

Threats to The U.S. Electric Grid & *The Implications of a Long Term Blackout*



A Presentation by The Secure The Grid Coalition

Authored by Tommy Waller

“The Supreme art of war is to subdue your enemy without fighting.”

- Sun Tzu



The GRID | The Backbone of America's Survival

After a brief introduction to our organization, this presentation provides an overview on threats to the U.S. Electric Grid, covering the five topics below:

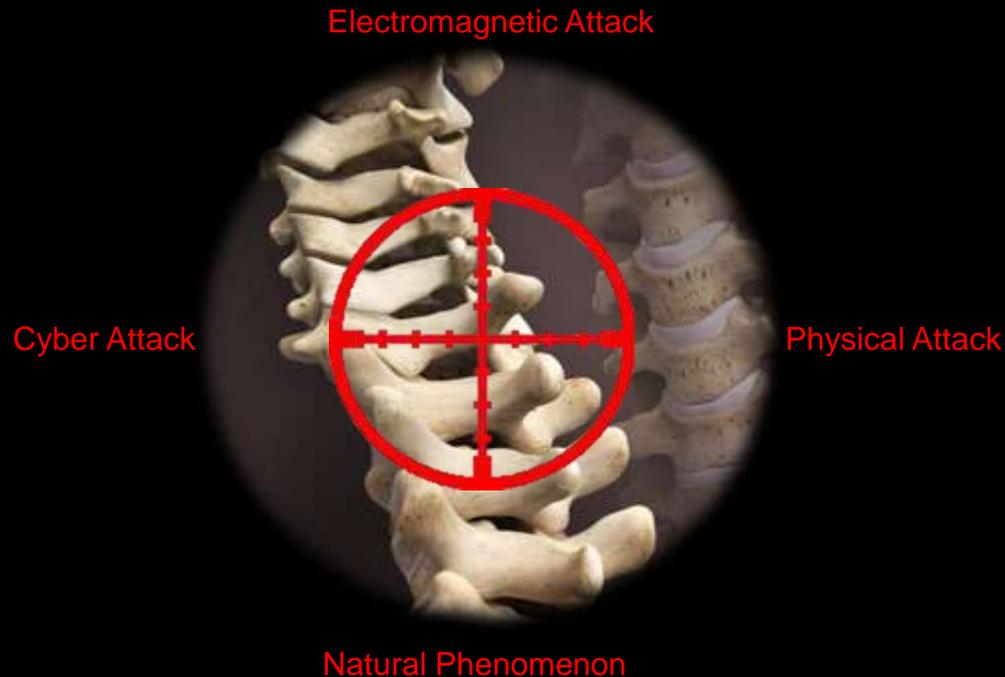
Grid
101

Grid
Vulnerability

Grid
Loss

Hardening
the Grid

What can
YOU do?



Introduction | The Center for Security Policy



- **501c3 Non Profit:** National Security Think Tank founded in 1988 by Frank Gaffney
- **Donor Funded:** Receives NO Government Funding, NO funding from grid-related vendors
- **Competent, Trusted, Effective:** Considered the “Special Forces in the War of Ideas”
- **Small and Experienced Staff:** Tommy Waller = Director, Special Projects – manages the Secure the Grid Coalition

Expert Research & Analysis



National Security Briefings



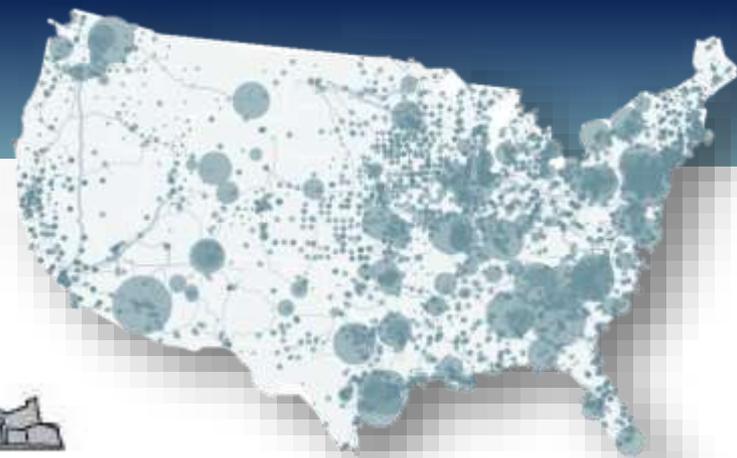
Legislative Support & Testimony



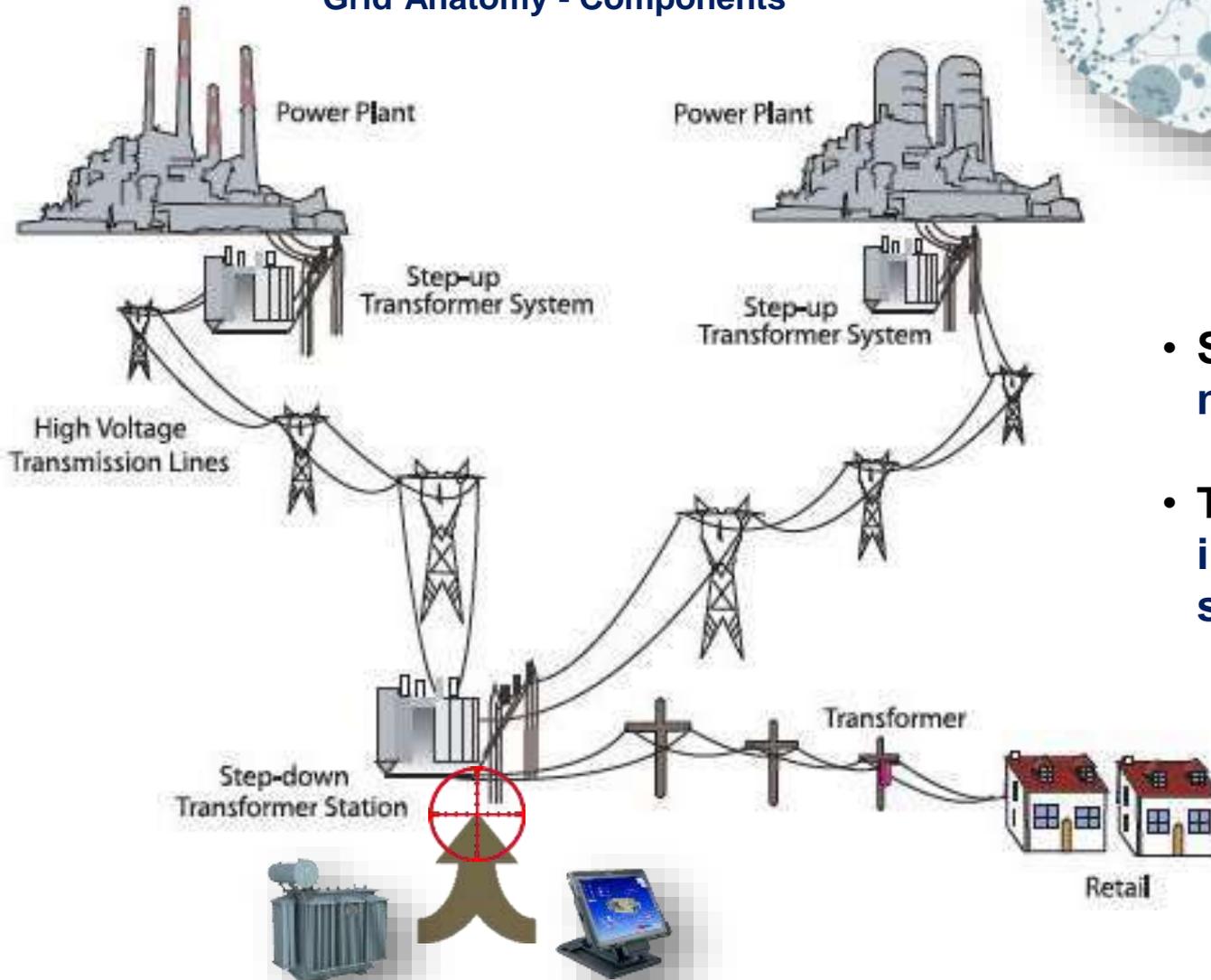
Training for Law Enforcement & Defense Professionals



Grid 101 | How the Grid Works



Grid Anatomy - Components



The Grid

- Serves more than **300 million** people.
- The most essential infrastructure to society as we know it.



