Critical Asset Recovery Equipment

CARE

for the Electric Power Grid

Prepare **Install** **Restore**

PEC
Phoenix Electric Corporation

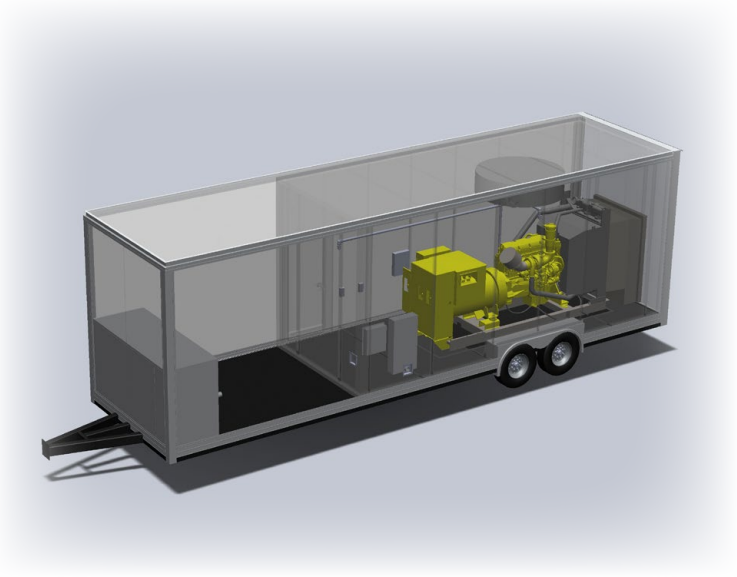
What is C|A|R|E?

Custom Modules to Expedite Recovery from an Extended Shutdown of the Power Grid

C|A|R|E modules provide "Beyond Design Basis" resiliency to vulnerable substations and other remote facilities to expedite recovery from an extended duration "grid down" scenario caused by the cascading effects of man-made or natural disasters such as:

- **High-Altitude Electromagnetic Pulses (HEMP)**
- **Intentional Electromagnetic Interference (IEMI)**
- **Cyber attacks**
- **Terrorist attacks**
- **Natural disasters**
- **Aging infrastructure**

The main function of the equipment is to withstand a HEMP event. The HEMP module's intrinsic design is also resistant to all hazards including floods, earthquakes, and "with the integration of specially designed panels" ballistic attacks.

