



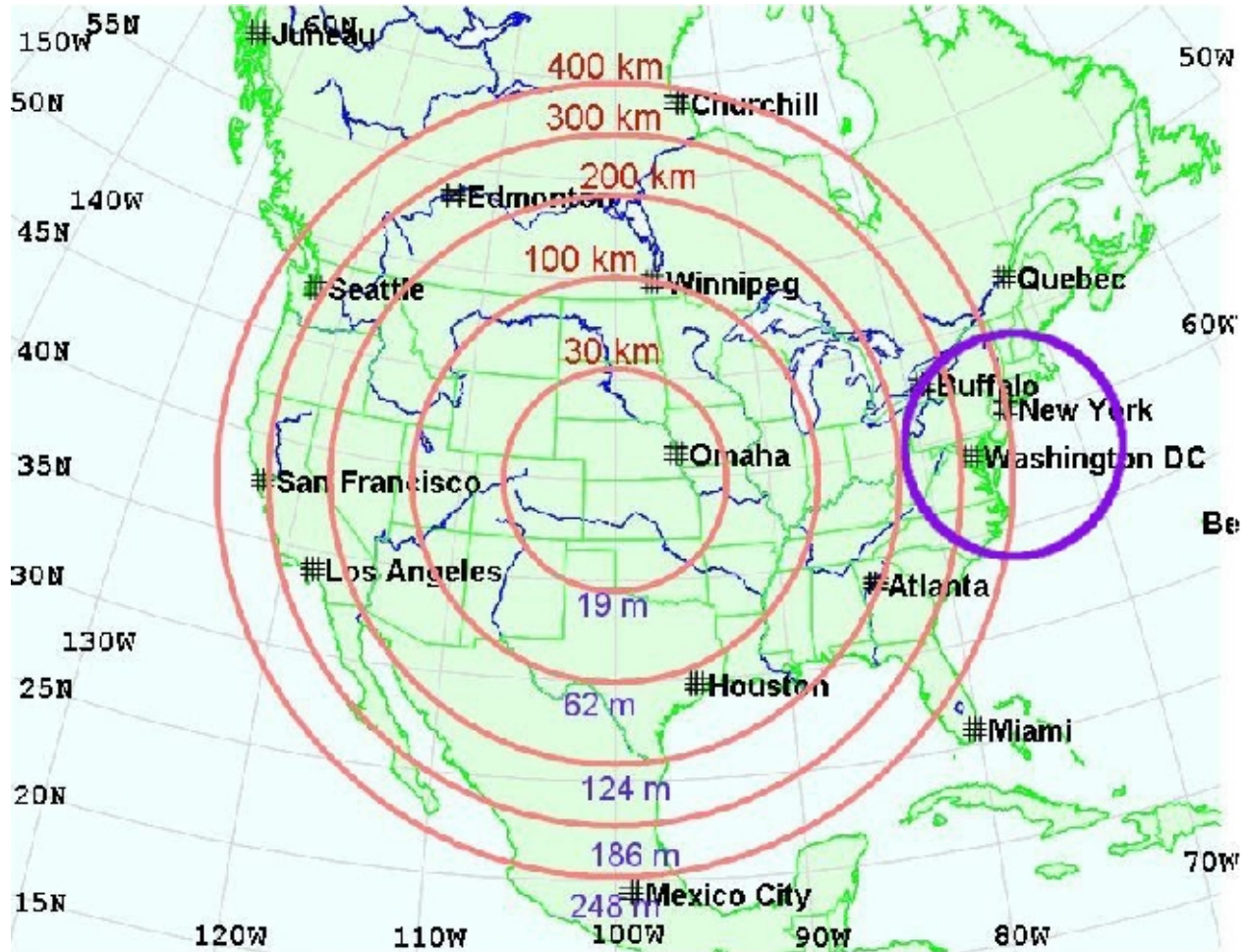
# **SECURING THE GRID AGAINST ALL HAZARDS**

**Severe Weather  
Cyber Attack  
Sabotage  
Solar Storms  
Electromagnetic Pulse**

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EMP