Transformers

SCADA Controls



Transformers



Throughout the United States, there are some 2,000 high voltage transformers in use and they are vulnerable to attack, both from within and from outside the substations where they are located. These transformers are large, expensive and to a considerable extent, custom built.

Currently, they are almost entirely produced overseas, with an average delivery time of one to two years (under the best of circumstances).

Most transformer substations are left unguarded and woefully unprepared for the types of attacks that threaten them.

SCADA Controls



Supervisory Control and Data Acquisition (SCADA) systems have quietly become an integral part of our critical infrastructures. These automated monitoring and control systems have provided the ability for unparalleled productivity and efficiency. Our critical infrastructures can operate at a level that was previously unimaginable.

Our critical infrastructures' reliance on these automated monitoring and control systems have made them more vulnerable today than ever before. Increasingly tied to Internet applications they are susceptible to outside manipulation via cyber-attacks and based on their electronic design are also incredibly vulnerable to electromagnetic attack.

If you would like to learn more about Large Power Transformers and the U.S. Electric Grid, read this report [from the U.S. Department of Energy:](#)



Grid Vulnerability | How? To Whom?

“Therefore, the skillful leader subdues the enemy’s troops without any fighting; he captures their cities without laying siege to them; he overthrows their kingdom without lengthy operations in the field.”

Chapter 3, The Art of War, Sun Tzu

How



Physical Attack



Cyber Attack



**Electromagnetic
Attack**



**Solar Geomagnetic
Phenomenon**

Who



State Actors



**Non-State
Actors**



Mother Nature



How | Physical Attack

Worldwide, this trend is growing exponentially, with terrorist organizations targeting grid infrastructure at an increasingly alarming pace. A senior Obama administration official has said that reports of sabotage against our grid are a weekly, if not a daily, occurrence.

Some of these attacks have been perpetrated by highly skilled teams, most notably an attack in Metcalf California on 16 April 2013. Had the perpetrators of this attack in California been successful, it could have resulted in Silicon Valley being out of power for up to a year.

A successful attack like the one in Metcalf, focused on just 9 key sub stations would create cascading failures that would take out the entire U.S. Electric grid.



Are we doing enough to protect our infrastructure from physical attack??



PG&E Metcalf Transmission Substation

- Services San Jose, San Francisco, and Silicon Valley
- 16 April 2013 – Highly professional “sniper” attack
- 27 Aug 2014 – same substation breached successfully by unknown actors.



Garkane Energy's Buckskin Substation

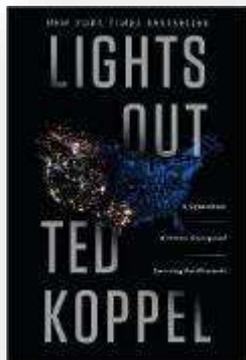
- 25 Sep 2016 – Garkane Energy Coop's Buckskin Substation attacked w/small arms - \$1mil / 6mo repair

How | Cyber Attack

Like the physical attacks on America's grid, this is not a new phenomenon. Congressional studies have found that more than a dozen utility companies report that cyber attacks are a constant and daily occurrence, with some key facilities receiving upwards of 10,000 attempted cyber attacks per month (a rate of nearly **one attack every four minutes**).

On October 27th 2013, National Geographic aired a docu-drama entitled "American Blackout." It chronicled the horror that would be experienced by the country and its people in the event of a major disruption of the grid.

In 2015 acclaimed news anchor and journalist authored "Lights Out" – revealing that a devastating cyber attack on the grid "is not only possible but likely." Such an attack took place in the Ukraine on December of that year.

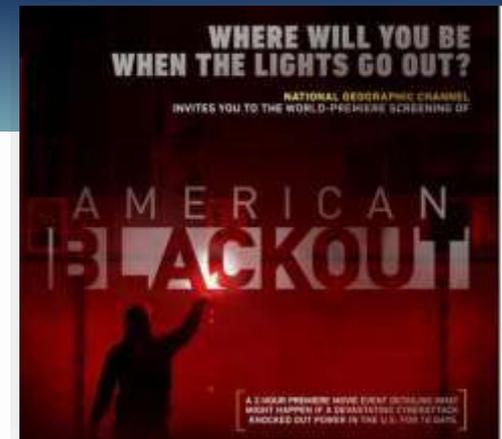


"The more I looked into it, the more I came to the conclusion that the federal and state governments have done little or nothing to prepare for anything other than the natural disasters we experience every year and that a cyberattack would potentially be far, far worse."

- Ted Koppel



Watch Ted Koppel's Chilling Warning Here



If you would like to view what National Geographic depicted in "American Blackout" you can go to their interactive website here:



Former Director of the Department of Homeland Security, Janet Napolitano, said that a cyber attack on the power grid was not a matter of "if" but a matter of "when"...



How | Electromagnetic Attack

There are three ways that an adversary might attack America's grid electromagnetically: through Direct or "RF" Energy weapons, EMP and HEMP.

Directed Energy or Radio Frequency Weapons are devices capable of subjecting transformers and other critical infrastructure to localized, but destructive, levels of EMP and they can be built from readily available equipment.



Vehicle Born RF Weapon (circa 2004)



Applied Physical Electronics LLC
Suitcase System (100-KV/M) & Footlocker
System (170 KV/M) Test Kits



How | Electromagnetic Attack

An **Electromagnetic Pulse (EMP)** emits a multi-staged 'Pulse' of electronic radiation and gamma rays capable of killing or "frying" electronic related infrastructure. A naturally occurring EMP is the result of a geomagnetic solar phenomenon. This same EMP effect can be artificially replicated by detonating a nuclear weapon over the earth at a high altitude: a HEMP attack.



A **High-altitude Electromagnetic Pulse (HEMP)** attack incorporates the detonation of a nuclear weapon at high altitude over the earth to artificially achieve an EMP event. When detonated, the three-staged 'Pulse' has the capability to target a large geographic area – causing widespread and catastrophic damage below.

We have known of the HEMP threat since the U.S. conducted the *Starfish Prime* test near Hawaii in 1962 and Russia conducted the *184 Test* over Kazakhstan – both events causing electronics of the age to fail in the areas within line of sight of the tests; both events producing belts of radiation outside the atmosphere that destroyed the six U.S. and U.S.S.R. satellites that passed through it in orbit (a non-EMP related phenomenon that, today, would kill the many satellites we use for navigation, communication, etc.).



Click [here](#) to learn more about the 3-stage pulse (E1, E2, E3) and the frightful discoveries made by the U.S. and U.S.S.R. in their tests of nuclear weapons. (This article about Nuclear EMP will take approximately 30 minutes to read but is extremely informative and is authored by one of the nation's experts, Jerry Emanuelson.)

How | Electromagnetic Attack

HEMP – High Altitude EMP – Coverage of Continental U.S. based on the height of burst.



NUCLEAR HEMP AREA COVERAGE
NUCLEAR EMP ATTACK SCENARIOS

EMP field coverage increases with increasing height-of-burst. A balloon or jet aircraft could loft a nuclear warhead to an altitude of 30 kilometers which, targeted over New York City, would also cover Washington, D.C., New York State, New Jersey, Pennsylvania, Virginia, Maryland, Delaware, and most of New England.