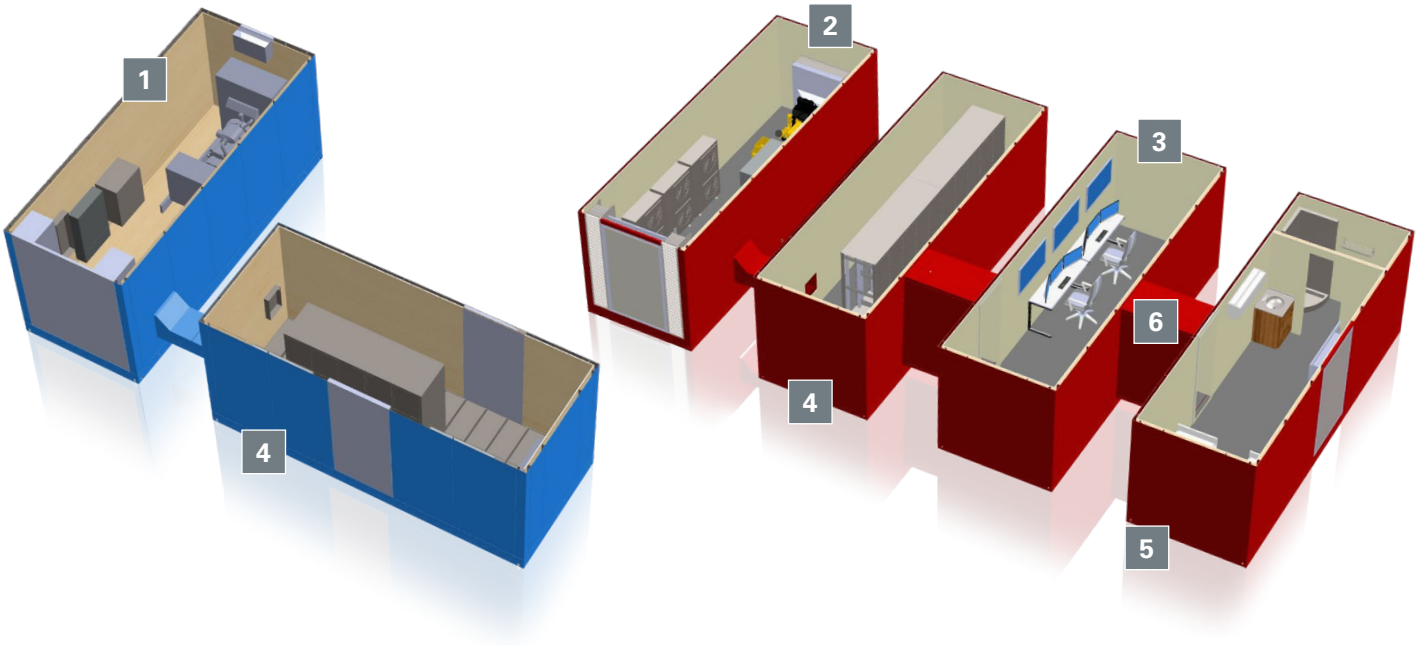


The C|A|R|E system includes the necessary backup assets including communications, information technology (IT), supervisory control and data acquisition (SCADA) equipment, and supporting backup generator power.

The modules arrive at site fully equipped, ready for immediate installation and start-up deploying a true plug-and-play configuration.

Natural disasters, terrorist acts, or prolonged maintenance of aging infrastructure could shut down the power grid for extended periods of time.

Modules Are Installed in Retrofit Solutions, New Construction, or Temporary Applications



1 Backup Generation: Designed to accommodate a wide range of generator sizes: from 20kW generators to maintain substation back-up batteries over an extended period, to generators of several hundred kilowatts for larger facility.

2 HVAC Mechanical: Support functions for communications/emergency relay modules maintaining temperature-controlled environment and storage facilities.

3 Communications: House IT and SCADA systems for connection from back-up emergency relay equipment to regional communication centers.

4 Emergency Relay System: Supplied with back-up protection relay rack designed to existing substation equipment operations to support restarting substation high voltage equipment and service.

5 Living Quarters: Designed to provide protection for personnel against specific hazards during a "grid down" scenario including a walkthrough vestibule connection to the other C|A|R|E modules.

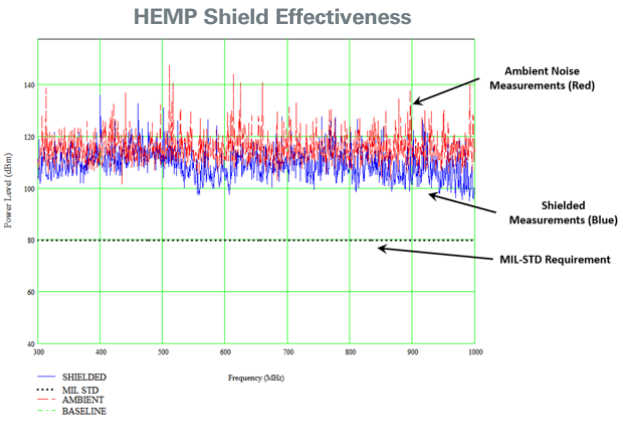
6 Module Interconnections: Available module options include ability to connect to each other via a plug-and-play design using standard umbilical enclosures or full access walkthrough vestibules.

C|A|R|E modules provide the vital communications and power control capabilities essential for faster recovery and restoration of power services.

How Does C|A|R|E Protect?

