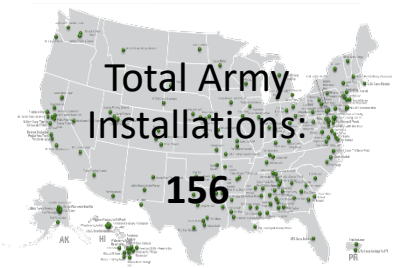
UNC Clean Tech Summit:
Energy Innovation to Support the Military Mission

28 February 2018

Mr. Michael McGhee
Executive Director
U.S. Army Office of Energy Initiatives

Army Installation Universe

Installation Population:
3,002,873



National Guard & Reserve Centers:
>2,800

Total Land (acres):
13,591,251

Buildings (ft²):
982,668,264

Army Installation Energy & Water Consumption Costs

Energy Use Intensity since FY03

16.6%

$1.1B Energy 75.5T BTUs/year

$86.9M Potable Water 31.2B GALs/year

Water Use Intensity since FY07

34.6%

Army Office of Energy Initiatives (OEI)

The Office of Energy Initiatives was established by the Secretary of the Army as a task force in 2011, then as a permanent office in 2014

- Serves as central program management office for Army's development, implementation and oversight of **large-scale renewable and alternative energy projects** that leverage private financing
- Secures Army installations with energy that is **resilient, affordable and sustainable**
- Focused on creating an **"islandable" capability** – energy security projects that include onsite generation, storage, and controls

***Fort Hood**, Texas: 65 MW AC Hybrid Wind & Solar Projects; Expected to provide $100 million in cost avoidance over the term of the 30-year contract*

***Redstone Arsenal,** Alabama: 10 megawatt (MW) alternating current solar project with Army's first privately funded, commercially available battery storage solution*

***Schofield Barracks**, Hawaii: 50 MW Biofuel/Multi-fuel Project operational since May 2018. Full "Islandable" energy capability expected for Schofield Barracks, Camp Kunia and Wheeler Army Airfield*

Energy Resilience Drives OEI Priorities

"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

- Improve Mission Readiness
  - Energy and water resources are critical mission enablers required to train, sustain, and deploy a globally responsive Army
- Modernize Energy Systems
  - New capabilities emerging from advances in distributed energy, smart grids, and storage technologies
- Reform Army Business Practices
  - Attract private sector capabilities and capital to ensure Army energy systems are equipped with best capabilities to withstand modern threats