Task Force on National and Homeland Security  
[peterpry@verizon.net](mailto:peterpry@verizon.net)  
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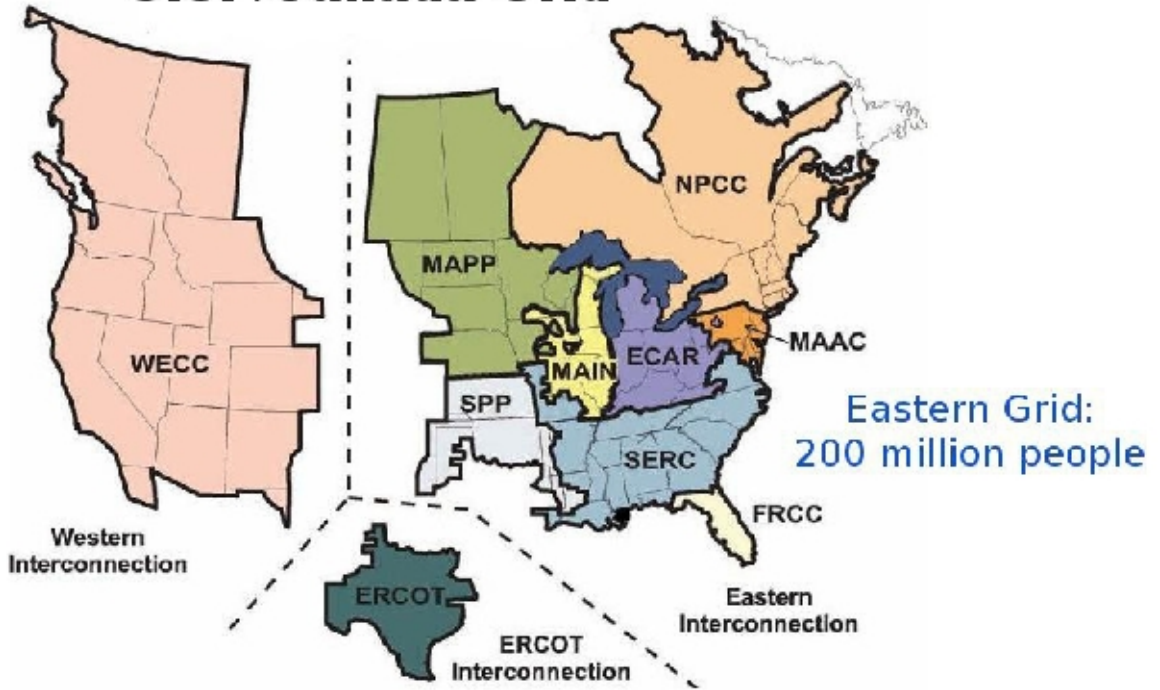
**EMP FIELDS**

