Energy Planning for Resilient Military Installations

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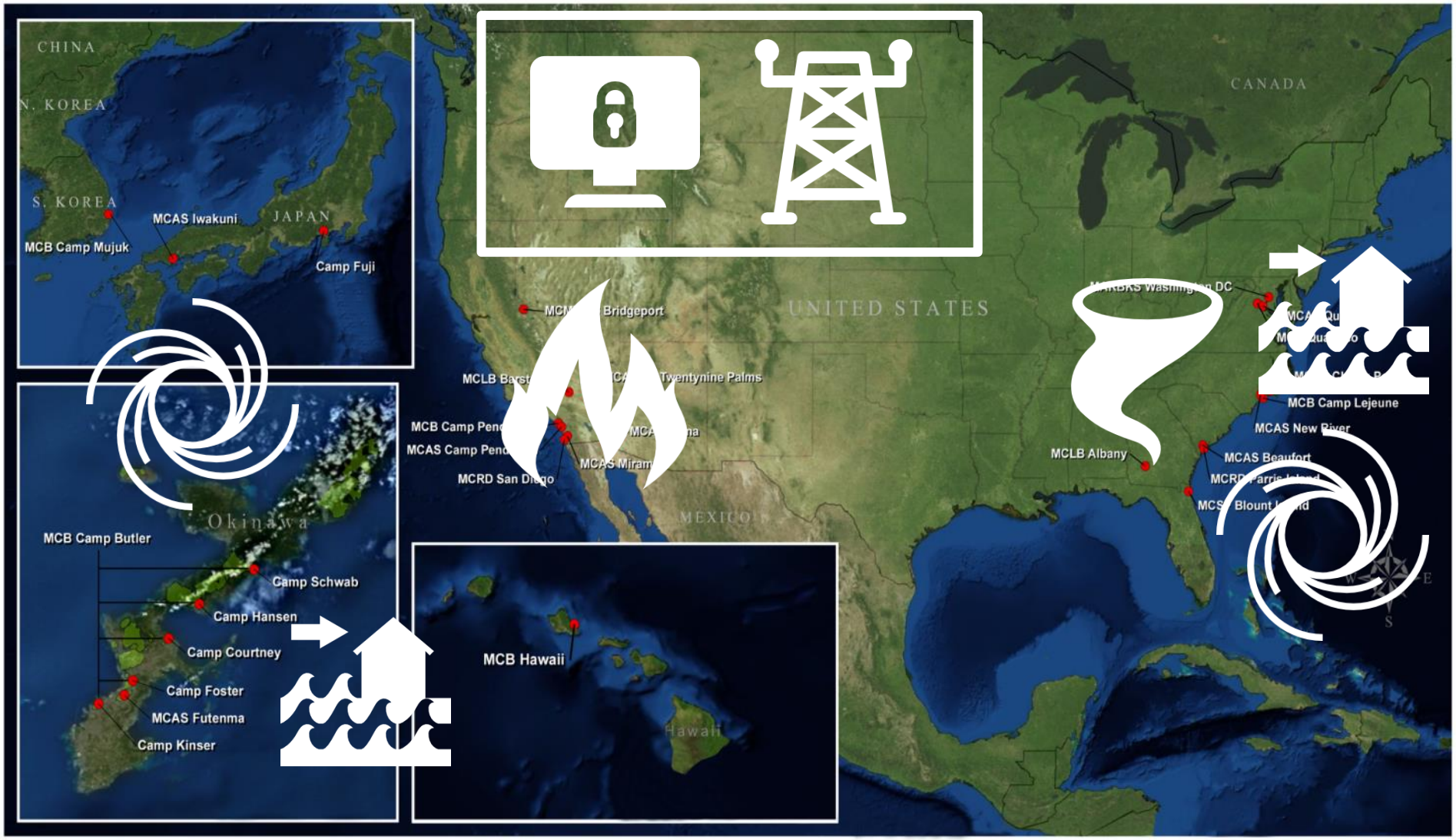
MARINE CORPS ENERGY

