Army's Pivot to Resilience

The Federal Utility Partnership Working Group

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Army Energy and Water Universe

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

Army Universe

Installation Population:	3,002,873
Total Army Installations:	156
National Guard & Reserve Centers:	>2,800
Total Land (acres):	13,591,251
Buildings (ft^2):	982,668,264

9.6% Energy Use Intensity since FY15 vs 5% FY17 Goal

32% Water Use Intensity since FY07 vs 20% FY17 Goal

Army Directive 2017-07,
Installation Energy & Water Security Policy
(February 23, 2017)

FY 2017 ARMY
Energy & Water Cost / Consumption

$1.1B Energy 71.8T BTUs/year
$86.9M Potable Water 31.2B GALs/year

Office of Energy Initiatives (OEI)

11 Awarded Energy Projects
325 MW Onsite Generation Capacity
42% Islandable Projects *(onsite generation, storage & controls)*

Utilities Privatization: 145 Privatized Systems

Water	34
Wastewater	33
Electric	42
Gas	34
Heat/Power	2

Combined Heat & Power (CHP) Strategy

14 Projects / 109.2 MW

Sustainable Buildings: ≥ LEED Silver (FY05-17)

919 Buildings

Demand Response: 16 Installations Participating

Enterprise Metering System

> 21,000 Electric, Gas & Water Meters

Facility Related Control Systems

Energy / Resource Energy Managers: 179

FY 2017 Energy Sources:

- Electricity: 45.2%
- Natural Gas: 34.6%
- Fuel Oil 4.4%
- Other 15.8%

Installation Energy & Water Plans: In Progress

Energy Resilience & Conservation Investment Program (ERCIP):

FY 2019: 6 Projects / $31.2 M

Energy Savings Performance Contracts (ESPCs)/ Utility Energy Service Contracts (UESCs)

$2.8 B Total Third-Party Investment
637 Total Task-Orders and Mods
FY 2017: $289.3M Investment

Energy and Water Resilience

"It is now undeniable that the homeland is no longer a sanctuary. … attacks against our critical defense, government, and economic infrastructure must be anticipated"

National Defense Strategy 2018

"The Secretary of Defense shall ensure the readiness of the armed forces for their military missions by pursuing energy security and energy resilience"

10 USC 2911 (2018 NDAA)

Addressing Vulnerabilities:
Pivot from focus on efficiency and compliance to
ENERGY AND WATER RESILIENCE

SecArmy Directive 2017-07 (Installation Energy and Water Security Policy)

- CRITICAL MISSION SUSTAINMENT (CMS): Critical mission continuity of operations for a minimum of 14 days
- ASSURED ACCESS (AA): Dependable supply of energy and water needed to meet evolving mission requirements during normal and emergency response operations
- INFRASTRUCTURE CONDITION (IC): Infrastructure capable of on-site storage and flexible and redundant distribution networks to reliably meet mission requirements
- SYSTEM OPERATION (SO): Trained personnel conduct required energy and water security system planning, operations and sustainment activities

Army installations – A whole flock of pink flamingos?

The year is 2030: Army has invested in training and equipment but took risk in installation infrastructure

Cyber attack disrupted power supplies, including communications

Key external utility, water, and energy control systems under attack

Authorized mobilization and deployment to counter the invasion in allied nation

Systems below the threshold of "critical," disrupted

The Army is unable to deploy

Black Swans = unknown, unknowns

Pink Flamingos = known, knowns

http://madsciblog.tradoc.army.mil/91-army-installations-a-whole-flock-of-pink-flamingos/

Energy and Water Resilience for Warfighter Readiness

"Secure and reliable access to energy, water, & resources is vital for the Army to perform its mission & support global ops" - *Chief of Staff of the Army Gen. Mark A. Milley*