How | Solar / Geomagnetic Disturbances (GMD)

**Even if a human adversary does not attack the U.S. with an Electromagnetic Pulse...
...Mother Nature will.**

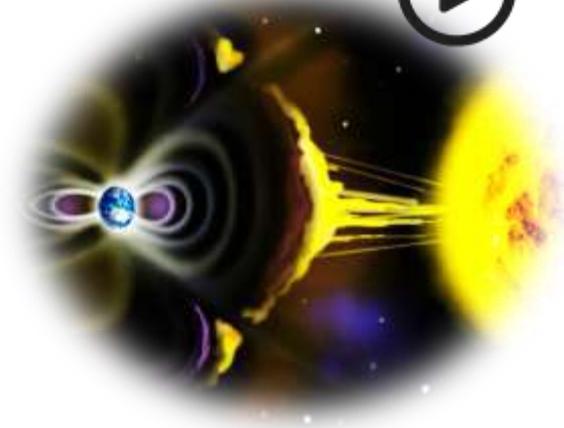
Very similar to the way that a nuclear weapon's "E-3" pulse reacts with the earth's magnetosphere, naturally occurring coronal mass ejections (solar storms) produce powerful electromagnetic energy that damages grid infrastructure. This phenomenon is also known as "Space Weather" and it is so well-recognized that the insurance giant Lloyd's of London has reported on it on numerous occasions, including their 2013 study titled "Solar Storm Risk to the North American Electric Grid."

Click  for a copy of the Lloyd's study.

Well-recognized solar storms that have affected earth in recent history:

- **The Carrington Event – 1859 (August-September):**
 - Telegraph networks were rendered inoperable across North America, Europe, Asia, and even Australia – **even requiring the replacement of the trans-Atlantic telegraph system.**
- **The Quebec Storm – 1989 (March):**
 - Complete collapse Quebec electric power grid interconnect.
 - Parts of the Northeast and Midwest electric grid suffered a near collapse.
- **Halloween Storms – 2003 (October):**
 - Power failure in Sweden led to a blackout that affected some 50,000 individuals.
- **The Near Miss– 2012 (July):**
 - Earth missed a Carrington Class Storm by one week.

**Solar Storms
and the
Carrington
Event**



Effects of Space Weather:

Catastrophic damage to EHV Transformers



PJM Public Service Transformer – severe damage to transformer windings



Who? | State Actors: Russia & China



“Sixth Generation Warfare” combines and coordinates use of **cyber** operations, **physical** attacks, **RF** weapons, and **nuclear EMP** attack (the ultimate cyber weapon) to **blackout electric grids** and other critical infrastructures to decisively defeat the adversary.

*Russian General Vladimir Slipchenko in military textbook:
“No Contact Wars”*



“...As soon as its computer networks come under attack and are destroyed, the country will slip into a state of paralysis and the lives of its people will ground to a halt. Therefore, China should focus on measures to counter computer viruses, nuclear electromagnetic pulse...”

*Peoples Liberation Army textbook by Shen Weiguang,
“The Third World War - Total Information Warfare” – Jan 2000*

- **Main Points:** Threat Doctrine, Confirmed Proliferation, Persistent Harmful Intent



Who? | State Actor: North Korea

“The days are gone forever when our enemies could blackmail us with nuclear bombs.”

North Korean Dictator Kim Jong-Un

(The latest Jong-Un from 60 years of absolute power)

- Received from Russia and China the design plans for **EMP-specific nuclear weapons**.
- **5 successful nuclear tests**, and has doubled its nuclear stockpiles in the last 18 months.
- Repeated successful tests prove that their **ballistic missiles can reach the entire U.S.**
- Learned the **Fractional Orbital Bombardment System (FOBS)** method from Russia.
- **Rehearsed FOBs** with both **KMS 3-2** (Dec 2012) and **KMS 4** (7 Feb 2016) satellites.
- **Rehearsed “Scud in a Tub” scenario** with Chong Chon Gang tramp steamer vessel hiding two full-up, **nuclear-capable SA-2 missiles on their launchers**, hidden under 10,000 tons of sugar.



The Chong Chon Gang



- **Rehearsed an EMP attack** on South Korea on **29 April 2017** with a 71km conventional detonation, which would produce an EMP field of 930 KM, covering all of North and South Korea and reaching far out to sea.

Picture Above: April 2013 - Kim Jong Un at an urgent meeting with his top generals. The map is labeled **“The Strategic Forces’ Plan to Strike the U.S. Mainland.”**

Who? | State Actor: Iran



“A world without America is not only desirable, it is achievable.”

- Iranian President Mahmoud Ahmadinejad

- Vowed to wipe the “Little Satan” (Israel) off the map and defeat the “Great Satan” (U.S.).
- **Practiced launching Scud missiles** from a freighter consistent with the nightmare “scud in a tub” scenario postulated by the Congressional EMP Commission as a method to attack the U.S. with a HEMP launched from the Gulf of Mexico.
- **Exchanged scientists with North Korea** consistently during its **25yr nuclear program**.
- According to IAEA reports, has configured the existing re-entry vehicle of the Shahab-3 missile to accommodate the types payloads consistent with nuclear applications, causing **many leading experts to believe they already possess nuclear weapons**.
- The Iranian regime, **enriched with more than \$100 billion from the JCPOA** (“Iran Deal”) continues to work on nuclear warheads and explosive charges to initiate the implosion sequence of a nuclear bomb at **clandestine sites off-limits to IAEA inspection**.

Click  for IAEA 2011 Study

 Iran Deal = repeating history

“A [recently translated] military doctrine from Iran...mentioned EMP as a weapon more than twenty times.”

Rep. Trent Franks, December 6, 2014



Non-State Actors | Can Now Take Down a Civilization



Hackers

Hackers are the practitioners of “cyber attacks” or “cyber warfare” and cost the U.S. economy up to 500,000 jobs a year, have contributed to the largest transfer of wealth in history (notably from the U.S. to China), and are continuing to outpace the U.S. government’s efforts to counter them.



