Workshop: Energy Planning for Resilient Military Installations

Energy Supply for Mission Critical Facilities: Tiered Requirements and Capabilities of Supporting Energy Systems

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Overview

– Overview of Approach to Developing Resilient Design Criteria

– Identify Critical Loads

- What loads need to served

– Impact of Threats and Vulnerabilities on System Requirements

- How to critical energy systems vary by location
  - o Climate
  - o Threats
- Other factors impacting design requirements

– Maximizing Value in Design

Existing Approach

– There is no existing universal protocol for design for resiliency

– About to embark on the development of a Energy Resilience UFC

- Identify suitable resiliency criteria and best practices for installation energy plans/projects
- Goal is a clear and consistent approach to developing resilient energy systems

Designing to Mitigate Risk

<u>The requirements for systems vary by risk</u>

Take inventory of all of the people, processes, and technologies that will be affected by new security solutions.

RISK = THREAT × VULNERABILITY × CONSEQUENCES

Threat - potential issue that could have negative impacts
Vulnerability - likelihood of being impacted by a threat
Consequences - the effects and cost of being impacted by a threat

> What are the threats?
> What makes you vulnerable?
> What can you afford?

Overview of Approach

A proposed approach to defining design parameters

1. Identify Critical Loads

- Mission critical facilities & assets identified
- Characteristics of critical energy loads

2. Threat & Vulnerability Assessment

- Identification of threats
- Likelihood & intensity of event

3. System Design Criteria

- System options & performance requirements
- Maximizing value of resilience system

CONSEQUENCES

X

THREAT

X

VULNERABILITY

=

RISK

1. Identifying Critical Loads

The requirements for systems vary by asset mission importance

– Task Critical Asset (TCA) Tiers

I. Loss would result in DoD/Service mission (or function) failure

II. Loss would result in DoD/Service mission (or function) severe degradation

III. Loss would result in non-DoD/Service mission (or function) failure or severe degradation (lower level)

– MDI Ratings

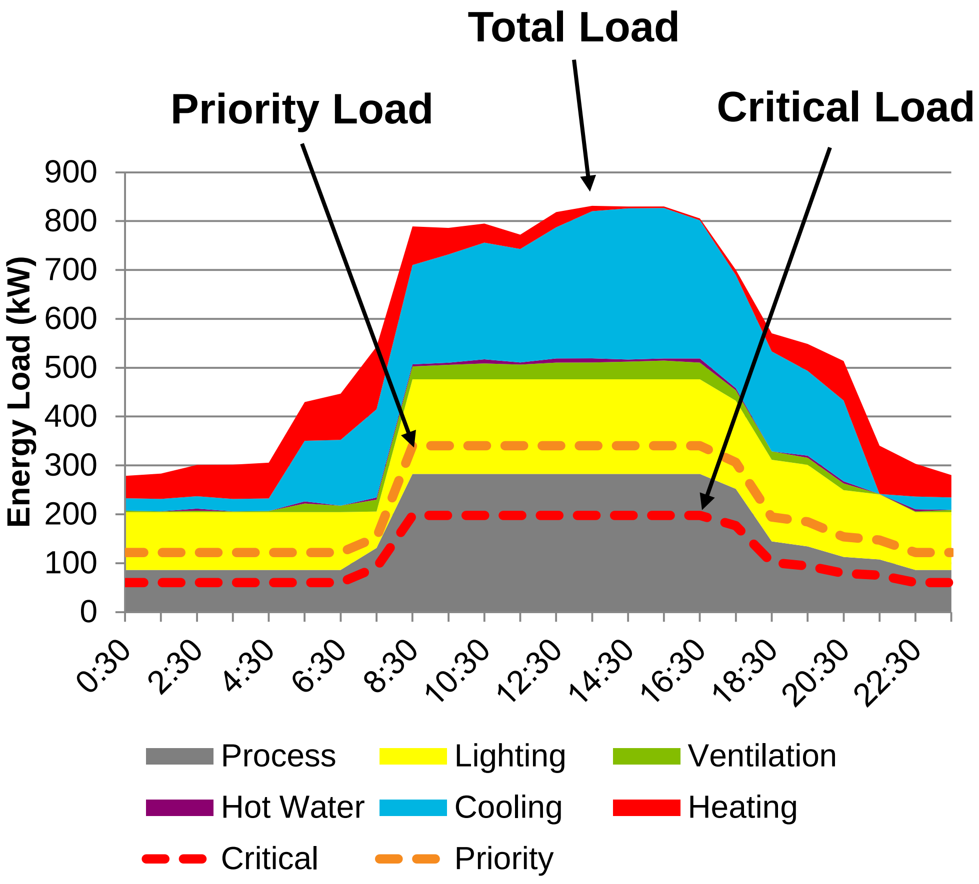
– With these assignments, the overarching requirements are set

