Army Energy Resilience and Security

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

Improving Resilience through Microgrids and Battery Storage
Leaders in Energy and Resilient Virginia
October 19, 2017

Army Universe Chart

Army Installations	156
Land Acreage	13,591,251
Buildings (Square Feet)	982,668,264
Relocatables	1,488 (6.30M SQFT)
Leased Facilities	6,923 (27.9M SQFT)
WWII Wood	2,395 (10.3M SQFT)
Aviation	
Airfields	57
Heliports	24
Roads (Paved)	426,052 Lane Miles
Bridges and Dams	
Road Bridges	2,200
Railroad Bridges	149
Dams	254
Utility (Systems) (Electric, Gas, Water and Wastewater)	
Army-Owned	197
Privatized	153

Installation Supported Population	
Military	496,876
Civilian	546,825
Family Members	633,334
Retired Military	345,823
Retiree Family Members	980,015
Totals	3,002,873

FY16
Army Energy
2.7% Reduced Energy Consumption
9.5% Renewable Energy Consumption
Used 62.6T BTU Energy
Used 32 B Gallons Potable Water

Family Housing	
Owned	10,328
Leased	4,176
Privatized	84,743
Lodging (Guest Rooms)	
Rec Lodging	1,080
Privatized	14,164
Armed Forces Rec Ctrs	2,052
Barracks (Spaces)	
Permanent Party	189,927
Privatized	2,408
Training	84,137
Operational Readiness Training Complex (ORTC)	169,773

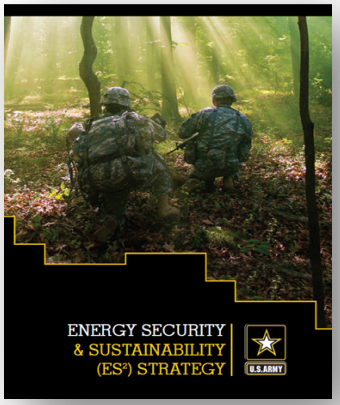
Plant Replacement Value
$437.8B

Deferred Maintenance
$19.1B

Data as of 2d Qtr FY17

Energy Security and Sustainability Strategy

Army Energy Security & Sustainability (ES2) Strategy



Find it at:
https://www.army.mil/e2/c/downloads/394128.pdf

3. Assure Access

- Diversify and Expand Supply
- Maximize Flexibility in System Design
- Reduce Vulnerability and Risks

1. Inform Decisions

- Incorporate Resource Sustainability into Plans and Processes
- Educate and Train
- Lead by Example

4. Build Resilience

- Maintain Continuity of Operation
- Foster Adaptability
- Adapt to Uncertain, Changing Conditions

2. Optimize Use

- Decrease Resource Demand
- Increase Resource Efficiency
- Support Resource Recovery

5. Drive Innovation

- Leverage Expertise
- Expand Collaboration
- Continuously Improve

Energy & Water Security Policy: Army Directive 2017-07

Signed 23 February 2017 by the Acting Secretary of the Army

Army Directive 2017-07 (Installation Energy & Water Security Policy): http://www.asaie.army.mil/Public/ES/doc/Army_Directive_2017-07.pdf

Key Elements of the Strategy Include:

- Supports the Army's ability to project power and support global operations
- Sets a requirement to **secure critical missions** by providing necessary energy and water *for a minimum of 14 days*
- Sets a requirement for **sustainment of all installation missions**
  - Secure Critical Missions
  - Assured Access to Resource Supply
  - Reliable Infrastructure Condition
  - Effective System Operations

Key Next Steps:

- Develop business rules for defining and assessing energy and water security risks and for prioritizing mitigation actions
- Assess programming resources to address gaps in critical energy and water security requirements and submit a resourcing strategy

Army OEI Renewable and Alternative Energy Security Projects

- 88% with Onsite Generation
- 47% with Onsite Storage
- 51% with Onsite Controls
- 45% Islandable *
- 45% Solar
- 39% Biomass / Biofuel
- 12% Wind