Terrorists

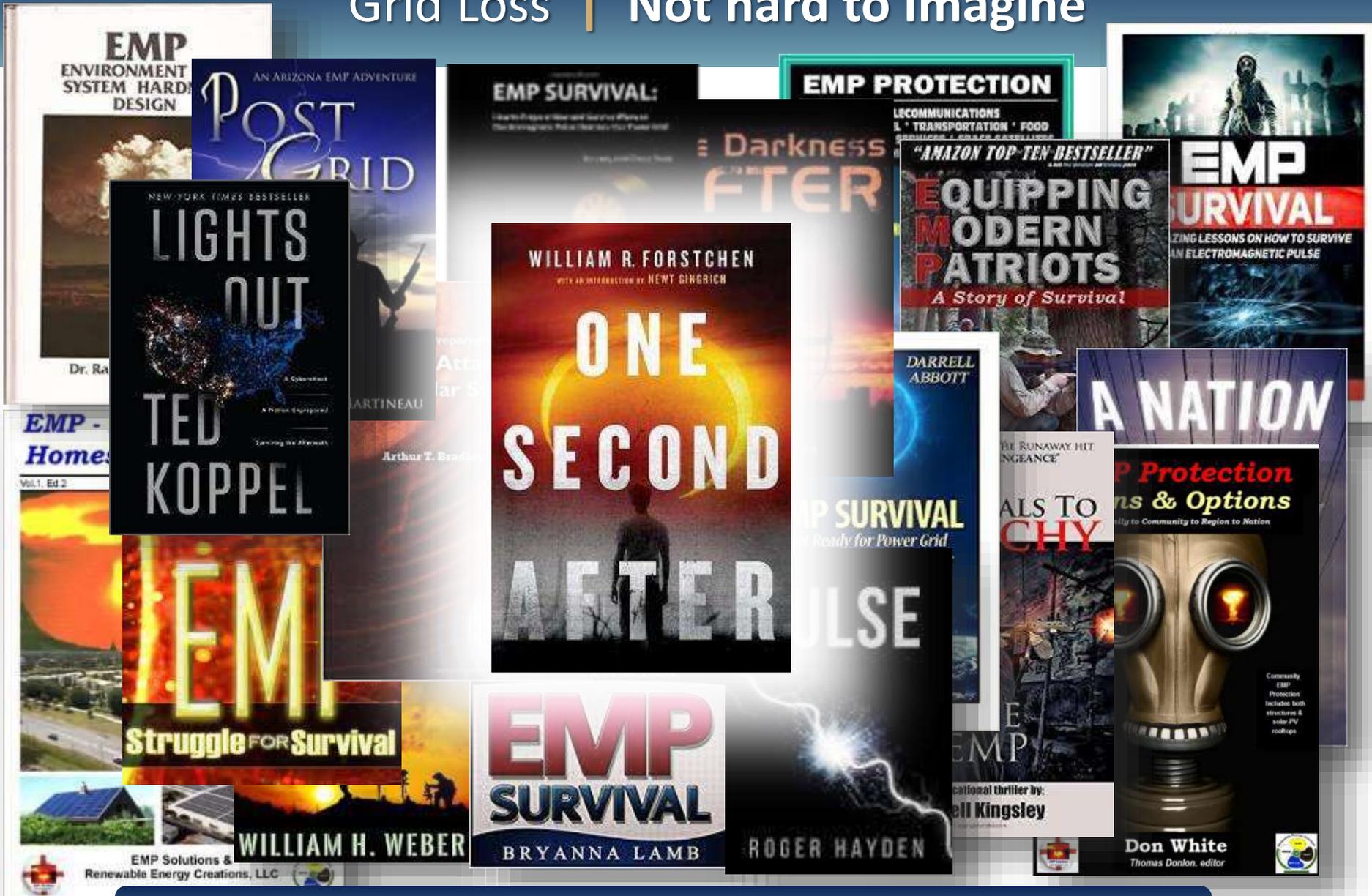
Over 1400 years, the Global Jihad Movement and its application of shariah has crushed 7 civilizations at the expense of 270 million human lives. They have dedicated and effective hackers, abundant military resources, and a steady stream of revenue from a wide range of sources.



Attacking the U.S. Electric Grid is the fastest way to crush our civilization.



Grid Loss | Not hard to Imagine



A Library of books have been written about Grid Loss and how to survive it.

Grid Loss | America enters the 'new' "Dark Ages"



Imagine this infrastructure without electric power

The 16 Critical Infrastructures according to Presidential Policy Directive:
-- Critical Infrastructure Security and Resilience – February 12, 2013

1. Chemical Plants

2. Commercial
Facilities

3. Communications

4. Manufacturing

5. Dams

6. Defense Industrial
Base

7. Emergency
Services

8. Energy Sector

9. Financial
Services

10. Food and
Agriculture

11. Government
Facilities

12. Healthcare and
Public Health

13. Information
Technology

14. Nuclear Reactors,
Materials, and Waste

15. Transportation
Systems

16. Water and
Wastewater systems

“Not even a global humanitarian effort would be enough to keep hundreds of millions of Americans from death by starvation, exposure, or lack of medicine. Nor would the catastrophe stop at U.S. borders. Most of Canada would be devastated, too, as its infrastructure is integrated with the U.S. power grid. Without the American economic engine, the world economy would quickly collapse [...] earth would most likely recede into the “new” Dark Ages.”

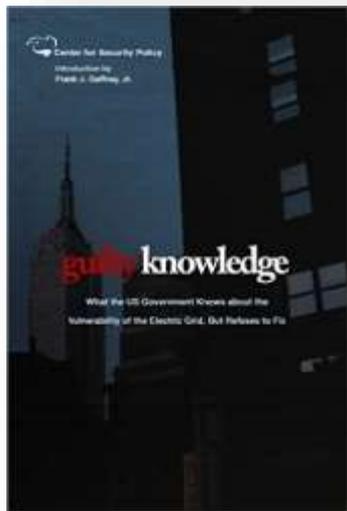
James Jay Carafano, Ph.D. (Heritage)



Grid Loss | “9 out of 10 Americans dead in the first year”

A blue-ribbon commission convened by the Congress to examine the EMP threat concluded that, if the power went out and stayed off for more than a year in large parts of the U.S.—a prospect it found was plausible—as many as **nine-out-of-ten Americans would perish.**

In the interest of ensuring that American citizens have ready access to the same information available to policymakers, Congress, and the U.S. Military, the Center for Security Policy has compiled in one short reference book – [*Guilty Knowledge: What the US Government Knows about the Vulnerability of the Electric Grid*](#) – the executive summaries of eleven authoritative studies on the vulnerability of the U.S Electric Grid.



Risks to the U.S. Electric Grid and showcasing of the book
“Guilty Knowledge.”



Click for a PDF Copy of “Guilty Knowledge”



Grid Loss | Implications for Nuclear Power Plants

A prolonged blackout could result in “Fukushima” for North American nuclear facilities.

“In the event of prolonged electrical grid failures, neither the NRC nor any other government agency has a strategy for implementing measures that would effectively prevent multiple concurrent reactor core meltdowns and spent fuel pool (“SFP”) fires, which would cause catastrophic releases of radiation.”

- Mark Leye, Atomic Safety Organization



Click  here to read the full report:
**ZIRCONIUM FIRES IN POOLS OF SPENT
NUCLEAR FUEL: HIGH-PROBABILITY
SCENARIOS AND PHENOMENA**

NRC Regulatory Guide 1.137 stipulates that Nuclear Power Plants **must only maintain 7 days of fuel** for diesel generators that power the pumps that provide cooling water circulation in spent fuel rod storage pools.

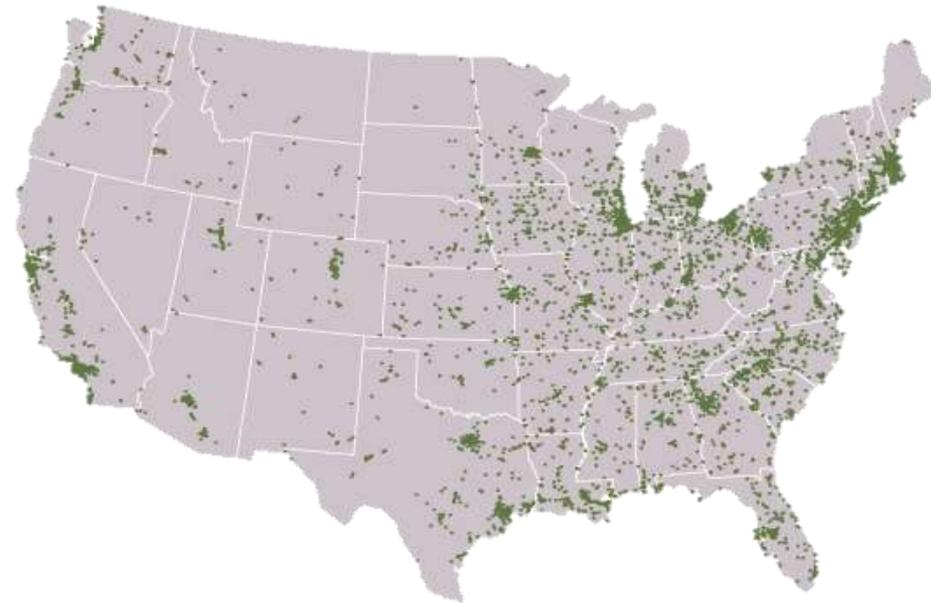


Grid Loss | Implications for Refineries and Chemical Plants

Petroleum Refineries and Chemical Plants require electricity to operate. Most of them require both electric power and steam. When electricity and steam power are lost, it forces production units to shut down which can cause releases of chemicals and fires associated with those releases.