1. Identifying Critical Loads

– Within these critical facilities, the use of energy varies significantly

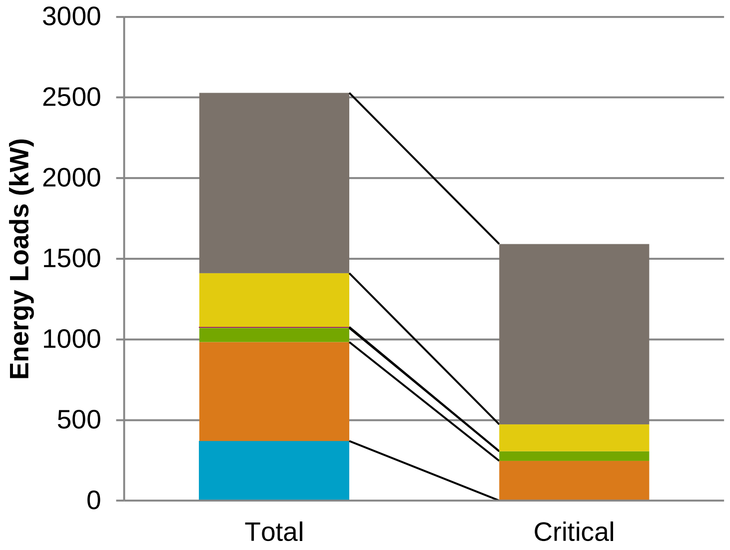
– Need to consider:

- Operational times
- Scale of demand
- Type of demand
  - o Process loads
  - o Lighting systems
  - o Heating, cooling and ventilation
- Quality of supply
- Role under critical operation
- Ability to load-shed
- Changing functionality

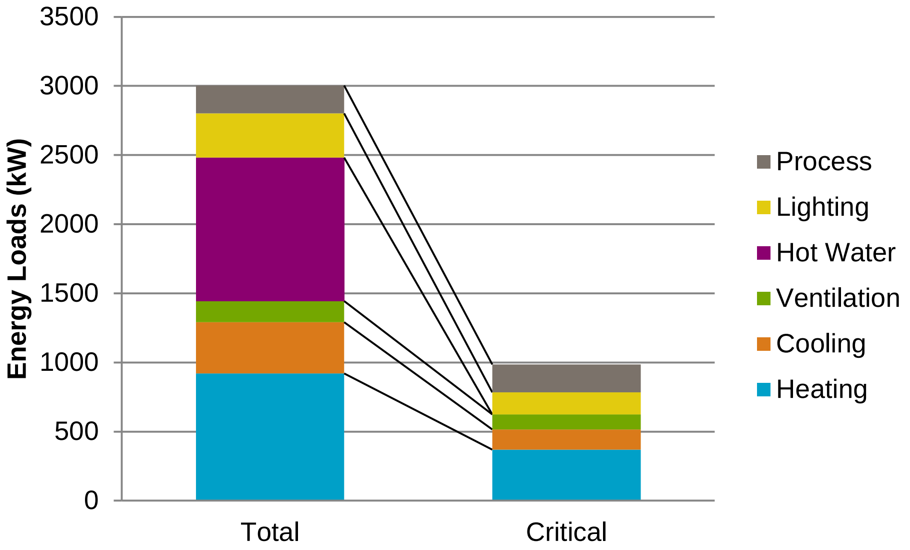


1. Identifying Critical Loads

– A communications building has different demand than a training facility, armory, or airfield



Communications Facility



Recreational Facility

2. Threat and Vulnerability Assessment

<u>The requirements for systems vary based on threats</u>

– The threats and vulnerabilities need to be assessed to determine the level of resilience the systems need to exhibit:
  - Identification of Threats
    - o Climate
    - o Geopolitical
    - o Operational
  - Likelihood of Event
  - Intensity of event (CAT rating on mission impact)

2. Threat and Vulnerability Assessment

<u>Climate Impact</u>

- Alaska
  - Heating systems are critical
  - District heating & local boilers?
- Guam
  - Cooling is critical
  - District cooling and local chillers?
- San Diego
  - Could lose cooling / heating and be comfortable
  - Passive building design?