C|A|R|E Team Provides a System to Protect Against Your Specific Threats

Utility critical substation assets require system interoperability during and after exposure to HEMP environments. The installed C|A|R|E modules provide a HEMP hardened barrier for critical operations to ensure system survivability during a HEMP event.



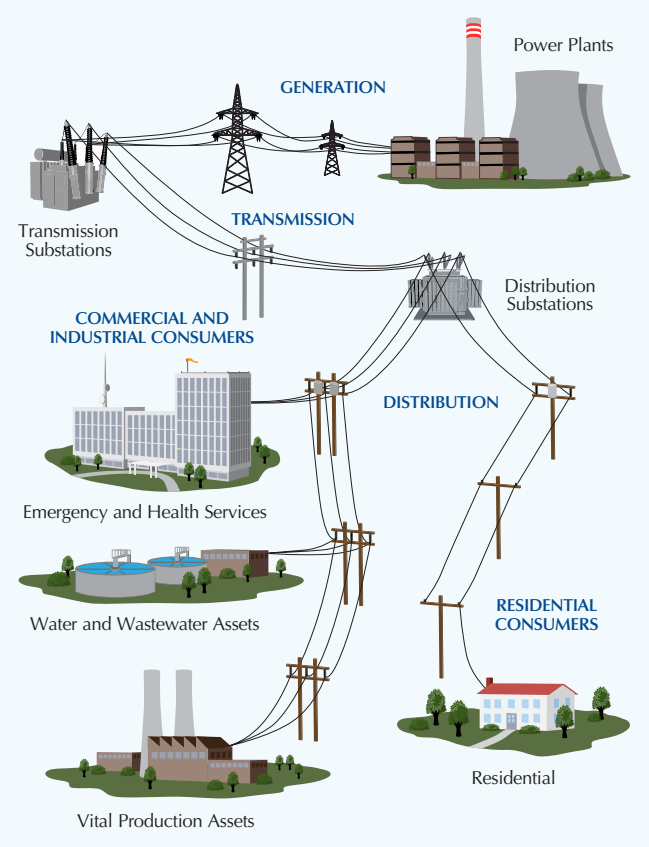
Actual Test Data for SCADA/IT Resilient Envelope

C|A|R|E module implementation is based on a 4-step process:

- Define the threat of concern including the electromagnetic vulnerability of the system
- Design, manufacture, and test integrated HEMP protection system
- Install a complete electromagnetically hardened environment around the boundaries of the vulnerable systems
- Maintain the electromagnetically hardened environment over the functional and operational life cycle of the systems

These modules can be applied to shorten recovery times for other facilities such as:

- **Power plants**
- **Water and wastewater assets**
- **Emergency and health services**
- **Vital production assets**



C|A|R|E modules provide invaluable safety and reliability to substations or remote facilities where critical assets were not designed to today's threats.

Safety and Security of the Grid Requires Resiliency

New Transmission Operation Centers (TOC) are being designed and constructed with HEMP resilience. These facilities will survive, but to fulfill their mission they will need to communicate with their substations for restoration efforts.

Solid-state Smart Grid solutions allow digital access to power plants and substations to optimize monitoring/operation of the grid. However, these solutions which make the grid more efficient also make it more vulnerable to "grid down" scenarios.

Successful HEMP/IEMI protection requires the experienced engineering, fabrication, test and integration capabilities of the C|A|R|E team.

Electromagnetic Associates, LLC

Electromagnetic Associates

Power Grid Recovery Analysis and Design

Electromagnetic Associates has extensive design experience in HEMP hardening, systems integration, scientific and project engineering, testing, coordination, and education.

TRITON DEFENSE

Triton Defense

Custom Manufacturing and Quality Assurance

Triton Defense designs and manufactures world-class HEMP-protected modules with fully integrated solutions for electric utilities and industry.