Critical Mission Sustainment

CONUS assets support operational capabilities – Fort Polk, Louisiana

Rail Deployment – Fort Hood, Texas

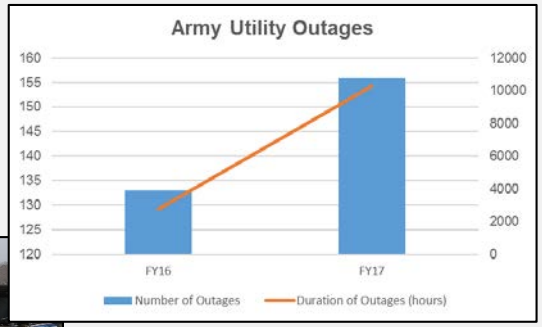
Infrastructure Condition

Water main break at Fort Bragg, North Carolina

Texas ARNG clears downed power lines after Hurricane Harvey, Texas

Assure Access

Annual increase in frequency and duration of outages



Lines for fuel after Hurricane Maria, Puerto Rico

System Operation

Example SCADA System

Backup generator maintenance

Energy Resilience Readiness Exercises

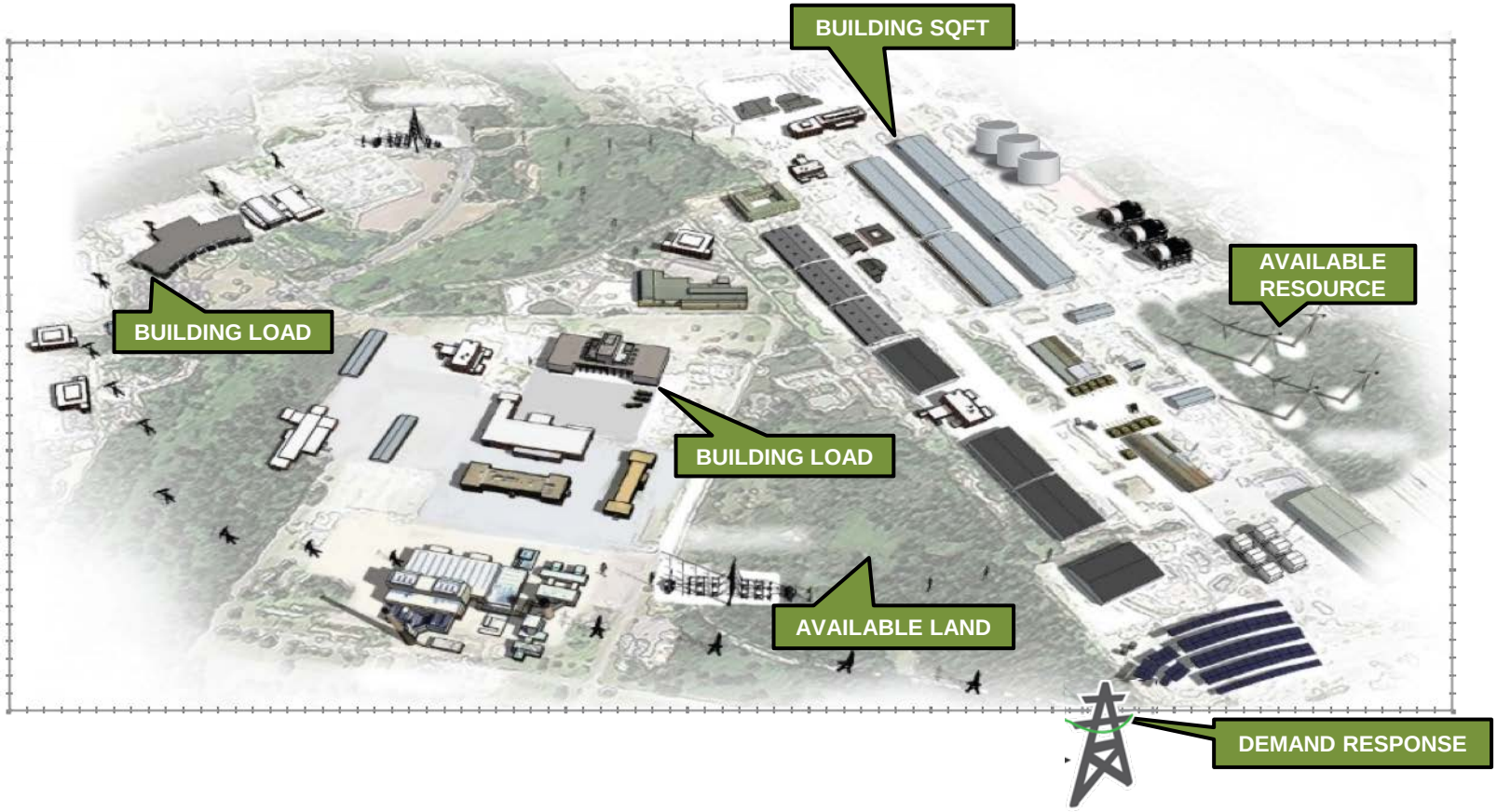
Energy Resilience Readiness Exercises – The simultaneous loss of utility power to a subset or to the entire installation, where backup generation must run at full operational load for an extended period of time

Themes:

- Critical loads not consistently identified
- Critical loads not correctly configured to backup generation
- Uninterruptable power supplies and generator failures related to sizing, maintenance, and testing
- Emergency response plans need to better address communications
- Improved coordination needed between mission owners, DPTMS, DPW, and private support contractors on protocols and priority restoration sequences
- Tabletop exercise do not always uncover concerns or test emergency communications. Only actual testing uncovers interdependencies

