only localized areas. While it is difficult to estimate the damage of an improvised attack, during a 1993 non-nuclear EMP device test, the U.S. military shut down engine controls 300 meters away at a contractor site.⁹
Protecting America Against the EMP Threat

Local communities, states, and the federal government can take important steps to mitigate the effects of an EMP event.

WHAT YOU CAN DO

- **Prepare at the family level.** Ensure that your family knows and can recognize the signs of an EMP event. Store emergency supplies including food, water, a first-aid kit and manual, and medications.

- **Educate yourself and raise awareness of the EMP threat in your community.** Find out how an EMP event would affect your local infrastructure by meeting with members of local industries and utilities. Raise questions about the hazards of both natural and man-made EMP events.

- **Find out whether your state has an EMP emergency response plan.** Many states and even counties have established commissions that analyze the dangers of EMPs and develop plans to protect citizens, respond to the aftermath, and recover after the event.
WHAT THE FEDERAL GOVERNMENT SHOULD DO

■ **Add an EMP attack scenario to the official manual.** The Department of Homeland Security’s 15 National Planning Scenarios provide risk analysis for possible high-consequence threat scenarios, such as terrorist attacks or natural disasters—but an EMP attack is not included today.¹⁰

■ **Take all possible measures to protect and defend the nation against an EMP strike.** On one side, it means taking measures against rogue states to prevent them from developing nuclear weapons and the ballistic missiles to deliver them. It also means advancing U.S. missile defense programs that can intercept missiles, as well as reviving the development of space-based interceptors. The U.S. should especially improve missile defense protection of the East Coast.

■ **Provide resilience.** The U.S.–Canadian electrical grid powers telecommunications nationwide. We must work to protect the grid, identify means for the timely replacement of essential damaged parts and develop redundancy to better prepare for an EMP event.

■ **Produce a national intelligence estimate** on which countries are pursuing EMP weapons and associated delivery systems—or are already capable of launching an EMP attack. Preparing for an attack means understanding one’s opponents and how they are incorporating EMP weapons into their strategic postures.

It is essential that state and national leaders have the most recent intelligence—and real defense plans—at hand to determine how best to respond to EMP threats as they arise.

As families also take responsibility and prepare, **America will be more safe and secure** from an EMP crisis event.
ENDNOTES


WHAT SORTS OF THREATS DO WE FACE AROUND THE WORLD?

Iran, the foremost state sponsor of terrorism, supports many groups that have killed Americans. Should Iran get a nuclear weapon, it could threaten its neighbors, curtail oil supplies to the U.S., and hold U.S. foreign policy hostage.

Afghanistan and Pakistan, “ground zero” in the fight against al-Qaeda and terrorism, could become even greater sources of terrorism if U.S. and allied forces vacate Afghanistan too soon.

Terrorist safe havens are cropping up in places like Yemen and Somalia, fomenting unrest and even reaching into Russia, China, and Europe. If terrorists sense our resolve to fight weakening, we too could see more plots to strike us here at home.

SHOULD THE UNITED STATES BE THE WORLD’S POLICEMAN?

The U.S. military cannot and should not engage in every conflict or international crisis. That would compromise our readiness to respond if we were attacked. Indeed, part of the reason we have invested so much in the United Nations is to get others to contribute their fair share to global peace and security. Yet we cannot rely on others to protect us or our interests. Slash defense programs solely to meet an arbitrary bottom line without regard to what we need to secure our territory and interests and keep our commitments to allies is foolish. It will encourage more aggression from those who conclude we won’t—or can’t—come to others’ defense. It makes us all more vulnerable to attack. The surest safeguard of peace is a U.S. military second to none and leaders who will deploy it. It’s what President Reagan meant by “peace through strength.”
DISASTER HAS STRUCK BEFORE.

PREPARE FOR WHEN IT HAPPENS AGAIN.

Power plants shut down. Food and water become scarce. Riots consume cities in blackout. This isn’t a Hollywood disaster movie: Such chaos has happened before, right here in America. And if an electro-magnetic pulse (EMP) weapon triggers the next calamity, the effects will be much worse.

Experts at The Heritage Foundation are analyzing this emerging threat. In this booklet, learn the science behind EMP, the real-world effects you could expect to see after a significant event ... and what you can do now to prepare.

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