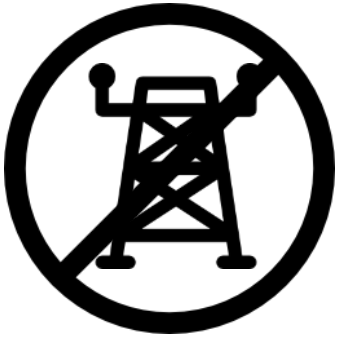
Video 1 – Training or Combat?

Video 2 – Training or Combat?

Threats to Installations

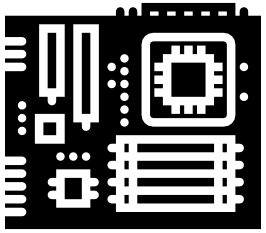


Path to Energy Resilience



Reducing dependence on external suppliers of energy

Hardening energy infrastructure against physical and cyber vulnerabilities



Utilizing microgrids and other smart grid capabilities

Leveraging third-party financing to implement cost-effective project portfolios

Maximizing Resources to Build Resilience Projects

Faced with limited budgets, we are using third-party financing to:

- ✓ **Implement broader, more complex projects**
- ✓ **"Bundle" projects into a blended portfolio to pair resiliency measures with conservation measures**
  - **Standard ECMs:** HVAC, boilers, controls, water, lighting
  - **Challenging "Resiliency" ECMs:** Renewable energy, energy storage, micro-grids, smart-grids, controls, utility upgrades, etc.

Marine Corps practices ‘bundling’ techniques

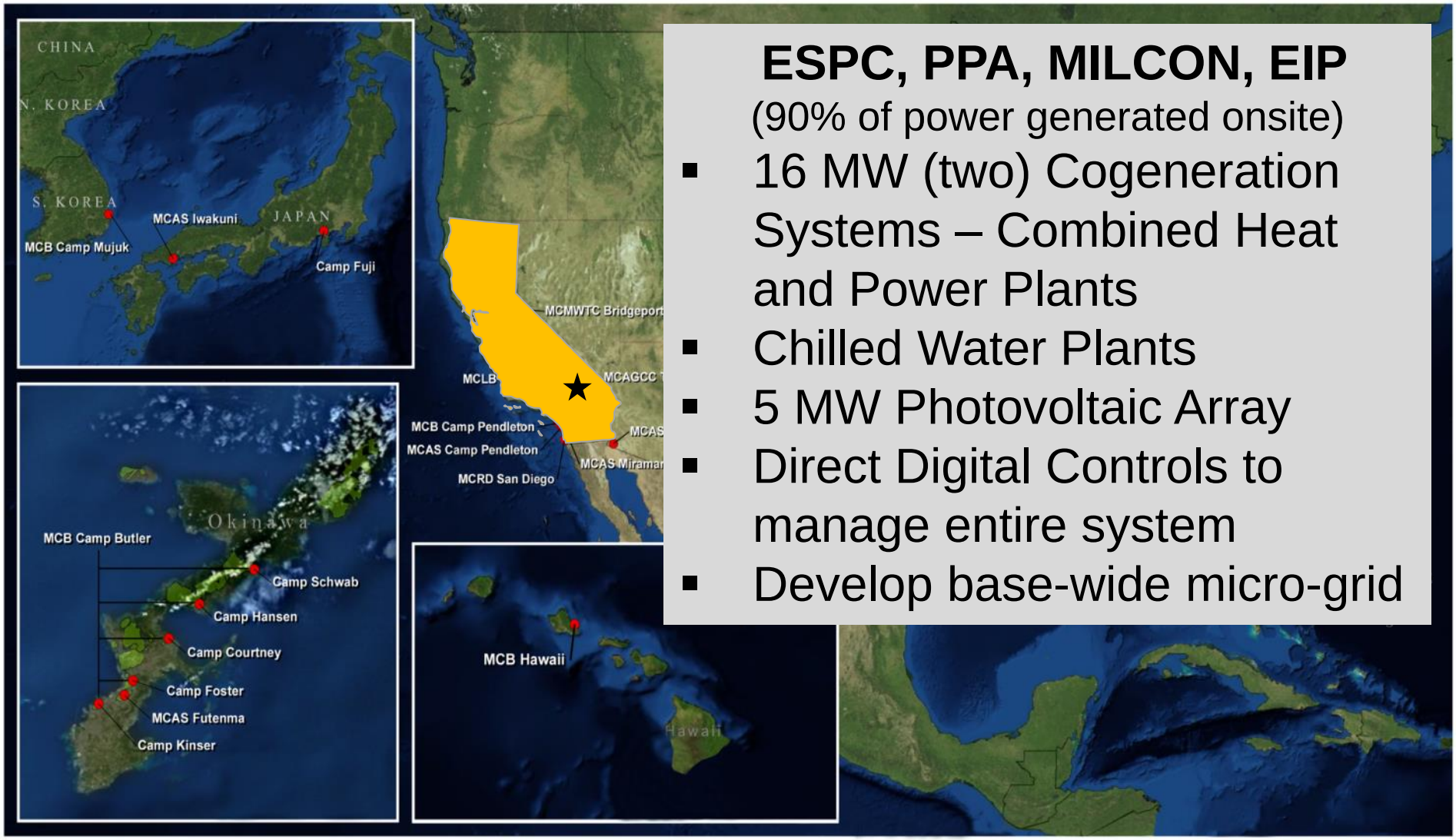
Marine Corps – Current Resilience Projects