PEC Phoenix Electric Corporation

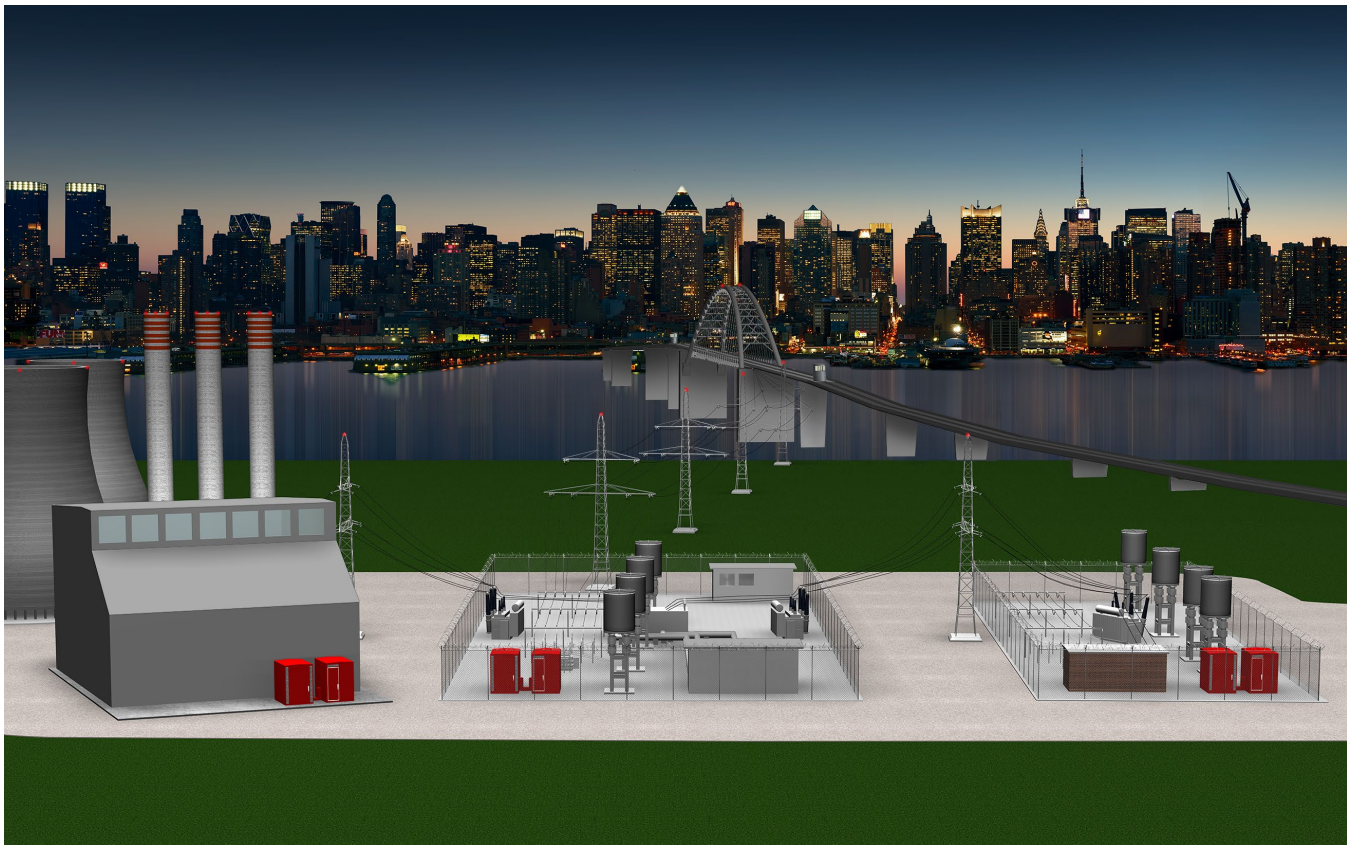
Phoenix Electric Corporation

Sales, Project Management, and Training

Phoenix Electric's expertise serving the electric industry derives from providing custom manufactured equipment and engineering services to substation and power generation facilities.

Electric utilities must take action –

Protect vital communications and power control capabilities that will be essential for recovery and restoration of power services limiting the impact and shortening the duration of "grid down" scenarios.



Mitigate

Respond

Recover

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