

Can Texas Survive an EMP Attack on Its Power Grids?

By Alan Lammey

While the world appears to be evolving at an increasingly unpredictable place, particularly when it comes to national security threats, one of the greatest concerns facing our society, even in Texas, is the reliability of our electricity grid in the face of a naturally occurring or an intentional attack. As outlandish as it may sound, businesses throughout the nation and in the Lone Star State could be negatively affected should there be an unexpected strike against our power grids. Thus, we're going to dive into the real vulnerabilities of this issue, look at the business impacts of such an event, and dispel some of the fear-driven hype that tends to surround this topic.

It has been said that the fastest way to disable the U.S. economy and society itself would be to interrupt or disable the nation's electricity grid on a longer-term basis. This is undoubtedly a true statement since our modern society is so utterly dependent on internet communications and electricity in virtually every facet of life that serves our day to day living in countless ways. One threat to our regional and national power grids that has seen increasing media coverage in recent months and years is the effects of an electromagnetic pulse (EMP), which is a sudden burst of electromagnetic radiation resulting from a natural or man-made event.

An EMP Event Can Occur With No Warning

EMP events occur with little or no warning and can have catastrophic effects, including causing electricity outages to major portions of the power grid possibly lasting for weeks, months, or even longer. Naturally occurring EMPs are produced as part of the normal cyclical activity of the sun. Man-made EMPs include Intentional Electromagnetic Interference (IEMI) devices designed specifically to

disrupt or destroy electronic equipment as well as High Altitude Electromagnetic Pulse (HEMP) devices which detonate a nuclear device high above the earth's atmosphere..

EMP threats have the potential to cause wide-scale, long-term losses with economic costs that vary with the magnitude of the event. Some estimates suggest that the cost of damage from the most extreme solar event could range from \$1 to \$2 trillion with a recovery time of multiple years. However, because power utilities in Texas and other states do recognize that this sort of event could be a reality, the average yearly cost of installing equipment to mitigate an EMP event is estimated at less than 20-cents per year for the average residential customer. Some measures to mitigate this risk have already been put into place in some areas of the nation including Texas.

Naturally occurring EMP events resulting from magnetic storms that flare on the surface of the sun are inevitable. Although we do not know when the next significant solar event will occur, we do know that the geomagnetic storms they produce have occurred at varying intensities throughout history. According to long-range meteorologists who study these cycles, it does appear that we are currently entering an interval of increased solar activity and are likely to encounter an increasing number of geomagnetic events on earth that could happen at any given time.

Yes, EMP Events Have Actually Occurred in Recent History

Even in the modern times that we live in now, EMP events most definitely do happen from time to time and actually do shut down power grids. For instance, in 1989, an unexpected geomagnetic storm triggered an event on a power system in Quebec, Canada, which resulted in a complete collapse

within a matter of a few minutes, leaving six million residential and business customers without power. This same storm triggered hundreds of incidents across the United States, including destroying a major transformer at an east coast nuclear generating station. Major geomagnetic storms that hit major metropolitan areas, such as ones that occurred in 1859 and 1921, are rare and occur approximately once every 30 to 100 years. Storms of this type are global events that can last for days and can have an effect on electrical networks world-wide. Unfortunately, the earth is overdue for another major geomagnetic event to occur.

Should a storm of notable magnitude strike today, it could interrupt power to as many as 150 million people in the United States alone, requiring several weeks or months if not longer to recover. Mitigation technologies to protect the power grid against such a costly EMP event have been developed, and in some cases already do exist.

Intentional EMP Events

In addition to naturally occurring EMP's, there are also two other types of intentional electromagnetic threats to the power grid. IEMI and HEMP are man-made but can prove similarly devastating to the electrical infrastructure and produce similar harm to the power grid.

HEMP is produced by a nuclear weapon detonated above the atmosphere. No blast, shock, or radiation is felt at the Earth's surface; however, electromagnetic fields do reach the surface. The areas of modern grids that are particularly vulnerable to a HEMP

event are disruptions of substation communications and control systems, power generation facilities, power control centers, and certain distribution power equipment.

IEMI is a term that refers to a non-explosive, non-nuclear intentional generation of intense electromagnetic fields that are used to introduce signals into electronic equipment for the specific purpose of disrupting, confusing, or damaging these electronics. IEMI devices are malicious in nature and are used for terrorist or criminal purposes. Many types of IEMI are commercially available and can be as compact as a briefcase in size.

This sort of threat actually occurring sometime in the future has been taken seriously enough that the U.S. government has already put mechanisms in place to mitigate or lessen the impact of this sort of event, including surge arrestors, faraday cages, and other devices that prevent EMP from damaging electronics, as well as micro-grids that are inherently less susceptible to EMP. In fact, the U.S. Department of Defense has had many of these types of devices in place for decades to protect crucial military installations and strategic forces.

An EMP's Impact on Business Commerce

From a business perspective, there's no doubt that an EMP event could be devastating to local, regional,

and national commerce. Let's face it, it would be extremely difficult to conduct business with no electricity, no functioning pumps at gas stations, no working cash registers at stores, no pumping of water out of reservoirs, and no pumping of natural gas or oil in pipelines along with a countless list of other impacts. Communications would be limited to word-of-mouth and hand-delivered notes, and there would be no functioning banks or governments. Businesses that deal in raw materials and basic commodities would likely be the most successful operations.

EMP Protective Measures Already in Place in Texas

As frightening as this scenario may sound, in Texas, according to the Electric Reliability Council of Texas (ERCOT), a majority of the utilities in the major metropolitan areas have recognized this sort of threat and measures have already been designed to notably lessen the impact of the kind of event that poses a threat to the Texas power grid. Newer grid installations are designed to withstand harsh temperatures, high winds, major lightening-storm events, electric switching transients, and a multitude of other natural or intentional risks. Many electric utilities in the Lone Star State have tested equipment and infrastructure to the point where it has become internationally recognized

as an EMP standard for power grids around the globe.

A majority of the utility equipment operated these days is able to define the EMP event—depending upon magnitude—in a matter of milliseconds, shielding attenuation and voltage levels to vast areas of the grid while also protecting utility control centers from catastrophic damage. Numerous EMP stress tests are regularly conducted, and the devices put in place have endured repeated EMP event simulations and continue to perform their protective functions with no major issues. With that said, these tests are based on certain magnitudes of various EMP events, but there is a threshold at which point the magnitude is so great that the measures put in place begin to fail.

We as a society are always at the bargaining table of an unknown future. The bottom line is that while there may be the looming threat of an EMP at some point down the road, it's good to know that fellow Texans have already put measures in place to thwart the risks and impact of such an event. **N**

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