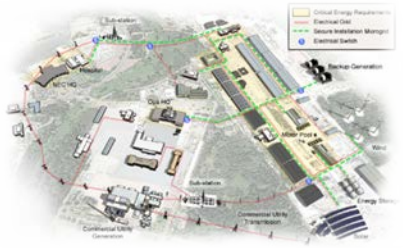
Funding Resilience

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



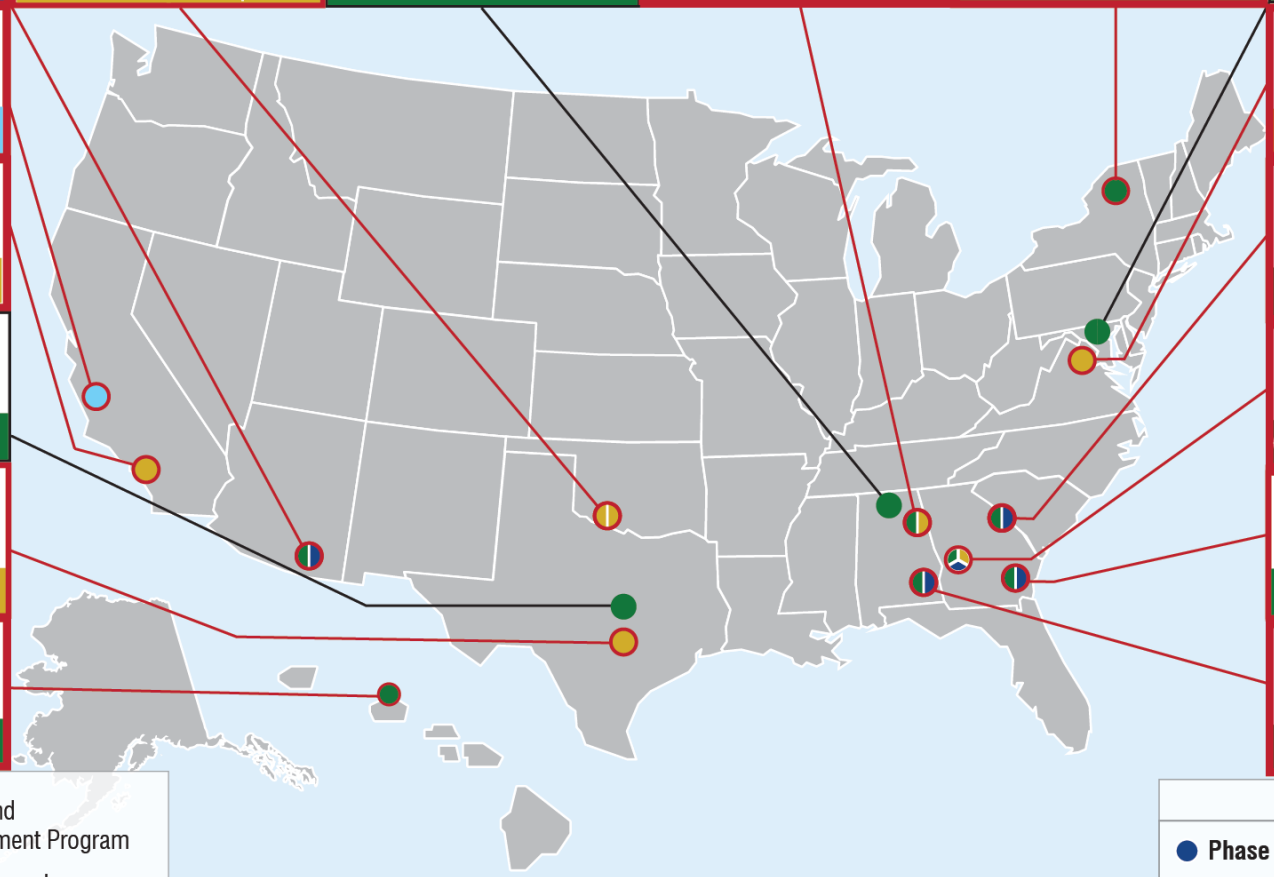
Fort Campbell, KY: MILCON
Conceptual drawing a microgrid included in the FY2018 NDAA

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 multi-fuel power generation plant, fuel storage tanks, and controls.

Army Office of Energy Initiatives (OEI)
Current Energy Projects Portfolio

As of February 2019



FT. HUACHUCA, AZ 1&2
ERCIP

FT. SILL, OK 1&2
Microgrid, ERCIP

REDSTONE ARSENAL, AL
PPA

ANNISTON ARMY DEPOT, AL 1&2
Microgrid, ERCIP

FT. DRUM, NY
Microgrid, PPA

FT. DETRICK, MD
PPA

CAMP ROBERTS, CA
Microgrid

JFTB LOS ALAMITOS, CA
Microgrid

FT. HOOD, TX
PPA

CAMP MABRY, TX
Microgrid, ERCIP

SCHOFIELD BARRACKS, HI
Microgrid

HUMPHREYS ENGINEER CENTER, VA
Microgrid

FT. GORDON, GA 1& 2
Microgrid, ERCIP

FT. BENNING, GA 1-3
Microgrid, ERCIP

FT. STEWART, GA 1&2
ERCIP

FT. RUCKER, AL 1&2
Microgrid, ERCIP

ERCIP - Energy Resilience and Conservation Investment Program

PPA - Power Purchase Agreement

Project Status

- **Phase 1**: Assessment
- **Phase 2**: Validation
- **Phase 3**: Contracts and Agreements
- **Phase 4**: Construction
- **Phase 5**: Operational
- Islandable Capability