MCAGCC Twentynine Palms

Mission: Support large scale combined arms exercises.

Key Challenges: Located in Mohave Desert (extreme heat) and at end of the grid.

MCAGCC Twentynine Palms – Resilience Projects



ESPC, PPA, MILCON, EIP

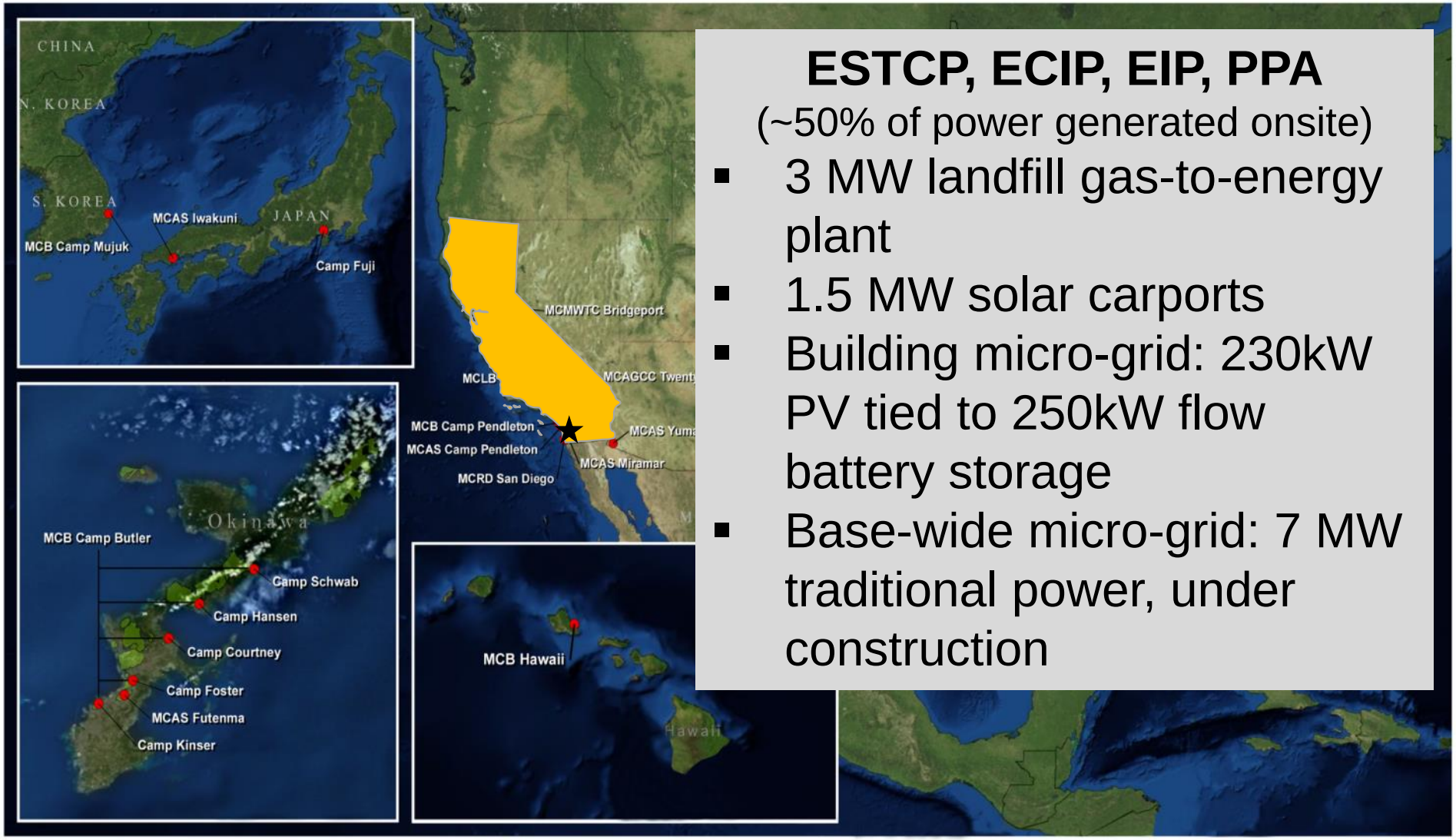
(90% of power generated onsite)

- 16 MW (two) Cogeneration Systems – Combined Heat and Power Plants
- Chilled Water Plants
- 5 MW Photovoltaic Array
- Direct Digital Controls to manage entire system
- Develop base-wide micro-grid

MCAS Miramar

<u>Mission</u>: Train pilots and maintain aircraft for forward deployment.
<u>Key Challenge</u>: Grid instability in Southern California.

MCAS Miramar – Resilience Projects



ESTCP, ECIP, EIP, PPA

(~50% of power generated onsite)

- 3 MW landfill gas-to-energy plant
- 1.5 MW solar carports
- Building micro-grid: 230kW PV tied to 250kW flow battery storage
- Base-wide micro-grid: 7 MW traditional power, under construction