Petroleum Refineries



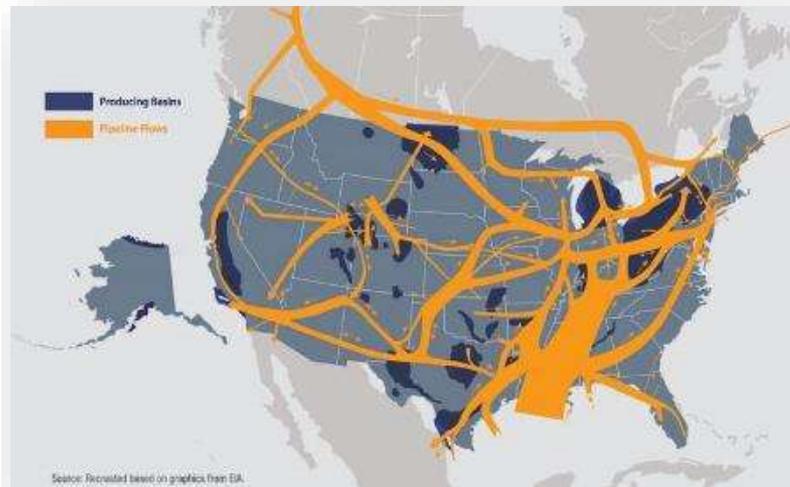
Chemical Plants

Click here  and here  for examples of what happens to a chemical company during a power outage. Click here  to learn more about these effects on other industries.

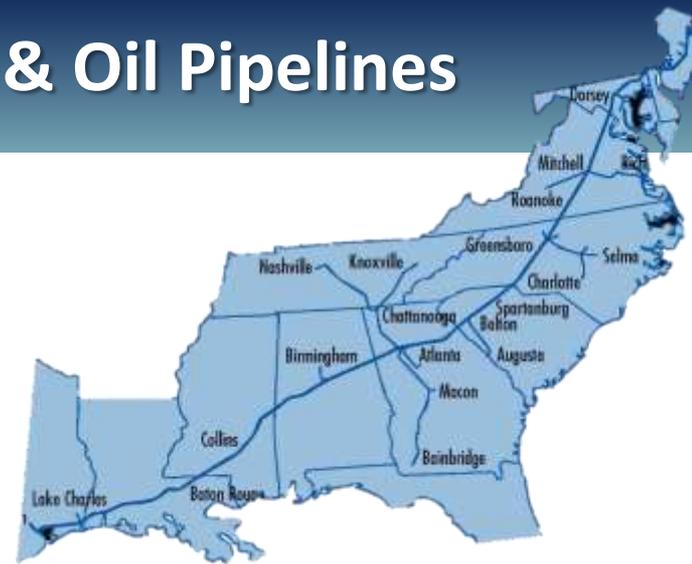
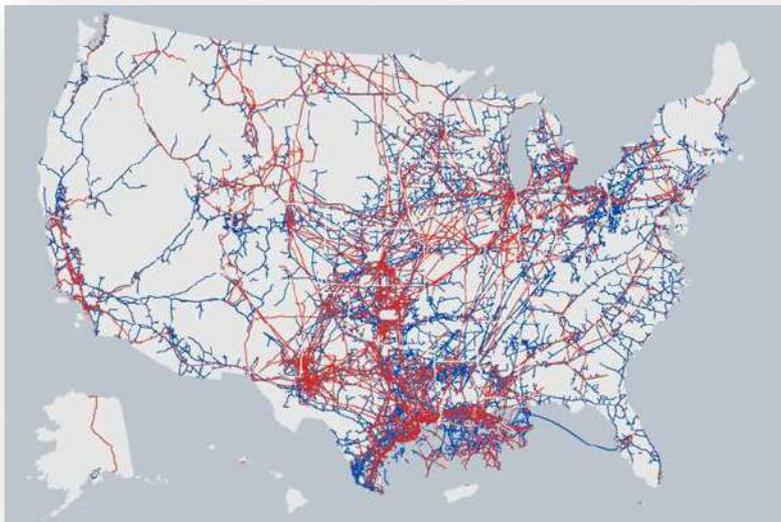


Grid Loss | Implications for Gas & Oil Pipelines

Natural Gas Flow



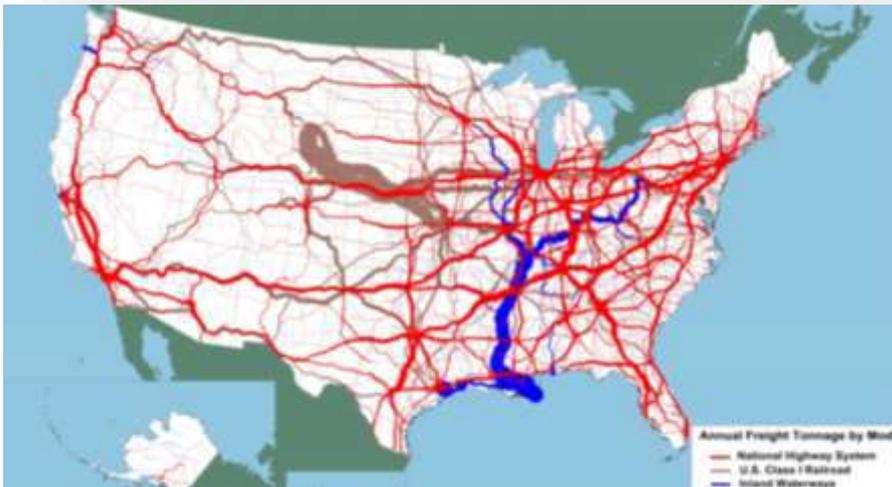
Major Oil Pipelines



North America's natural gas, oil, and gasoline pipelines provide the U.S. with not only the ability for its citizens to live and move about **WITHIN** the nation, but for its military to sustain homeland defense and power projection capabilities to defend the nation from **OUTSIDE** threats. A pro-longed outage could jeopardize all three of these critical functions.

Click here  for an example of what happens during a relatively **SHORT** disruption in just **ONE** pipeline system.

Grid Loss | Transportation – Trucking / Shipping



Inland Transportation Routes

IF TRUCKS STOPPED:



DELIVERY OF MEDICAL SUPPLIES TO THE AFFECTED AREA WILL CEASE. HOSPITALS WILL RUN OUT OF BASIC SUPPLIES. SERVICE STATIONS WILL BEGIN TO RUN OUT OF FUEL. MANUFACTURERS USING JUST-IN-TIME MANUFACTURING WILL DEVELOP COMPONENT SHORTAGES. U.S. MAIL AND OTHER PACKAGE DELIVERY WILL CEASE. WITHIN ONE DAY, FOOD SHORTAGES WILL BEGIN TO DEVELOP. AUTOMOBILE FUEL AVAILABILITY AND DELIVERY WILL DWINDLE, LEADING TO SKYROCKETING PRICES AND LONG LINES AT GAS PUMPS.



FOOD SHORTAGES WILL ESCALATE, ESPECIALLY IN THE FACE OF HORDING AND CONSUMER PANIC.

SUPPLIES OF ESSENTIALS, SUCH AS BOTTLED WATER, POWDERED MILK, AND CANNED MEAT AT MAJOR RETAILERS WILL DISAPPEAR.

ATMS WILL RUN OUT OF CASH AND BANKS WILL BE UNABLE TO PROCESS TRANSACTIONS.

SERVICE STATIONS WILL COMPLETELY RUN OUT OF FUEL.

GARBAGE WILL START PILING UP IN URBAN AND SUBURBAN AREAS.

CONTAINER SHIPS WILL SIT IDLE IN PORTS AND RAIL TRANSPORT WILL BE DISRUPTED, EVENTUALLY COMING TO A STANDSTILL.



AUTOMOBILE TRAVEL WILL CEASE DUE TO THE LACK OF FUEL. HOSPITALS WILL BEGIN TO EXHAUST OXYGEN SUPPLIES.