# VARYING BURST HEIGHTS

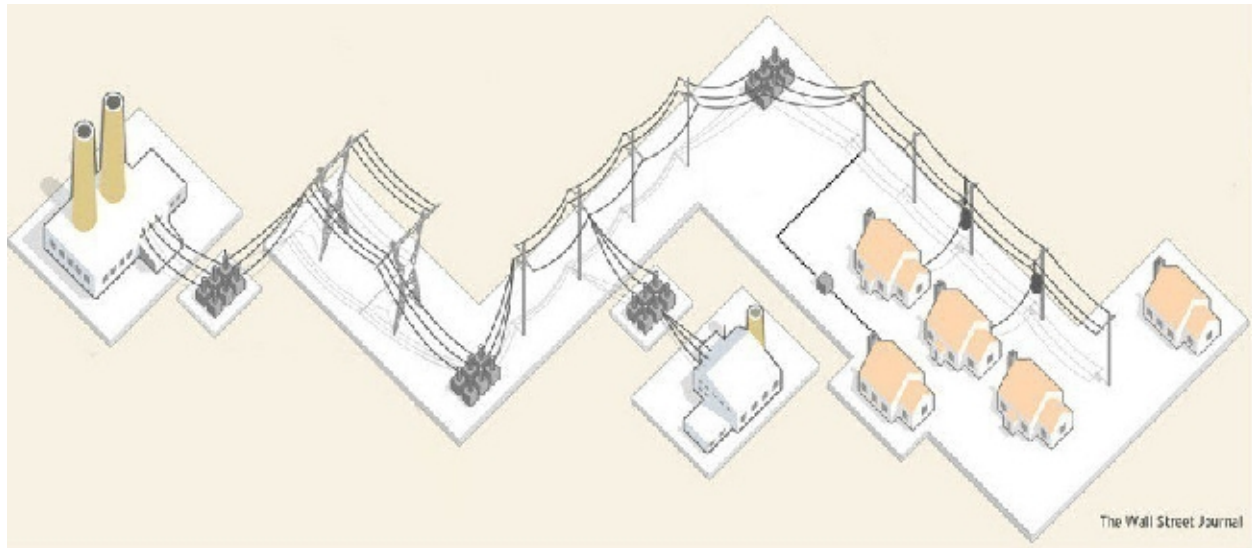


**PURPLE RING DENOTES  
EMP FIELD AT  
20 MILES (30 km) HOB  
ACHIEVABLE BY  
SHIP-LAUNCHED SA-2 MISSILE  
OR  
METEOROLOGICAL BALLOON**

# U.S. /Canada Grid



# GRID ARCHITECTURE



## POWER GENERATION

- \* Coal
- \* Nuclear Power
- \* Natural Gas
- \* Hydro-Electric
- \* Wind farms
- \* Solar
- \* Geothermal



## POWER TRANSMISSION

- \* Step-Up Transmission Sub-station (transformers)
- \* High-Voltage Power Lines
- \* Step-Down Transmission Sub-stations (transformers)
- \* Power lines
- \* Pole Transformers



## END USERS

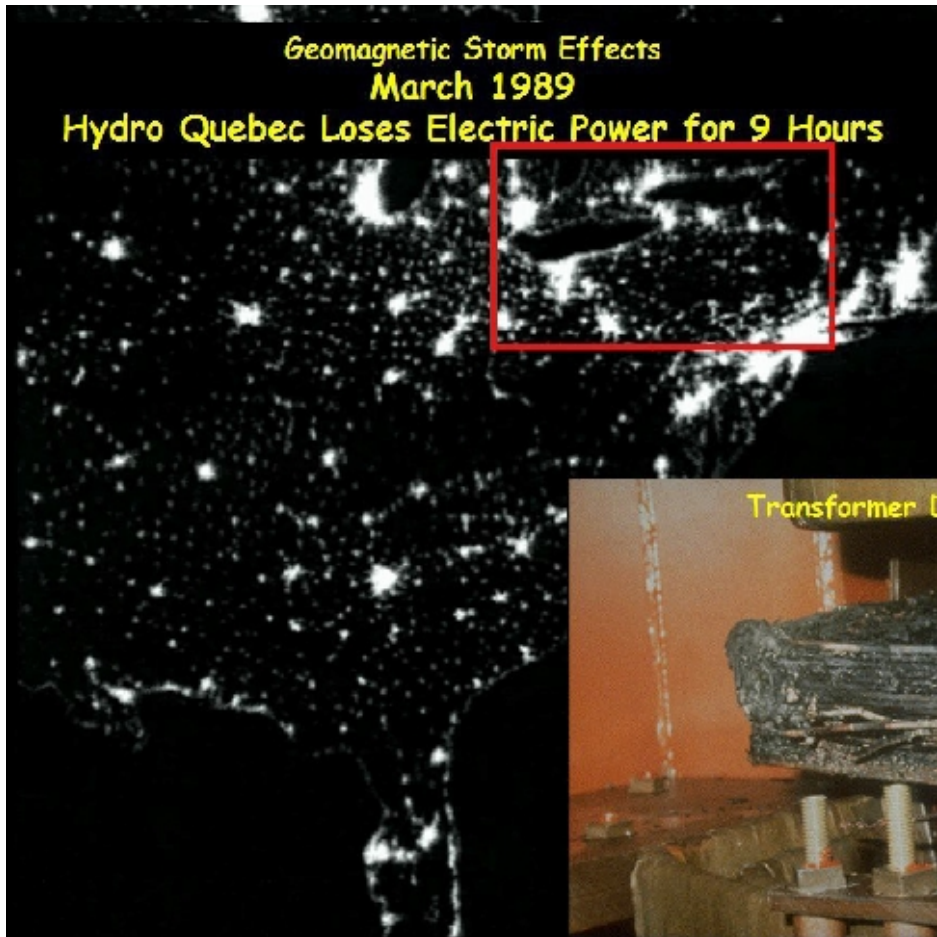
- \* Residential users
- \* Industrial users

