Army Energy Resilience Update

Mr. J.E. “Jack” Surash, P.E.
Acting Deputy Assistant Secretary of the Army
for Energy and Sustainability

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Energy and water security/resilience ensure available, reliable, and quality power and water to continuously sustain critical missions.

**Army Installations Universe**
- Installation Population: 3,002,873
- Total Army Installations: 156
- National Guard & Reserve Centers: >2,200
- Total Land (acres): 13,591,251
- Buildings (ft²): 982,668,264

**Office of Energy Initiatives (OEI)**
- 11 Energy Projects in Operation
- 325 MW Onsite Generation Capacity
- 81% Islandable Projects (onsite generation, storage & controls)
- $627M Estimated Private Capital Investment

**Utilities Privatization: 151 Privatized Systems**
- Water: 35
- Wastewater: 34
- Electric: 45
- Gas: 35
- Heat/Power: 2

**FY 19 ERCIP:** 8 Projects / $40.5M

**Energy Managers / Resource Efficiency Managers:** 168

**FY18 Energy Sources:**
- Electricity: 43.4%
- Natural Gas: 38.2%
- Fuel Oil: 4.1%
- Renewable Energy: 5.0%
- Other: 9.3%

**Installation Energy & Water Plans:**
- Due Sep 2019, 2020, 2021

**Energy and Water Cost / Consumption**
- $1.1B Energy / 75.1T BTUs / year
- $86.9M Potable Water / 31.2B GALs / year

**Combined Heat & Power (CHP)**
- 14 Projects / 109 MW

**Sustainable Buildings: ≥ LEED Silver (FY05-18)**
- 961 Buildings

**Demand Response:** 16 Installations Participating

**Enterprise Metering System**
- >21,000 Electric, Gas & Water Meters

**Facility Related Control Systems**
- Inventory Underway

**Army Directive 2017-07**

**Installation Energy & Water Security Policy**

**Army Energy & Water Cost / Consumption**

- $1.1B Energy / 75.1T BTUs / year
- $86.9M Potable Water / 31.2B GALs / year

**Energy and Water Resilience and Security Enables Army Readiness**

**Energy Use Intensity since FY15:** 5.7%

**Water Use Intensity since FY07:** 34.6%

**FY18: $114M Investment**

**Army Directive 2017-07**

**Installation Energy & Water Security Policy**

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**Energy Savings Performance Contracts (ESPCs) / Utility Energy Service Contracts (UESCs)**
- $2.9B Total Third-Party Investment
- 637 Total Task-Orders and Mods
- FY18: $114M Investment

**Energy and Water Universe**
**Physical Natural Cyber**

### Historic Army Utility Outages

- Utility outages include electricity, natural gas, steam, water, wastewater, and hot or chilled water
- Outages have increased in the last two years
- In FY18, the largest causes of outages were acts of nature and equipment failure

### Reported Utility Outages (hrs)

<table>
<thead>
<tr>
<th>Year</th>
<th>Outages (hrs)</th>
</tr>
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<tbody>
<tr>
<td>FY16</td>
<td>5,000</td>
</tr>
<tr>
<td>FY17</td>
<td>10,000</td>
</tr>
<tr>
<td>FY18</td>
<td>25,000</td>
</tr>
</tbody>
</table>

Notes: FY16 and FY17 reporting only captured outages > 8 hrs
FY18 reporting includes all outages, with 96% > 8 hrs
FY18 reported outages without impacts from acts of nature in Puerto Rico are 11,810 hrs
“Our adversaries and strategic competitors will increasingly use cyber capabilities to seek political, economic, and military advantage over the United States and its allies and partners.”

“China has the ability to launch cyber attacks that cause localized, temporary disruptive effects on critical infrastructure in the United States.”

“Russia has the ability to execute cyber attacks in the United States that generate localized, temporary disruptive effects on critical infrastructure… Moscow is mapping our critical infrastructure with the long-term goal of being able to cause substantial damage.”

Daniel R. Coats, Director of National Intelligence
Testimony to Senate Select Committee on Intelligence, January 29th 2019
1. Focus must be on **resilience**, using efficiency where it makes sense

2. Focus efforts on critical facilities and **resilience** at the critical facilities

3. Propose deals where **savings are shared** with the Army **along the way**

4. **Reduce risk** and concern associated with the long periods of payback

5. **Reduce** energy **consumption** at critical facilities, to reduce needed backup power

6. Focus on **replacing and upgrading critical infrastructure** components that serve, or could serve, an energy resilience role
7. Focus on **microgrids** to provide **back-up power**, as well as **peak demand reduction**

8. Prioritize **installation generation**, such as solar PV and natural gas, that could serve as a microgrid component

9. **Prioritize building control systems** that are tied or ready to be tied into campus or enterprise control schemes

10. Consider **“hardening” facilities** to better withstand physical attack to contribute to resilience

11. Help Army installations participate in **electricity demand reduction** programs

12. Consider **adding ISO 50001** (Energy Management) to guarantee savings

13. Consider implementing a **program similar to the Portland GE backup generator program** at Army installations
Demand Response is a program offered by electric utilities or service providers that provides customers a financial incentive to reduce electricity usage during a given time period.
Win-Win Solutions with Dispatchable Standby Generation:
Provides utilities with generation to meet non-spinning reserve requirements. Increases resilience and simplifies Army logistics of testing, fueling and maintaining generation assets.
Energy Resilience through Microgrids

<table>
<thead>
<tr>
<th>Driver</th>
<th>Critical mission requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Footprints</td>
<td>Uninterruptable and critical footprints, interdependencies, and emergency response</td>
</tr>
<tr>
<td>Risk Considerations</td>
<td>Threat/hazards with associated impact</td>
</tr>
<tr>
<td>Solutions</td>
<td>Load management PLUS O&amp;M, infrastructure, and onsite generation and storage</td>
</tr>
<tr>
<td>Project Prioritization</td>
<td>Meeting mission need, reducing risk, cost effective alternatives analysis</td>
</tr>
</tbody>
</table>
Implementation Methods

Appropriated
- Military Construction
- Energy Resilience and Conservation Investment Program
- Restoration and Modernization
- Army Working Capital

Third-Party
- Utility Energy Service Contracts / Energy Savings Performance Contracts
- Utility Privatization
- Private Capital (Office of Energy Initiatives)
- Enhanced Use Leases

Low Cost/No Cost
- Planning
- Installation Energy and Water Plans
- Best Management Practices
- Energy Resilience Readiness Exercises
Thank You

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