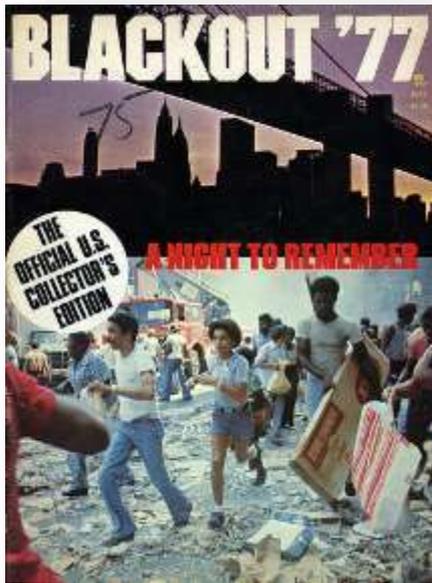
CLEAN WATER SUPPLY WILL BEGIN TO RUN DRY.



THE NATION'S CLEAN WATER SUPPLY WILL BE EXHAUSTED.



Grid Loss | Implications for Law Enforcement



NYC Blackout 1977



Northeastern Blackout 2003



Hurricane Katrina 2005

No Electricity = Societal Collapse

- Wrongful assumption that “The Feds / FEMA will arrive in 72hrs.”
- Most Americans are not prepared to live without the comforts of electricity, let alone the lack of water, food, medication, or other necessities.
- Self governance requires virtue. Virtue is lacking in modern society.
- Americans were once “self reliant” with “rugged individualism...and are now all too often part of the “entitlement mentality” and “snowflake generation.”
- There is a determined and well financed effort to dislocate Americans’ faith in law enforcement and our nation’s founding principles...and this won’t help during a blackout.



EMP Hardening | DOD has known all along...

- Following the Starfish Prime test and the Soviet K-Project tests the U.S. government took steps to protect strategic military assets from EMP.
- The primary headquarters for NORAD, which provides early warning and command and control for the defense of the U.S. against nuclear attack, has for a decade been at nearby Peterson Air Force Base.
- At an April 7, 2015 Pentagon news conference, NORAD Commander Adm. William Gortney noted that NORAD is going back underground “because of the very nature of the way that Cheyenne Mountain’s built. It’s EMP-hardened.” He explained that North Korea now has mobile intercontinental ballistic missiles, the KN-08, armed with nuclear warheads, that can strike the U.S.



Why Cheyenne Mountain?

- **However, the Military is 99% dependent on the “civilian” electric grid, which is completely unprotected to EMP and nominally protected from other threats.**
- Fortunately, there are proven / tested technologies that can help harden the civilian electric grid against all hazards.



Who can help? | IAN & DTRA - via MicroGrid Contract



Instant Access Networks LLC

- Co-Owned by Chuck Manto, leader of InfraGard EMP SIG
- Contracted by DTRA to create EMP hardened Micro-Grids
- Maintains a catalog of 50+ companies / vendors who can provide assets and services related to micro-grid construction, power generation / transmission, EMP/GMD hardening, water/wastewater services, communications services, etc.

IAN DTRA/SCC-Approved Press Release, 24 June 2016

The Defense Threat Reduction Agency (DTRA)/SCC announces the beginning of a Small Business Innovation Research (SBIR) contract with Instant Access Networks, LLC (IAN) and its subcontractors as of March 28, 2016 entitled, "Accelerating Society-wide EMP Protection of Critical Infrastructure and Micro-grids". DTRA's request for proposals (RFP) was an invitation to small businesses to participate in a commercial R&D program to create EMP protected micro grids for critical infrastructure needed both on and off military bases and other defense critical infrastructure. The need was explained by DTRA as follows: "An electromagnetic (EM) attack (nuclear electromagnetic pulse [EMP] or non-nuclear EMP [e.g., high-power microwave, HPM]) has the potential to degrade or shut down portions of the electric power grid important to the DoD.... Restoring the commercial grid from the still functioning regions may not be possible or could take weeks or months."

Fairfax Water



JAXON
ENGINEERING & MAINTENANCE

dc FUSION

POWER ANALYTICS™



Technology Assessment & Transfer, Inc.

A DIVERSIFIED ADVANCED MATERIALS RESEARCH AND DEVELOPMENT COMPANY

Who can help? | Siemens



Pretact® bullet-resistant transformers

The unit consists of bullet resistant panels that are supported by steel brackets attached directly to the transformer or reactor tank wall.

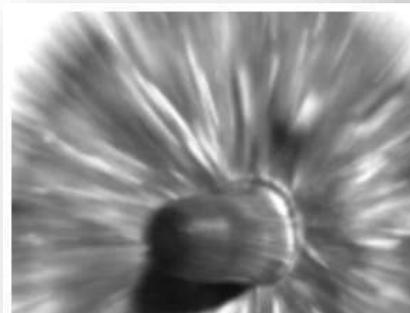
Materials testing



Above: A 10 mm S335 steel sheet – representing a standard transformer tank wall – penetrated by a VPAM Class 7, .308 Winchester lead core projectile.



Above: The reverse of an 8-inch reinforced concrete wall penetrated by a VPAM Class 13, .50 BMG M2 AP projectile.



Above: A VPAM Class 13, .50 BMG M2 AP round – representing the maximum likely ballistics threat – being reflected by the Siemens protection system.

Delivery of the first Pretact® bullet-resistant transformer

Press Release 16 October 2016: *Siemens will supply the 970 MVA three-phase generator step-up transformer with a voltage level of 345 kV. This bullet-resistant transformer has been designed to fit five different generating stations in nine locations (with the same generator bus duct) and will be delivered to the customer in January 2017.*

Who can help? | EMPrimus

emPRIMUS™



Emprimus is a research and development company partnered with ABB, a global leader in power and automation technologies, working with major utilities to design, test, patent and produce the most effective products to protect against Solar Storm/Geomagnetic Induced Currents (GIC), Electromagnetic Pulse (EMP) including Nuclear EMP (E3 Pulse), and Intentional Electromagnetic Interference (IEMI) caused by Radio Frequency Weapons. Emprimus currently holds over 16 awarded U.S. Patents and more than 50 in other nations around the world.

SolidGround™ - EMP & GIC Neutral Blocker

The patented ABB SolidGround™ grid stability system offers tested and proven protection against the effects of both Solar Storms/Geomagnetic Induced Current (**GIC**) and Electromagnetic Pulse (**EMP**) specifically Nuclear EMP - **E3**.



EMP.Alert™ - Threat Detection System

iEmprimus' EMP.Alert™ is a patented real-time alert system that informs electrical grid operators and stake holders within milliseconds of an EMP event and can trigger SolidGround™ into protection mode before **E3** arrives.



Who can help? | Jaxon Engineering



Jaxon is a distinguished leader in Electromagnetic Pulse (EMP) hardening and survivability. Jaxon is a woman owned, small business dedicated to achieving survivability goals for the United States and our Allies. Jaxon designs, builds, tests and maintains EMP hardened structures for government and commercial clients around the world.



Who can help? | E3TEK Group Inc.

E3TEK Mitigation Technology is designed with advanced patent-pending technologies immune to EMP – providing the ultimate ability to maintain control of critical infrastructure when primary and emergency backup systems are powerless and failure is not an option.

ALL-HAZARDS / EMP CERTIFIED PRODUCT LINE



Ultra-High Security SCADA & EMP Hardened Industrial Control Systems

OPEN FRAME™ Military Certified EMP Hardened Generators



EMP Proof Water & Fuel Transfer Pumps



EMP Hardened & Certified Vehicles





ETS - LINDGREN is an innovator of systems and components for the detection, measurement and management of electromagnetic, magnetic, and acoustic energy. With more than 30 years of experience in design engineering, project management and building implementation worldwide, ETS-Lindgren is the preeminent provider of integrated EMP solutions. The company has 800 employees worldwide, offers on-site design, engineering and project management expertise with more than 30 years of experience and has more than 200,000 filters manufactured to date.