# **EHV TRANSFORMER**

**These transformers can be permanently "fried" and take several months or possibly years to replace.**



**Geomagnetic Storm Effects  
March 1989  
Hydro Quebec Loses Electric Power for 9 Hours**



**Transformer Damage**

**BLACKOUT  
1989 HYDRO-QUEBEC  
GEOMAGNETIC STORM**



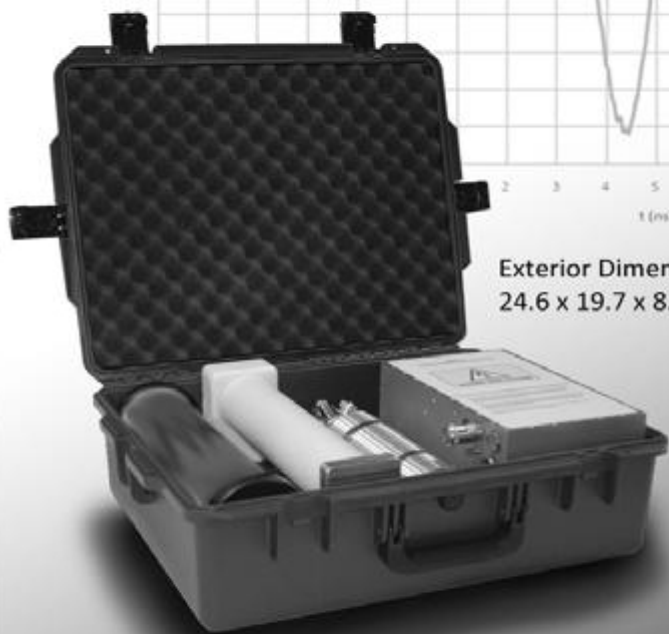
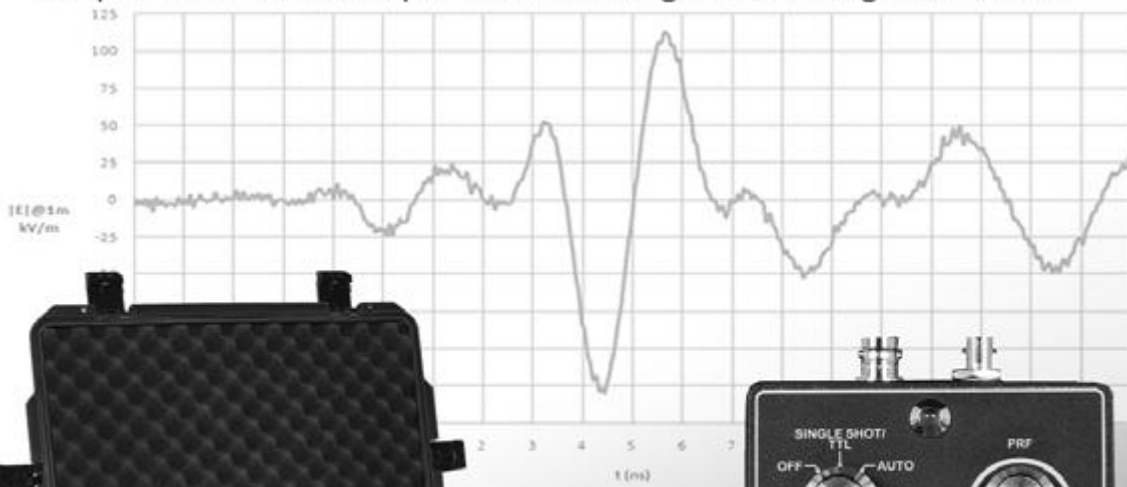