** An islandable project is defined as a project with onsite generation, onsite storage, and controls.*

60 MW Biomass at Ft. Drum, NY
Provides onsite generation through a microgrid

8.5 MW Hydro at Rock Island Arsenal, IL
Access to onsite contingency generation through a microgrid

15 MW Solar at Ft. Detrick, MD
Access to onsite non-contingency generation

16 MW Solar at JFTB Los Alamitos, CA
Access to onsite contingency generation through a microgrid

50 MW Natural Gas / 20 MW Solar at Ft. Sill, OK
Access to onsite contingency generation through a microgrid

7 MW Solar at Anniston Army Depot, AL
Microgrid-ready onsite generation, feeds the external grid

23 MW Solar at Ft. Jackson, SC
Onsite generation, infrastructure improvements, feeds the external grid

18 MW Solar at Ft. Huachuca, AZ
Microgrid ready onsite generation, feeds the external grid

10 MW Solar at Redstone Arsenal, AL
Access to onsite non-contingency generation

30 MW Solar at Ft. Gordon, GA
Microgrid-ready onsite generation, feeds the external grid

13 MW Solar at Ft. Benning, GA
Access to onsite contingency generation through a microgrid

30 MW Solar at Ft. Benning, GA
Microgrid-ready onsite generation, feeds the external grid

50 MW Wind / 15 MW Solar at Ft. Hood, TX
Access to onsite non-contingency generation

50 MW Biofuel at Schofield Barracks, HI
Access to onsite contingency generation through a microgrid

14 MW Solar at Camp Shelby, MS
Microgrid-ready onsite generation, feeds the external grid

10 MW Solar at Ft. Rucker, AL
Microgrid-ready onsite generation, feeds the external grid

30 MW Solar at Ft. Stewart, GA
Microgrid-ready onsite generation, feeds the external grid

As of October 17, 2017

Project Status

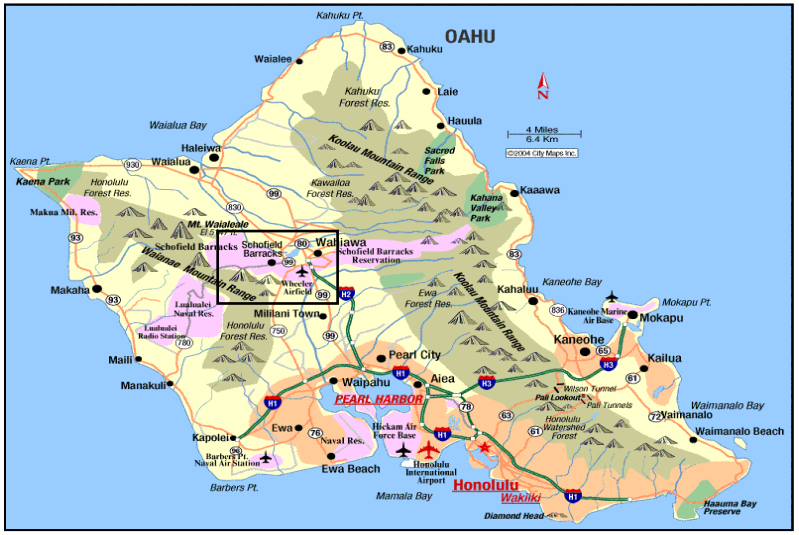
- ***Phase 1:*** Assessment
- ***Phase 2:*** Validation
- ***Phase 3:*** Contracts & Agreements
- ***Phase 4:*** Construction
- ***Phase 5:*** Operational

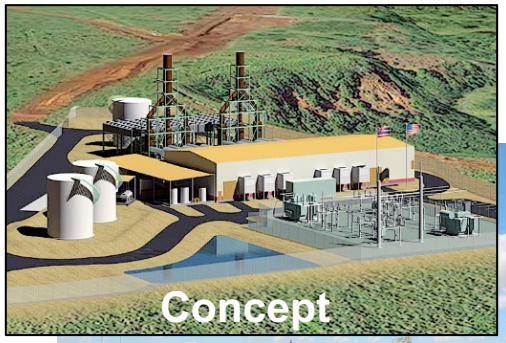
Renewable & Alternative Energy Key

Biomass, Biofuel, CHP, Geothermal, Hydro, Natural Gas, Solar, Wind, No Storage, No Controls, Battery Storage, Controls, Storage, "Islandable"