Some of ETS – LINDGREN’s Solutions include:

Non-Government Customers:

- Red Edge Pulse Protection (protects data equipment but not associated utilities)
- Level 2, Red Edge (fully independent and protected utilities for continuous operations during/after EMP event.)

Government Customers:

- DEI Enclosures for Government
- Series 81 Shielded Rooms for Government
- Welded Fabrication Enclosures for Government
- Series 101 Pan Form Rooms
- Architectural Shielding Material for Government
- Tempest Information Processing System (TIPS) Security Containers
- 5240 Table Top Test Cell for Government



Who can help? | Hardened Structures, Shelters LLC`

Hardened Structures Hardened Shelters LLC is a Construction Program Management firm. The Team consists of a core group of specially trained shelter engineers for shelter planning, shelter programming, shelter dynamics, architectural, structural engineering, blast engineering, EMP/HEMP shielding, CBRN, HVAC, electrical, security and alternative energy designs. The Hardened Structures Team has successfully delivered shelter projects world-wide since 1991.

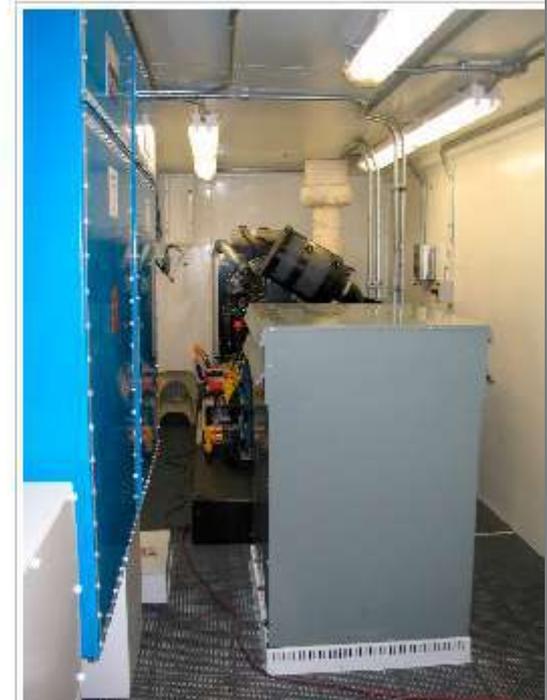
Specialties include:

- High Altitude Electromagnetic Pulse (HEMP) Shielded Enclosures
- Specialized enclosure to mitigate the effects of geomagnetic storms
- HEMP protected data centers
- Customized HEMP shielding enclosures for existing electrical generators
- Custom HEMP protected rooms designed to any size or application
- Generator Controls & SCADA systems
- Circuit Breaker and Switchgear Rebuild
- Power System Studies

EMPEENGINEERING.COM

ENGINEERED SOLUTIONS TO MITIGATE THE EFFECTS OF ELECTROMAGNETIC WEAPONS AND GEOMAGNETIC STORM ENVIRONMENTS

HEMP Protected Generator Shelters



Who can help? | Protecting Against Cyber Attacks

Mission Secure (MSi) is a seasoned team of cyber security professionals, control system engineers, combat and business experts committed to protecting critical physical assets, and the control systems that monitor and operate them.

- Provides software and hardware solutions to cyber threats.



ABOUT US SOLUTIONS MARKETS

Cyber Defense Solutions for Physical Assets & Controls

Patent pending solutions help keep operations running — even during



So what HAS been done? | Lots of Research & Little Action

Prior Research

- 1962 – 1989 – EMP discovery and classification
- 2000 – 2004 – Congressional EMP Commission conducts initial study / report.
- 2008 – EMP Commission releases 2nd report
- 2015 – EMP Commission re-established but funding withheld

Attempts to address this at the Federal Level

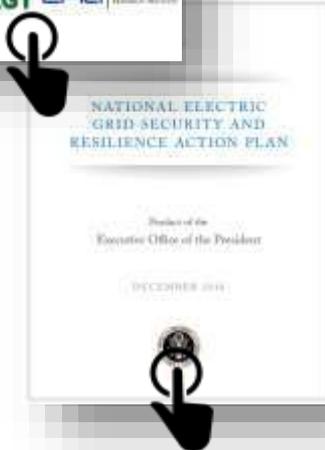
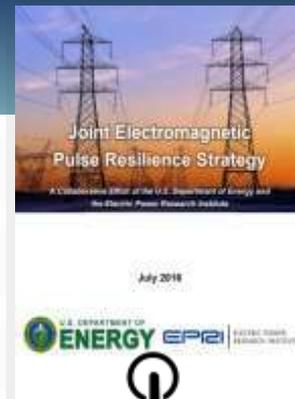
- 2009/2010 – Federal Legislation - GRID Act – failed.
- 2013 – Federal Legislation – SHIELD Act – failed.
- 2013 – Federal Legislation – Critical Infrastructure Protection Act (CIPA) – failed.
- 2014 – Federal Legislation – GRID Act resurrected – subsequently failed.
- 2015 – CIPA resurrected, attempts made to “water it down” but it passed through the House of Representatives.
- Thus far, nearly all federal legislative efforts have been either been defeated or “watered down” significantly to the point where they will not be effective at instituting real protections.
- The Obama administration published the White House National Space Weather Strategy & Space Weather Action Plan but neither of these have been actioned by the appropriate federal agencies.



2016-2017 | What's Happening Now?

2016

- Electric Power Research Institute (EPRI) – an industry funded non-profit – undergoes research project to study effects of EMP and GMD on grid and collaborates with DOE on “EMP Resilience “Strategy.” Because EPRI has an institutional imperative to protect the industry from oversight it doesn’t want, close scrutiny should be applied to EPRI’s research and testing methods related to EMP/GMD.
- Obama White House publishes “National Electric Grid Security and Resilience Action Plan” during last month in office, tasking the federal government with action items that are not likely being accomplished under the new administration.



2017

- The House Armed Services Committee, in the 2018 NDAA, dismantles the Congressional EMP Commission, removing the nation’s most knowledgeable group of experts from its position to independently analyze threats to the grid and make recommendations towards the mitigation of these threats.
- The Secure The Grid Coalition is currently undergoing an effort to “Save The EMP Commission” with the recommendation that it be made instead a “Presidential Commission on Critical Infrastructure Protection” answerable to the White House and thereby protect the EMP Commission from the obstructive political forces and self-interests that prevail in Congress and elsewhere in government. Learn more about this at: www.securethegrid.com



The Way Forward | Making it Possible in **YOUR** Region

- **Don't Wait on Washington to Fix This**
 - Since federal government and industry resolution are lagging, act regionally to harden your existing grid infrastructure and/or to establish new micro-grids hardened against all hazards.
- **Immediately Educate key leaders and stakeholders in your region**
 - Join InfraGard and expand / support state Secure The Grid Coalition Teams
 - Consider your company joining the Secure the Grid Corporate Council (see last slide).
 - Schedule threat briefings for key leaders. Draw from as many independent sources as possible.
 - Procure and provide available educational resources to as many decision makers as possible.
 - Encourage executive branch leadership at state and local level to create an associated task force or working group to address this issue.
- **Remember Policy Initiatives Require Support and Supervision**
 - Adopt policy statements and gather grassroots and grasstops support stating regional/local/State governments and industry must adopt the policy and act to assure the regional grid will suffer no outage for longer than 30 days due to any type of attack. Make these policies known to your federal legislators.
 - Take local initiatives (legislation, PUC rules, Executive Orders) to adopt this policy in law, regulation. Call for both prevention and reconstitution mandates.
 - Set up incisive, ongoing oversight by State legislative committees and local government (county Boards of Supervisors, Mayors and City Councils) who should request monthly updates on industry and government steps to implement the policy adopted.



