DTRA SBIR Challenge:

- 1) EM attack shuts down grid & infrastructure2) Restoring grid may not be possible
- 3) Needs EM-protected microgrids & energy loads Instant Access Networks (IAN) SBIR Response: EM-protected microgrid systems --DTRA/IAN

EM-protected microgrid **systems** --DTRA/IAN Contract: HDTRA1-16-P-0025

- Integrates 4 subs and 40 collaborators
- Uses energy savings to help self-fund

RAMS [™] Rapid Deployment Solution

Resilient: EM and cyber "island-mode" resilience

Adaptive: Power management system protects and models energy for quick deployment/growth

Modular: 50 kW to 250 kW, 1 MW+ self-funded

rapid growth (fixed, transportable, modular)

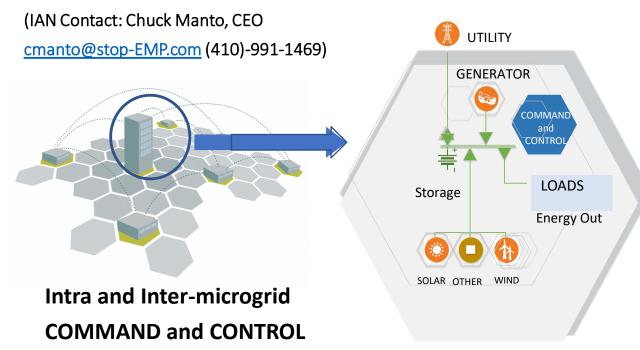
Microgrid: Energy generation, storage, controls, & communications linkable to other protected

"islands" in an "Archipelago of protected islands"

System: Linked energy loads provide "out-of-

band" power management and energy savings

The Archipelago ™ RAMS Scenario

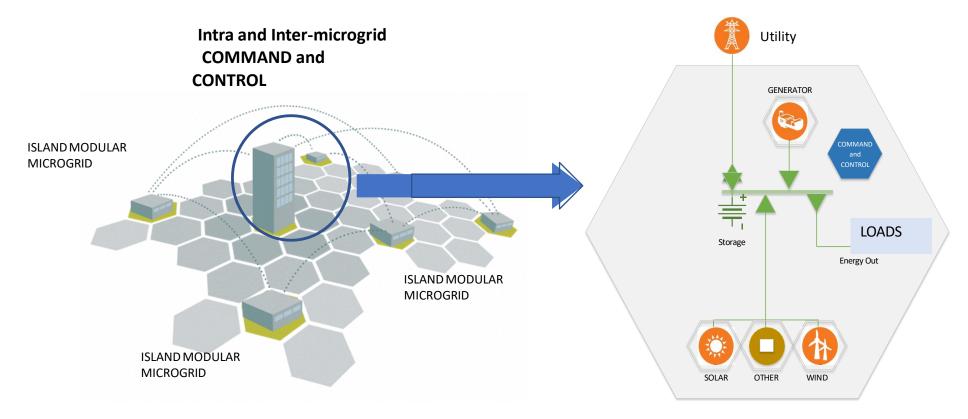


RAMS Benefits:

- 1) RAMS creates cyber and EM resilient systems
- 2) RAMS can be funded largely by operational savings from energy efficient microgrids with energy efficient uses of the energy (comms, hospitals, data, water...)
- 3) Expedited IAN SBIR Phase 2 or 3 contracts for EMprotected microgrid SYSTEMS including all energy uses

The Archipelago ™ Scenario

Independent EM-protected Resilient Adaptive Modular-Microgrid Systems (RAMS)™ are deployed and rely on local operational inputs for island-mode operation. A protected out-of-band (OoB) management network within the microgrid can also connect the islands to form an Archipelago for coordinated operation and situational awareness. This maintains command and control and facilitates restoration of the larger grid and infrastructure.