# EMP SUITCASE

## COMPACT 2100 SERIES

APELC proudly introduces the latest compact directed-energy solution. This portable and rugged Gigawatt-class source generates high-amplitude electric fields suitable for affecting electronics and testing system vulnerabilities. The development of APELC's EMP Suitcase was driven by input from DoD groups that required a powerful, reliable, compact EMP source capable of disabling or defeating electronics.



Exterior Dimensions  
24.6 x 19.7 x 8.6 in.



# APELC

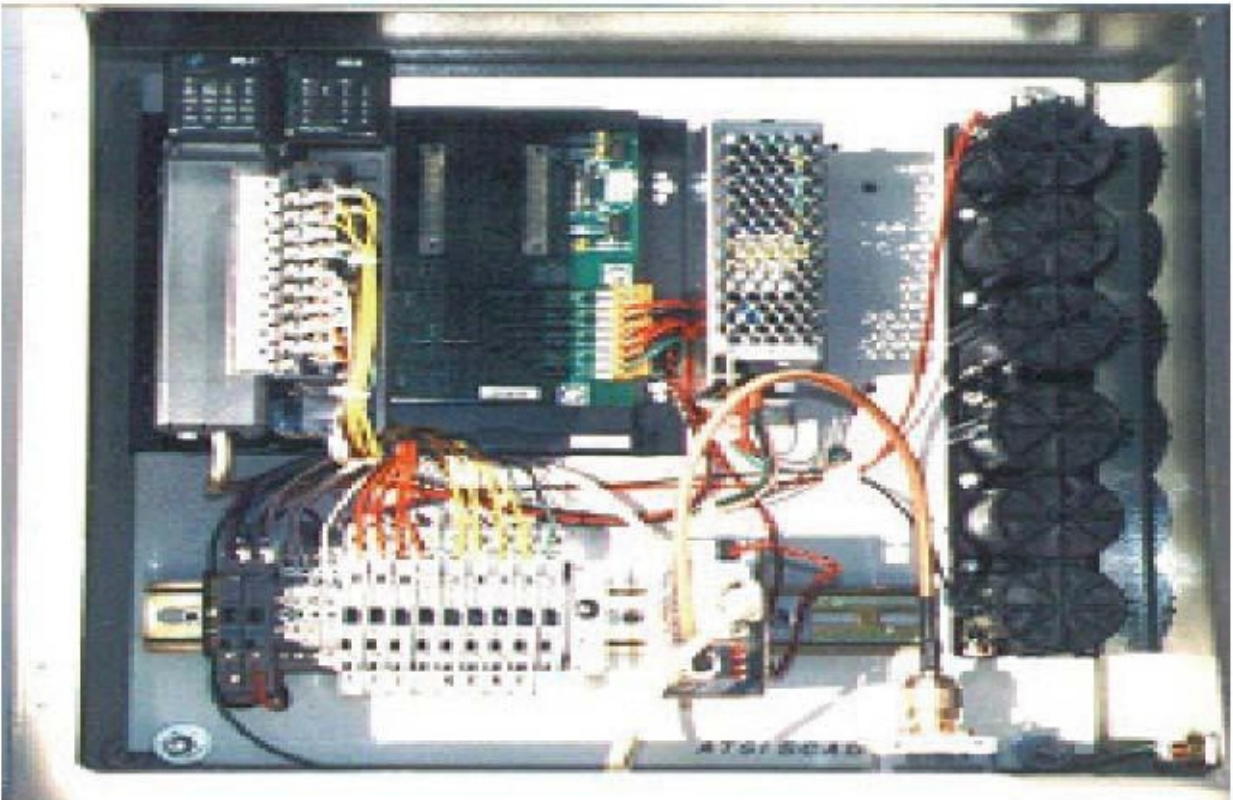
APPLIED PHYSICAL ELECTRONICS, L.C.