INCREASING **ENERGY SECURITY** AND **RESILIENCE** ACROSS ARMY INSTALLATIONS

Third Party Energy Security Project: Schofield Barracks, HI





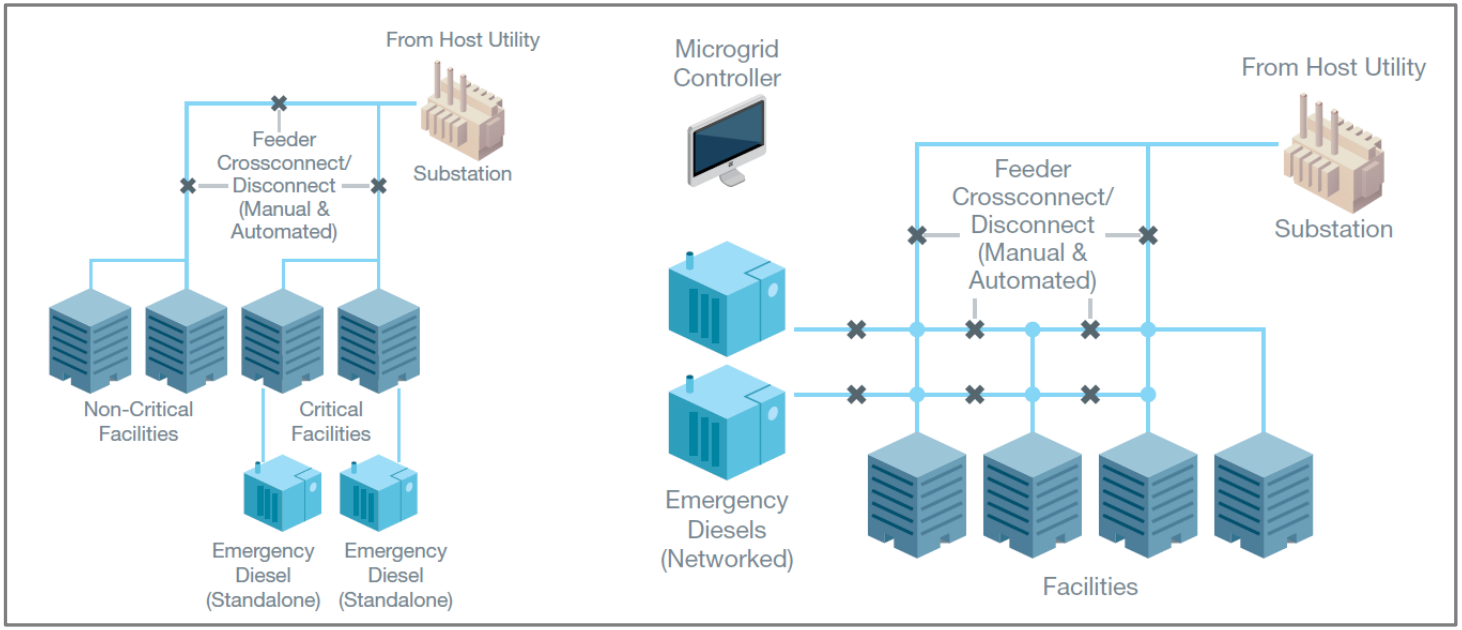
- Hawaiian Electric will construct, own, operate & maintain a 50 MW biofuel power generation plant
- The project is Oahu's only power generation facility above the tsunami strike zone
- During normal operations, power will flow to grid serving Army and Oahu
- During grid emergency, plant will provide 50 MW of "first call" and blackstart capability to three Army installations simultaneously; 5 days of fuel storage onsite, 30 days of fuel storage on island
- 50 MW of firm power sufficient to meet 100% of peak electricity demand at Schofield Barracks, Wheeler Army Airfield, and Field Station Kunia

Will Provide 100% Power to Three Installations in the Event of a Grid Outage

Microgrids and Standalone Generators

Overview from the December 2016 PEW Microgrid Report*

- Goal -- Balance supply and demand and operate in parallel to the grid
- Microgrids offer a fundamentally different way of providing energy security than standalone, building-tied generators (on left) – very simple microgrid (on right) relies solely on large diesel generators for backup power