Renewable and Alternative Energy Key

Biofuel	Diesel	Hydro	Solar	Battery Storage	Controls	No Controls
Biomass	Generation	Natural Gas	Wind	Storage / Supply	No Storage	No Generation

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

Energy Security Project Concept: Fort Sill, OK

Project Concept: National, Community and Utility Energy Security Alignment

Public Service Corporation of Oklahoma may construct, own, operate and maintain approximately 36 MWs natural gas fueled grid-facing power plant and approximately 14 MW solar PV array with controls.

Army Benefit The project would enhance energy resilience by locating on-demand generating assets on Fort Sill that are capable of suppling reliable power to mission critical facilities during a commercial grid disruption.

Utility Benefit Utility gains a distributed asset enhancing grid reliability in normal operations that aligns with their Integrated Resource Plan. Power from the project would flow directly to the commercial grid.

Community Benefit The project provides additional operational flexibility that further improves electrical service to the surrounding Lawton community.

Status Project in pre-negotiation stage. NEPA is underway in 1st public comment period and consultation phase.

Anniston Army Depot 2, AL

ANAD is the designated Center of Industrial and Technical Excellence

Proposed RICE Generation Plant at Nichols Complex

Project: Construction of a 7.5 MW RICE generator and microgrid controls through FY20 ERCIP funding

Nichols production area will have the capability to isolate from the larger power grid into a self-sufficient microgrid with continuous power generation capacity to meet power demand for critical missions at Anniston Army Depot (ANAD). The microgrid will provide operational reliability, maintenance sustainability, safety, and intelligent management to critical loads utilizing both new and existing generation assets.

Army Benefit: Onsite generation will power 50% of critical loads during a grid outage for minimum of 14 days. The microgrid will provide operational reliability, maintenance sustainability, safety and intelligent management by utilizing both new and existing generation assets.

Developer Benefit: Integration of a RICE generator and microgrid system with existing utility owned onsite 7.5 MW solar generation asset.

Status: FY20 ERCIP approved by OSD on 4 FEB 19; currently in contracts and agreements phase.

Energy Diversity at Redstone Arsenal, AL

10 MW Solar Array

Army's First Privately Funded, Economically Viable Battery Storage System

Project: 10 MW Solar Array coupled with 1 MW/2 MWh Battery Storage

SunPower Corporation constructed, owns, operates and maintains a 10 MW solar array with battery storage on Redstone Arsenal

Army Benefit Project brings energy diversity and cost avoidance to Team Redstone. The project is projected to reduce costs by $80,000 per year, resulting in $1.5 million savings for the term of the contract

Developer Benefit SunPower Corporation benefits from selling power to Redstone Arsenal

Community Benefit The project and battery storage system generates on-site fuel-free power for use by Redstone Arsenal and its tenants, and stores a portion of that power to be used to offset power and demand charges during peak rate times. This facility generates enough energy annually to power about 2,500 homes for a year

Status Operational since December 2017

Energy Resilience Project : Ft. Benning, Ft. Gordon, Ft. Stewart, GA

Ft. Benning: 133,950 solar panels, 216 acres

Ft. Gordon: 137,520 solar panels, 271 acres

Ft. Stewart: 137,640 solar panels, 269 acres

Project: 3x30 MW

Georgia Power owns and operates a 30 MW solar project at each of following: Ft. Benning, Ft. Stewart and Ft. Gordon.

Resilience Upgrades To expand and evaluate opportunities to add generation and controls to create resilient microgrid technology, providing power during outages

Utility Benefit Energy generated by the project feeds into Georgia Power's grid, improving the resilience of the grid and supporting Georgia renewable goals

Status

Ft. Stewart: Operational since Jan 2017

Ft. Benning: Operational since Nov 2016

Ft. Gordon: Operational since Dec 2016

Contact Us

Thank you

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