Adopt a Hospital? Get full publication

Amazon:

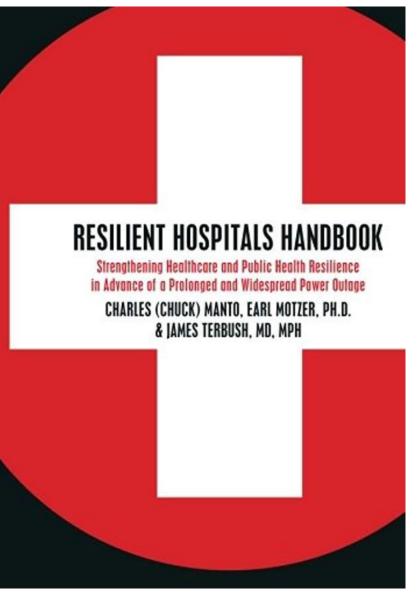
https://www.amazon.com/s ?k=resilient+hospitals+hand book&ref=nb sb noss

Westphalia Press:

https://westphaliapress.org/ 2017/12/18/resilienthospitals-handbook/

ASPR:

https://asprtracie.hhs.gov/t echnicalresources/MasterSearch?qt =resilient+hospitals+handbo ok&limit=20&page=1&CurTa b=0



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ABSTRACT OF THE RESILIENT HOSPITALS HANDBOOK

A number of high-impact threats to critical infrastructure can result in a regional or nationwide months-long power outage, making it unlikely for timely outside help to arrive. Hospitals are encouraged to gain the capacity to make and store enough power on-site to operate in island mode indefinitely without outside sources of power or fuel and protect on-site capabilities from threats that could impact regional commercial power systems. This handbook outlines challenges and opportunities to solve these problems so hospitals, healthcare facilities, and other resources might become more resilient.

From the Second Goal of the 2015 National Space Weather Strategy

http://www.dhs.gov/national-space-weather-strategy

- Other low-frequency, high-impact events are also capable of causing long-term power outages on a regional or national scale.
- . The plan must include the Whole Community."

From the US Defense Threat Reduction Agen

https://www.sbir.gov/sbirsearch/detail/736859

- "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 DoD.
- Restoring the commercial grid from the still functioning regions may not be possible or could take weeks or months. Significant elements of the DCI require uninterrupted power for prolonged periods to perform time-critical missions (e.g., sites hardened to MIL-STD-188-125-1).
- To ensure these continued operations, DCI sites must be able to function as a microgrid that can operate in both grid-connected and intentional island-mode (grid-isolated)."





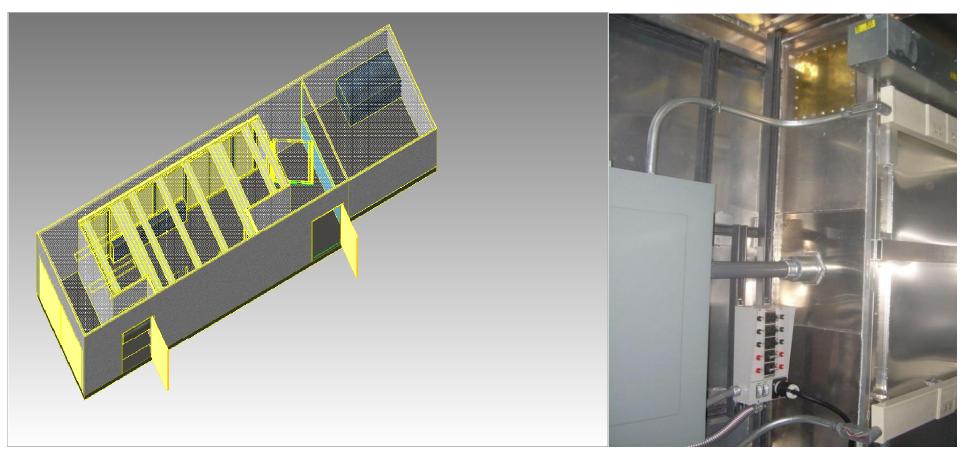
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EMP Safe Micro Grids Examples



Modular & Scalable Mitigation Strategies

IAN's EMP Protected Mobile Command Center



Executive Order 13865 March 26, 2019 Coordinating National Resilience to Electromagnetic Pulses

- By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:
- **Section 1**. *Purpose*. An electromagnetic pulse (EMP) has the potential to disrupt, degrade, and damage technology and critical infrastructure systems. Human-made or naturally occurring EMPs can affect large geographic areas, disrupting elements critical to the Nation's security and economic prosperity, and could adversely affect global commerce and stability. The Federal Government must foster sustainable, efficient, and cost-effective approaches to improving the Nation's resilience to the effects of EMPs.
- https://www.federalregister.gov/documents/2019/03/29/2019-06325/coordinating-national-resilience-to-electromagnetic-pulses