Current Paradigm of Small Building-Tied, Standalone Generators

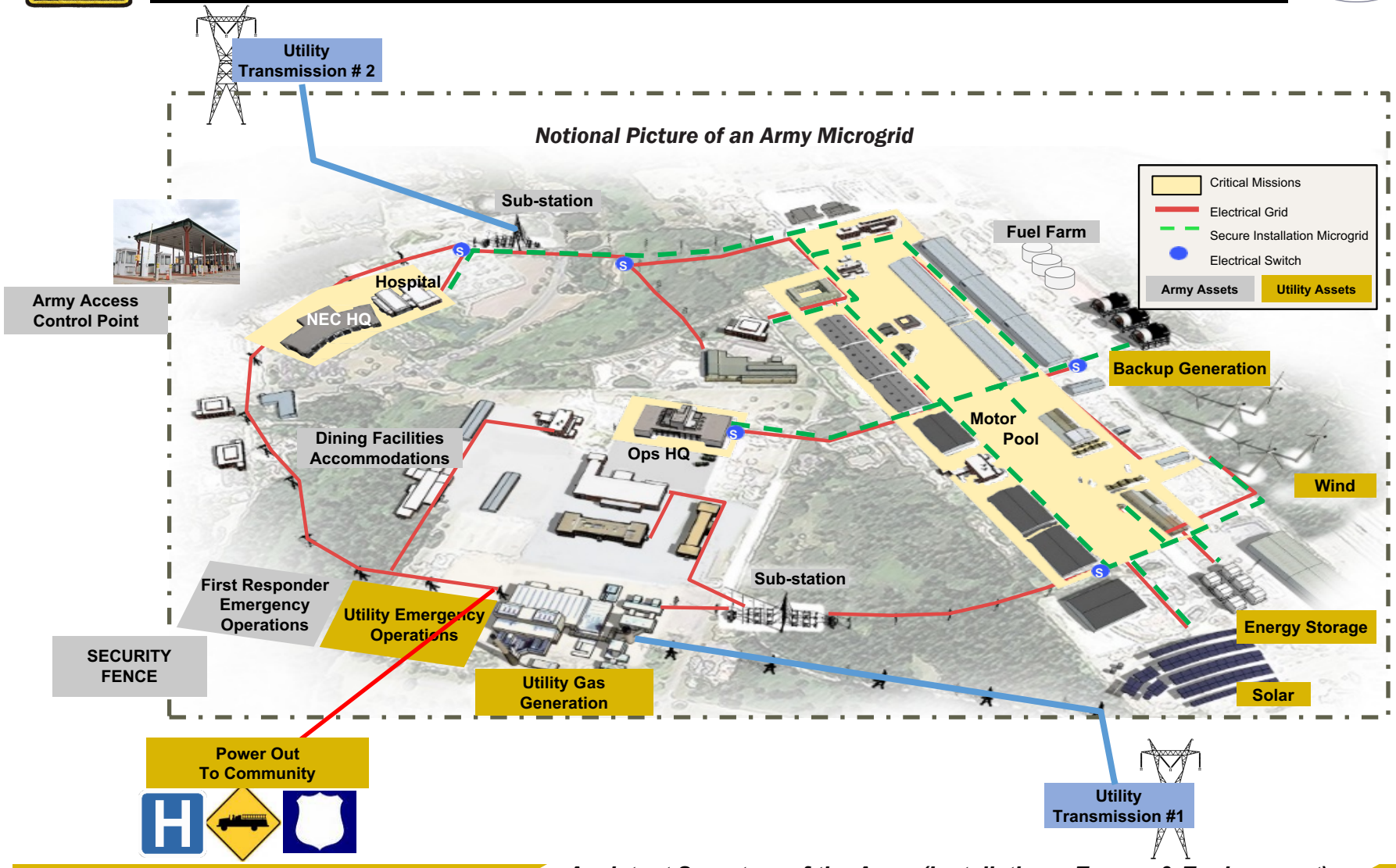
Microgrid with Larger Networked Generators

"Over their 20-year lifetimes on a net cost basis, an all-diesel microgrid can save large military installations from $8 to $20 million in energy security spending. The savings within that range is dependent on the region of the U.S."

- 2016 PEW Microgrid Report

* "Power Begins at Home: Assured Energy for U.S. Military Bases", report Commissioned by The Pew Charitable Trusts, December 30, 2016

Community Resilience



Energy Action Month 2017