2. Threat and Vulnerability Assessment

<u>Utility Grid Reliability / Power Quality</u>

– Seattle
  - Very reliable grid
  - Reduced back-up power requirements?

– Guam
  - Unreliable, poor quality power supply (400 outages in last 5 years)
  - Increased need for on-site generation infrastructure

3. System Design Criteria

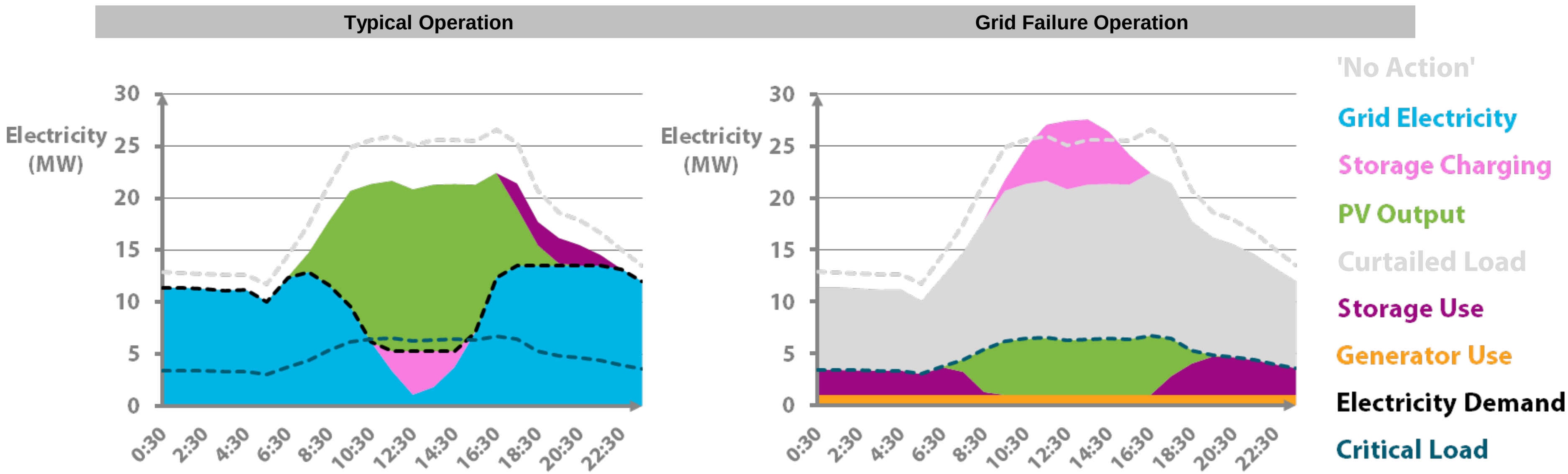
A more informed design maximizes value of system

– Once required load and resiliency requirements are defined in detail, opportunities for cost reductions and system synergies can be maximized
  - Identifies system types that are applicable
    - What level of redundancy/performance is required
  - Design it to reduce costs under regular operations
    - Everyday asset
  - Designing at scale opens up additional benefits
    - Shared systems
    - Cost effective
    - Additional serviceable priority load

3. System Design Criteria

– Design systems to maximize economic case

– Example is microgrid, solar and storage strategy at Guam



– Peak demand reductions allow system to pay for itself

Summary

- As we go about developing a design protocol we need to consider the whole range of influencing factors:
  - Understanding how the assets use energy
  - What the systems requirements are
  - Both general and site-specific threats and vulnerabilities impact on design
  - Opportunities for cost reductions and operational benefits beyond critical systems

<u>The more you know about how the asset uses energy the more you can optimize the solution</u>