MCAS Miramar – Base Microgrid

Microgrid Backup Power Plant

Energy Operations Center

3.2 MW Landfill Gas Energy Plant

250 KW / 1 MWH Battery Storage

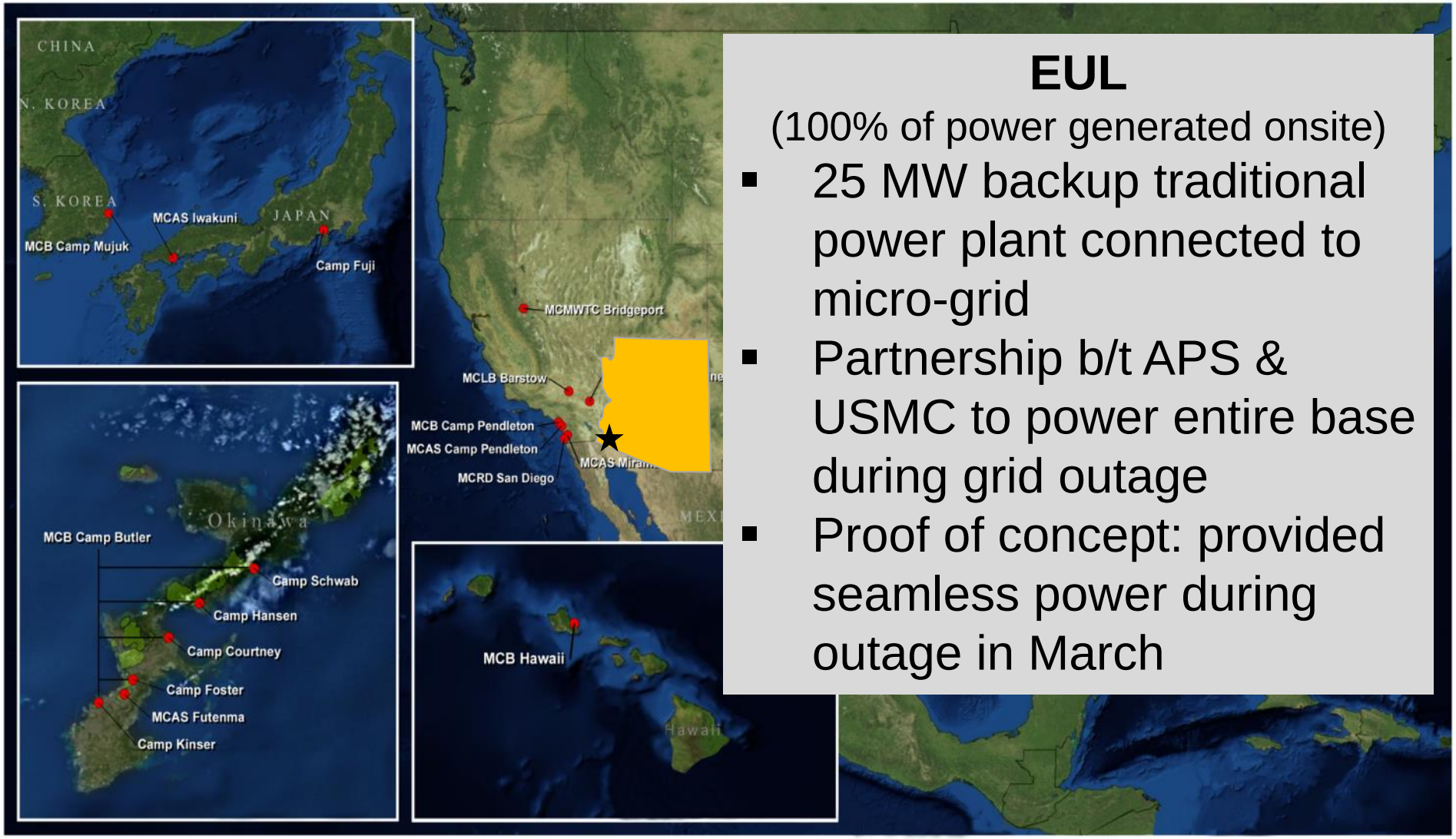
1.5 MW PV Carports

MCAS Yuma

<u>Mission</u>: Train pilots and maintain aircraft for forward deployment.

<u>Key Challenges</u>: Extreme heat, large industrial load (F35) and grid instability.

MCAS Yuma – Resilience Projects



EUL

(100% of power generated onsite)

- 25 MW backup traditional power plant connected to micro-grid
- Partnership b/t APS & USMC to power entire base during grid outage
- Proof of concept: provided seamless power during outage in March

MCRD Parris Island

<u>Mission</u>: Boot Camp for East Coast; provide foundational skills for combat.