[www.APELC.com](http://www.APELC.com)

(512) 264-1804

Made in the USA

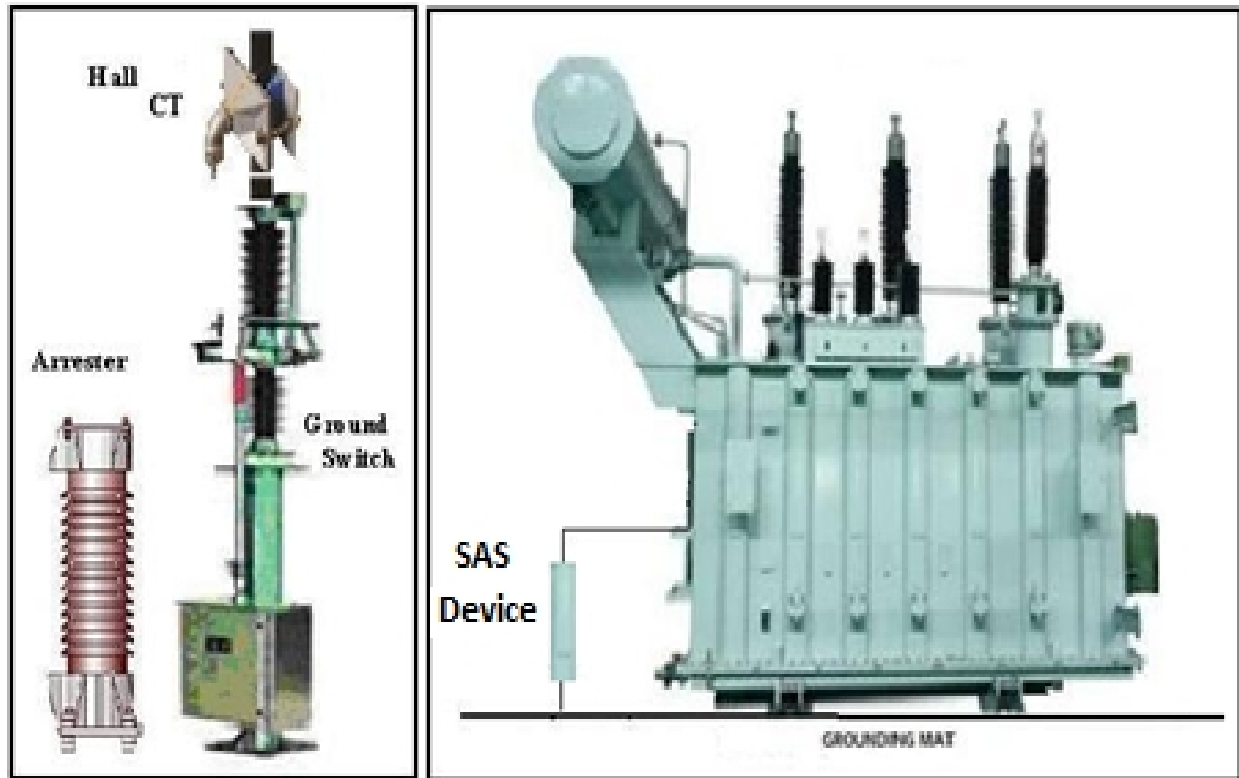
# SCADAS



## PROTECTION

- **Blocking Devices**--These prevent ground induced currents (magneto-hydrodynamic EMP or E3) caused by a geomagnetic storm or nuclear weapon from entering EHV transformers, that are indispensable to the operation of the electric grid, very difficult to replace, and must be protected.
- **Surge Arrestors**--Can be used to prevent the powerful electromagnetic shockwave (E1) generated by a nuclear weapon or non-nuclear radiofrequency weapon from entering and damaging EHV transformers and other critical equipment.
- **Faraday Cages**--Are enclosed metal structures, like a metal box, that prevents any type of EMP from penetrating and damaging electrical components inside the Faraday Cage. Entire buildings, like electric grid substations that have vitally important Supervisory Control And Data Acquisition Systems (SCADAS), can be designed or retrofitted to serve as a Faraday Cage, protecting SCADAS and other electronic systems within. A simple metal shed with metal roof and no windows could serve as a Faraday Cage.

## Surge Arrestor-Neutral Grounding Device



**DO NOT WAIT FOR WASHINGTON**

CRITICAL INFRASTRUCTURE PROTECTION ACT  
(CIPA)

Secure High-voltage Infrastructure for Electricity from  
Lethal Damage Act  
(SHIELD Act)

Grid Reliability and Infrastructure Defense Act  
(GRID Act)

# **STATE EMP PROTECTION INITIATIVES**

**MAINE**

**VIRGINIA**

**ARIZONA**

Florida

Oklahoma

North Carolina

Indiana

Pennsylvania

New York

Utah

**GENERIC EXECUTIVE ORDER**

EXECUTIVE ORDER

EXECUTIVE DEPARTMENT

STATE OF \_\_\_\_\_

EXECUTIVE ORDER NO. \_\_\_\_\_

by the

GOVERNOR OF THE STATE OF \_\_\_\_\_

WHEREAS, the reliable operation of [STATE]'s electrical transmission grid system is critical to ensure the health and safety of the People of the \_\_\_\_\_; and

WHEREAS, it is recognized that such electrical grid system within the State of \_\_\_\_\_ is part of a regional system that is governed and administered by the \_\_\_\_\_ (Regional Electric Reliability Organization); and

