Practical Considerations in Energy Planning for Air Force and Navy Installations

October 16th, 2020
A Practical Energy Planning Framework

Lessons from Case Studies
The OSD Policy (DoDI 4170.11) requires installations to prepare a resiliency focused Installation Energy Plan (IEP).

Challenges to achieving this at the Enterprise level include:

- **IEPs are FOUO** without classified information
- Comprehensive Mission Assurance and Vulnerability Assessments are typically classified and not easily translated into IEP usable data
- IEPs are led by Installation Planners, Energy Managers, Facilities and Utility Engineers – who typically do not have the capability or resources to do complex modeling and risk assessments
- A large number of IEPs have to be completed in a short time. Conditions in Installation vary in capability and structure
The Solution

A simple, template-driven approach is needed – one that can also:

- Accommodate unique installation conditions
- Include mission specific requirements
- Produce standardized outputs for the whole Enterprise
Step 1: Simplified Threat Assessment

High level simple selections drive degree of concerns based on consequences

**Critical Mission Needs**
- Power
- Fuel
- Heating
- Cooling
- Water
- Communications
- Personnel

**Critical Threats**
- Earthquake: Seldom - Critical
- EVP: Rarely - Critical
- Environmental Corrosion: Rarely - Negligible
- Flooding - Major: Occasional - Critical
- Flooding - Minor: Likely - Moderate
- High Winds: Likely - Critical
- Lightning: Frequent - Moderate
- Malicious - Cyber: Occasional - Moderate
- Malicious - Physical: Seldom - Moderate
- Tsunami: Rarely - Negligible
- Utility Blackout: Occasional - Critical
- Volcanic Eruptions: Rarely - Negligible
- Wildfire - Major: Seldom - Moderate
- Pandemic: Seldom - Moderate

**Threat Consequences**
- Source: Loss of Primary Sources - Degree of Concern: Low
- Supply Logistics: Disruption / Failure - Degree of Concern: Moderate
- Transmission: Failure / Loss - Degree of Concern: Moderate
- Distribution: Failure / Loss - Degree of Concern: High
- Controls: Loss of Access - Degree of Concern: Low
- Communications: Breakdown / Unavailable - Degree of Concern: Low
- Manpower: Unavailable / Inaccessible - Degree of Concern: Low
- Equipment: Damaged / Inoperable - Degree of Concern: Moderate

**Key Relationships**
- Power Utility: Strong
- Gas Utility: Average
- Water Utility: Average
- Community: Average
Step 2: Mitigation Capabilities Mapping

Consequences → Mitigation Capabilities & Strategies → Resilience Attributes

<table>
<thead>
<tr>
<th>Source</th>
<th>Mitigation Capabilities &amp; Strategies</th>
<th>Resilience Attributes</th>
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</thead>
<tbody>
<tr>
<td>Loss of Primary Sources</td>
<td>Alternative System or Fuel</td>
<td>Robustness</td>
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<tr>
<td>Supply Logistics: Disruption/Failure</td>
<td>Building Retrofits</td>
<td>Redundancy</td>
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<td>Transmission: Failure/Loss</td>
<td>Centralized Systems</td>
<td>Resourcefulness</td>
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<td>Distribution: Failure/Loss</td>
<td>Cybersecurity</td>
<td>Response</td>
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<td>Controls: Loss of Access</td>
<td>Energy Management</td>
<td>Recovery</td>
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<tr>
<td>Communications: Breakdown/Unavailable</td>
<td>Emergency Protocols</td>
<td>Reliability</td>
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<tr>
<td>Manpower: Unavailable/Inaccessible</td>
<td>Energy Storage</td>
<td></td>
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<tr>
<td>Equipment: Damaged/Inoperable</td>
<td>Fuel Supply Routes</td>
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<td>Generator Testing</td>
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<td>Increased System Capacity</td>
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<td>Infrastructure Hardening</td>
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<td>Microgrid</td>
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<td>Procurement</td>
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<td>Single Points of Failure</td>
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<td>Substation Infrastructure</td>
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<td>Water Strategies</td>
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<td>Personnel Capacity</td>
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<td>Install Backup System</td>
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<tr>
<td></td>
<td>Backup Water Systems</td>
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</table>
### Step 3: Mission Requirements

