

Findings from Energy Resilience Exercises

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DoD Energy Resilience Conditions

Adverse weather events are damaging our electrical infrastructure.
Downstream effects may cause outages on DoD installations.
Real-world testing ensures preparedness for an outage scenario.

- Sites currently operate with unknown risks and interdependencies to critical systems and missions
- Tabletop exercises investigate responses and capabilities during an extended simulated outage
- “Pull-the-plug” exercises provide awareness of actual system capabilities during a real outage



Existing Language for Energy Resilience

- Definition of resilience:
 - “...the ability to avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions in order to ensure energy availability and reliability sufficient to provide for mission assurance and readiness...”
 - - U.S. Code Title 10, Section 101(e)(6)
- OSD Policy and Program Guidance: DoD Components shall conduct
 - Annual full-scale or black start testing of all systems¹ supporting their critical energy requirements while completely separated from the primary source of power
 - Semi-annual² routine tests of all systems while still coupled with the primary source of power
 - - DoDI 4170.11, Enclosure 3, Section 3c(2)(b)4

¹ Systems: emergency, standby energy generation systems, infrastructure, equipment, fuel at full operational load

² Monthly for emergency and standby generation at DCI facilities

Energy Resilience Readiness Exercise (ERRE) Process

- **Current testing is insufficient to assess backup power system**
- **Requirement driven exercise customization**
 - What time of year and day of the week should the exercise occur?
 - How long should the exercise last and when should it start?
 - Are there any areas of installation excluded from the exercise?
 - Who should receive notice of the exercise and how much notice should they get?
 - Are there other exercises or scenarios that should be tested during the ERRE?
 - What mitigations need to be implemented before, during, or after the exercise?
- **ERREs assess more than performance of electric power infrastructure**
 - Capability gaps between interdependent systems
 - Personnel and organizational response to atypical scenarios



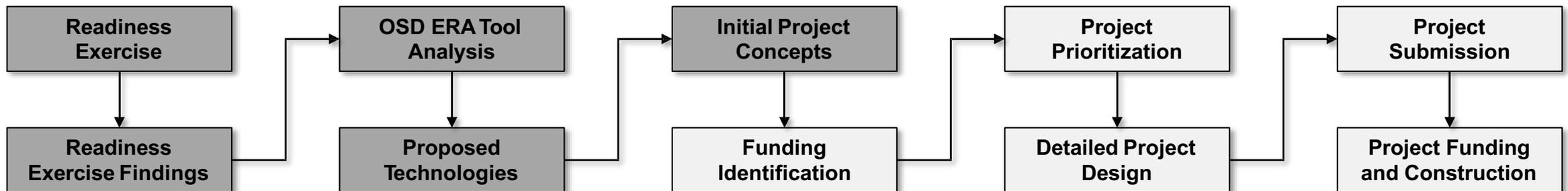
Sample ERRE Results

- **Backup power hardware problems**
 - 75% of backup generators loaded <30% (with most around 10%)
 - Short UPS operational lifetimes due to lack of testing and maintenance
 - HVAC systems tripped offline and only one or two people knew how to reset the units
- **Issues in spite of pre-ERRE activities**
 - Generators failed even though all assets were maintained and refueled beforehand
 - Problems with the emergency communication systems even after exercise check
 - Confusion about power restoration sequence between organizations
- **Long-standing assumptions challenged**
 - Mission reliance on off-installation information and personnel for system repair
 - Communications equipment not plugged into backup power
 - Water and wastewater system monitoring relied on relays without backup power



Future Plans for Installation Energy Resilience

- DoD installation energy resilience policy and solutions are rapidly changing from designing systems for individual buildings to more comprehensive installation plans
- Installation's need assistance turning the findings from real-world exercises and tool analysis into energy resilience projects
- Develop a framework for end-to-end project development starting with initial exercise and ending with a project submission to the correct funding source



Questions?

“This has caused a 20 year conversation to happen in one 1 hour meeting.”

“This exercise allowed us to see ourselves better.”

“You don’t even know what you need to be worried about until you start poking and prodding.”

“I am buying risk every day and I don’t know it.”

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