WHEREAS, it is further recognized however that such regional grid system is dangerously vulnerable to natural and nuclear electromagnetic pulse (EMP) and other man-made and natural acts that could disrupt service for a period of time that could pose significant risk to the security of the People of \_\_\_\_\_ as well as to the security of our Nation; and

WHEREAS, such vulnerability constitutes an extant energy emergency; and

WHEREAS, it is thus incumbent upon this Office to take measures through the Executive Department to protect the portion of the transmission grid system located within the State of \_\_\_\_\_ to the greatest extent possible;

NOW THEREFORE, I \_\_\_\_\_, Governor of the State of \_\_\_\_\_, hereby do declare that an energy emergency exists within the State of \_\_\_\_\_. I do hereby further declare that such energy emergency is based upon the existing vulnerability of the electrical transmission grid located within the State of \_\_\_\_\_ to natural and nuclear EMP and other man-made and natural acts that could disrupt service for a period of time that could pose significant risk to the security of People of this State.

IT IS FURTHER DECLARED AND ORDERED that no later than \_\_\_\_\_, all investor owned and public utilities shall file a secure, confidential report to the Adjutant General and the Director of Emergency Services that shall identify grid vulnerabilities and their individual plans to address such vulnerabilities; and

IT IS FURTHER DECLARED AND ORDERED that no later than (60 days from the above date) the Adjutant General and the Director of Emergency Services shall submit a combined secure and confidential report to the Office of the Governor summarizing the above-referenced reports and plans and setting forth their specific recommendations for securing the transmission grid system located within \_\_\_\_\_.

IT IS FINALLY DECLARED that the actions set forth in this Order are authorized by Article \_\_, Section \_\_\_\_\_ of the Constitution of the State of \_\_\_\_\_; and further specifically authorized by \_\_\_\_\_.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of \_\_\_\_\_ to be affixed this \_\_day of \_\_\_\_\_, 2014.

\_\_\_\_\_  
Governor of \_\_\_\_\_