#### Level of Resilience Capability Required

<table>
<thead>
<tr>
<th>Resource</th>
<th>Availability Requirements</th>
<th>Min Contingency</th>
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</thead>
<tbody>
<tr>
<td>Power</td>
<td>Uninterruptible</td>
<td>N+1</td>
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<tr>
<td>Fuel</td>
<td>3 Day Supply</td>
<td>N</td>
</tr>
<tr>
<td>Heat</td>
<td>Essential</td>
<td>N</td>
</tr>
<tr>
<td>Cooling</td>
<td>Uninterruptible</td>
<td>N+1</td>
</tr>
<tr>
<td>Water</td>
<td>Essential</td>
<td>N</td>
</tr>
<tr>
<td>Communications</td>
<td>Uninterruptible</td>
<td>N+1</td>
</tr>
<tr>
<td>Personnel</td>
<td>No Requirement</td>
<td>N</td>
</tr>
</tbody>
</table>

Is Mission Relocatable? **No**
Step 3: Mitigation Capabilities

Threats → Level of Concern → Requirement → Consequences

Required Mitigation Capabilities to Achieve Strong Resiliency

- Maximum Potential Score
- Typical Installation Maximum
- Adjusted Target Maximum Score for Mission
Step 4: Gap Assessment & Scoring

Inputs culminate in a scorecard – a visual snapshot highlighting performance.
Step 4: Gap Assessment & Scoring

Scorecards are also aligned with strategic direction from service leadership.
Step 5: Strategy Development (COAs)

Interactive and intuitive strategy mapping process

Considering strategies across scale to meet mission requirements
Step 6: Resiliency Action Plan

Resulting mission-tied implementation roadmap
Advantages of the Practical Approach

- Rapid assessment of baseline and capability gaps
- Standardized scoring for enterprise level prioritization
- Easily communicate strategic overview of installation and missions with synergies and benefits
- Develop and leverage best practices across the enterprise and multiple missions
- Allow for focused deep dive on high priority issues
- Ability to engage with non-technical mission owners
- Ability to incorporate local knowledge
Case Studies

- **Goal:** what was the installations intentions when looking at a resilience project

- **Practical Consideration:** What did that base have to contend with in striving for that goal

- **Solution:** What were the strategies deployed to meet the goal and how was it achieved
Case Study: MacDill AFB (USAF)

**Goal:** Improved power availability beyond critical ‘campuses’

**Practical considerations:** lack of expertise in power generation; varied infrastructure reliability

**Solution:** Partnership with local utility to install a gas ‘peaker-plant’ on installation.
Case Study: PMRF (US Navy)

**Goal:** Improved power availability and quality, reduction in operational costs

**Practical considerations:** small base but important missions, high reliance on contractors, existing stranded PV

**Solution:** Enhanced use lease with utility + grid consolidation

Note: Scorecards used for illustrative purposes only and do not reflect actual performance
Case Study: Warner Robins (ANG)

**Goal:** Visibility and controllability of loads, redundant power supply

**Practical considerations:** Tenant on a large base (little ‘up-stream’ influence), small staff, significant planned growth

**Solution:** District microgrid with PAMPER, smart energy monitoring

Note: Scorecards used for illustrative purposes only and do not reflect actual performance
Case Study: JBER (US Army and USAF)

**Goal:** Zero downtime of heat (requiring electricity)

**Practical considerations:** Two very different ‘sides’ – one privatized, heat redundancy critical, OCONUS/remote

**Solution:** Landfill gas capacity and interconnect 2 grids

Note: Scorecards used for illustrative purposes only and do not reflect actual performance
Empowering installations to implement resilience projects requires a plan that understands their unique challenges and capacity.

An energy planning process that facilitates strategic thinking (beyond mission/responsibility boundaries) from enables collaboration and the development to smarter solutions.

Some installations are already able to operate and implement projects in this way leveraging strong local expertise and relationships.

These forward-thinking installations have shown the importance of multi-stakeholder partnerships in successfully enhancing energy resilience.

Proven an effective way of developing mission-driven strategies without large resources.

Lays the foundation for enhanced analysis and design.
Thank You