What SHOULD be done? | Recommendations

- **Ensure CURRENT grid infrastructure is hardened against ALL HAZARDS**
 - ID Critical Assets in your region and share info b/n proper agencies, update vulnerability assessments, PROTECT them from all hazards, especially physical attack – immediately.
 - Recognize that transformers (Large e.g. 500-765kv but also smaller sized) should be pre-manufactured and pre-positioned in a secure location - e.g. on a nearby military or national guard base – since these are essential to re-constitution. The military services in the Pentagon have previously indicated interest in storing critical grid reconstitution supplies on bases and helping industry move them into place following an outage.
 - Public Service Commissioners must be involved and consider contracting independent expertise.
 - Plan for response & recovery after a pro-longed power outage.
- **NUCLEAR POWER PLANTS in Your Region**
 - Mitigate Risks and Create Opportunities
 - Harden against All Hazards – including EMP – and work “Black Start” Capabilities.
 - Create fuel storage and fuel transportation plans to support generators.
- **Harden Power to Critical Refineries (Explore COGEN Capabilities) in Your Region**
 - Explore the opportunity for hardening COGEN facilities and creating “micro grids” surrounding these facilities to send power to local communities.

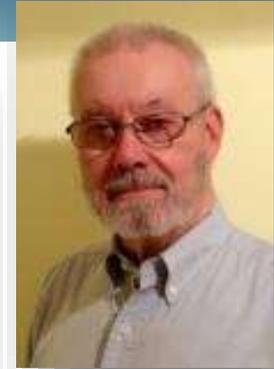


What SHOULD be done? | Recommendations

- **DOD Installations in the Gulf South Region**
 - **ID Locations for Ballistic Missile Early Warning and Missile Defense**
 - Aegis Ashore systems to cover early warning and missile defense from the southern U.S.
 - **Conduct Islanding & Create Safe Havens Where Possible**
 - An critical first step strategy - U.S. Military bases and National Guard facilities should island from the vulnerable grid with independent on site power wherever possible, producing their own electricity.
 - These “safe havens” can send power out to communities where ample, and assure the military can assist with maintaining order in civil society as well as help restoring the civilian grid.
 - A well planned grid attack is likely to couple with a secondary attack, making military operations essential to defend our country.
- **Plan for Prolonged Blackouts in coordination with EMAs and National Guard**
 - National Guard Participation in “GridEx” exercises, “The Dupont Summit,” and “EarthEx.”
 - Lean on support from Secure the Grid Coalition members.
- **Ensure FUTURE Infrastructure Investments are hardened against ALL HAZARDS**
 - ID opportunities for the creation of hardened micro-grids around key facilities that are critical for life support (such as water treatment, hospitals, communications facilities, etc.).
 - Work with electric utility providers to have independent experts verify that future infrastructure investment is in fact hardened against all hazards.



Project Managers Guide to Hardening the Grid



This Project Managers Guide, by Dave Phelps (C Eng FIMechE Eur Ing Chartered Engineer), proposes a methodology to pull together all the known technologies, components, strategies etc. in a comprehensive, holistic manner to arrive at an optimal, protected electric grid in the shortest time possible. It is based on proven methods from industry. **It has been endorsed by members of the Congressional EMP Commission.**

***Dave Phelps** officially retired and immigrated to the U.S. from England in 2008. He is a Fellow of the London-based Institution of Mechanical Engineers, a highly respected international organization of Professional Engineers. Dave spent much of his career in the process and oil industries and held leadership positions in design, manufacturing, operations, project management and new product development. As a Global Product Development Manager for a Fortune 500 company, he developed and commercialized numerous world-class multi-million dollar product lines. Dave’s current focus is on EMP’s and other threats to U.S. security where he believes his particular experience is applicable to resolving the grid-hardening conundrum. He is actively involved in a number of national independent groups of EMP experts including the EMP Task Force on National and Homeland Security within which he is SC State Coordinator.*

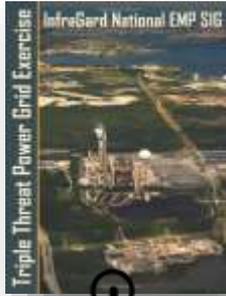
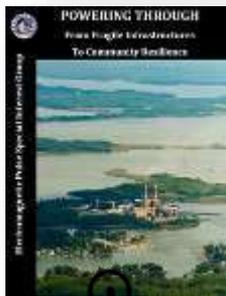


Planning for Long Term Outages | A Few Resources

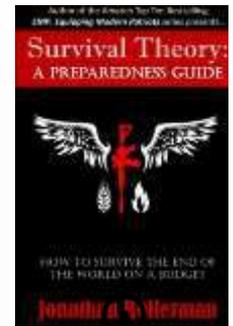
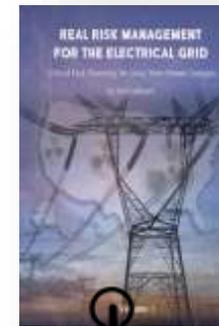
“Let our advance worrying become advance thinking and planning”

- Winston Churchill

Publications for Organizations / Govt



Books for Families



An Exercise for EVERYONE



Inspiration | State-level Example: *Louisiana Grid Coalition*

The Secure the Grid Coalition has teams of professionals working in numerous states. The Louisiana Grid Coalition is just one of these teams and it is a great example of the type of talent that can be brought to bear to address this critical issue.

Military Representation:

- 1 General Officer
- 4 Retired O-6s
- 5 Additional Field Grade Officers (3 retired, 1 active, 1 reserve)
- 1 Retired Sgt. Major

Government:

- 1 FBI Agent and 2 FBI Intelligence Analysts
- 1 Retired Deputy Superintendent Louisiana State Police
- 1 Louisiana Office of Homeland Security
- 1 Port of South Louisiana Risk/Planning Manager
- 1 NASA Manager
- 1 USMC Mission Assurance Manager



Technical:

- 1 Ph.D. Electrical Engineering
- 1 Ph.D. Engineering
- 1 Ph.D. Computer Science
- 1 Communications Engineer

Private Industry:

- 1 Head Entergy Corporate Security
- 1 Entergy Nuclear Engineer
- 2 IT/Cyber

Other: Business Consultants /Business Owners / Trade Association Reps & Legislative Reps

Several of the LA Team teach Homeland Security at Tulane University



"Even if you encounter opposition, have conviction and finish what you start. In the end, people will understand."

- Kotaku Wamura, former Mayor of Fudai, Japan



The Japanese mayor who was laughed at for building a huge sea wall - until his village was left almost untouched by tsunami

By [DAILY MAIL REPORTER](#)
UPDATED: 21:32 EDT, 13 May 2011



Quick Review | How protected are **YOUR** assets?

Threats



Physical Attack



Electromagnetic Attack



Solar Geomagnetic Phenomenon



Cyber Attack

- *What do ALL these assets depend upon to operate?*
- *How would **YOUR JOB** and **YOUR LIFE** be affected if you lost electricity for a long time?*

Your Assets



SCADAs



Generators



Transformers



Data Centers



Communications



Refrigeration Assets



Get Involved | Join **The Secure The Grid Coalition!**

If you would like to join The Secure the Grid Coalition, join an existing state-level team, or start a team in your state, contact Tommy Waller.

*If you are a business or corporation and would like to both join The Secure the Grid Coalition AND support our work, please join the **Secure the Grid Coalition Corporate Council**. This will give you the ability to schedule private briefings with national-level experts and for your business or corporation to also be involved in grid resiliency efforts in your state and region. To join the STG Corporate Council, contact Tommy Waller.*



Tommy Waller

Director, Special Projects

Center for Security Policy

2020 Pennsylvania Ave, NW

Suite 189

Washington, DC 20006

www.centerforsecuritypolicy.org

Email: Info@SecureTheGrid.Com