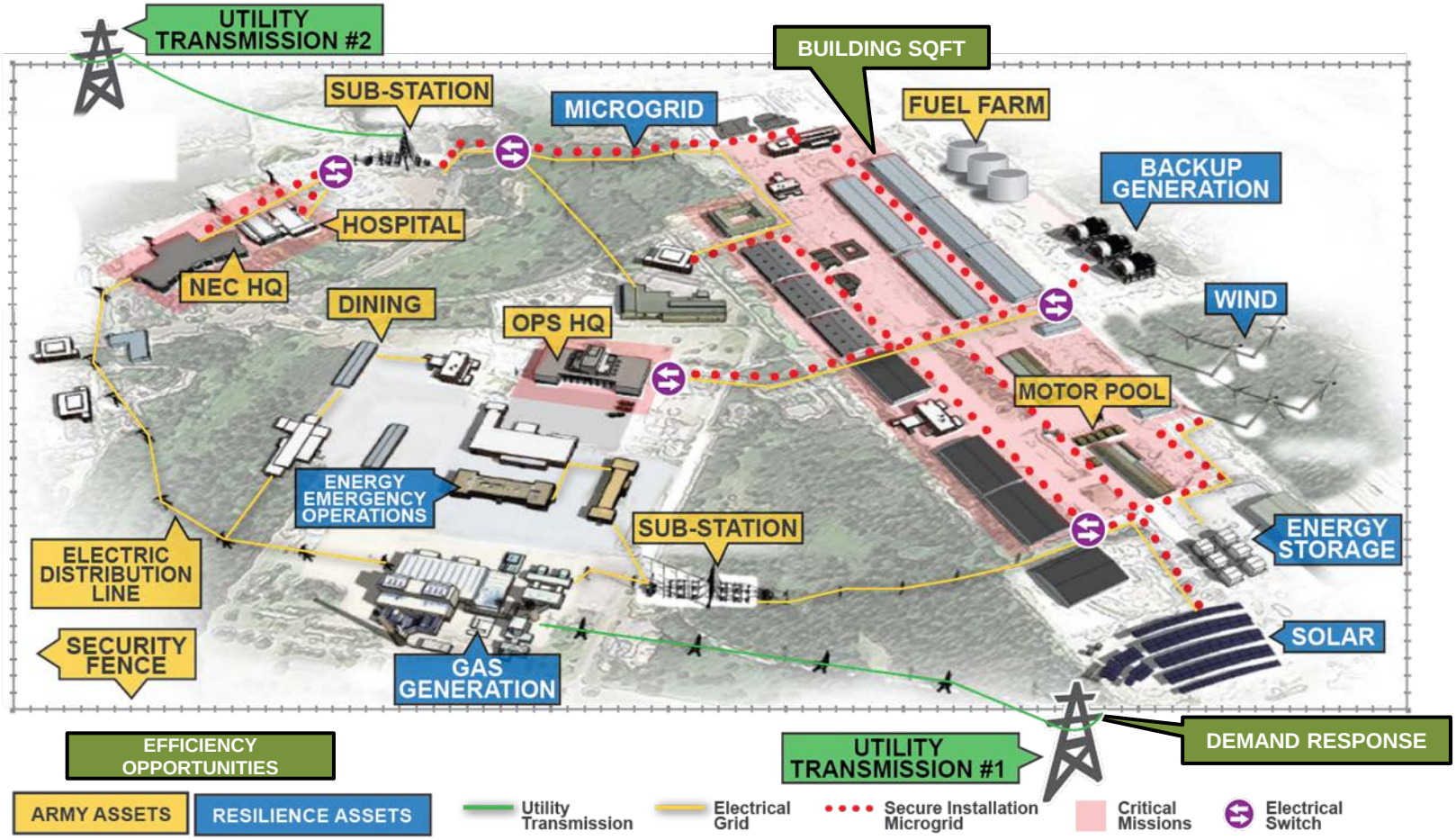
Next Steps: Army considering additional exercises

Efficiency and Conservation



Driver	Federal Mandates
Assessment Footprints	Square-footage and load
Risk Considerations	N/A
Solutions	Building load management strategies and onsite generation
Project Prioritization	Cost effectiveness

Security and Resilience



Driver	Critical mission requirements
Assessment Footprints	Uninterruptable and critical footprints, interdependencies, and emergency response
Risk Considerations	Threat/hazards with associated impact
Solutions	Load management PLUS O&M, infrastructure, and onsite generation and storage
Project Prioritization	Meeting mission need, reducing risk, cost effective alternatives analysis

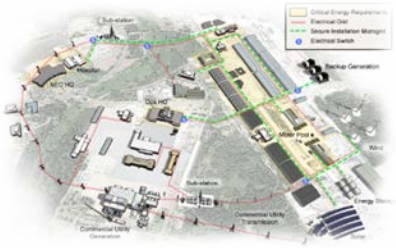
Closing Gaps

Low Cost/ No Cost Management
- Installation Planning
- Best Management Practices
- Energy Resilience Exercises

Appropriated Project Funding
- Military Construction (MILCON)
- Energy Resilience and Conservation Investment Program (ERCIP)
- Operations and Maintenance (O&M)

Third Party Financing
- Energy Savings Performance Contracts (ESPCs)
- Utility Energy Service Contracts (UESCs)
- Utilities Privatization (UP)

Private Financing
- Power Purchase Agreements
- Enhanced Use Leases



Fort Campbell, KY: MILCON
Conceptual drawing a microgrid included in the FY2018 NDAA

Anniston Army Depot, AL: UESC
Replacement and Modernization of Depot-wide central heating and process high pressure steam plants, HVAC equipment and controls, interior and exterior lighting, compressed air equipment and distributions, and potable water fixtures.

Schofield Barracks, HI: Lease
Project: 50 MW / 30 day contingency microgrid where Hawaiian Electric constructed, owns, operates and maintains a 50 MW biofuel/multi-fuel power generation plant, fuel storage tanks, and controls.