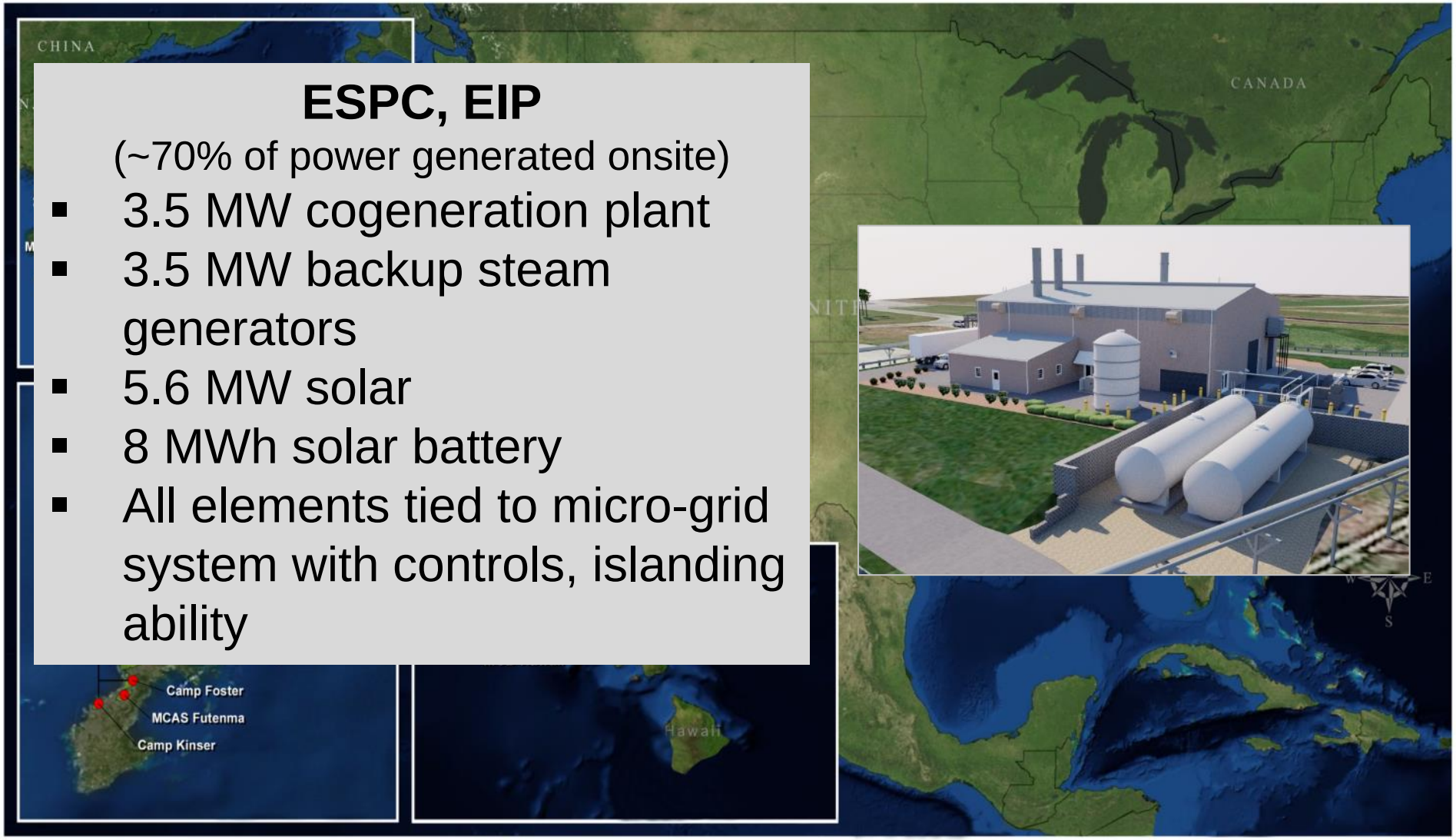
<u>Key Challenges</u>: Hurricanes, power & water come across causeway to island; little toleration for disruptions.

MCRD Parris Island – Resilience Projects

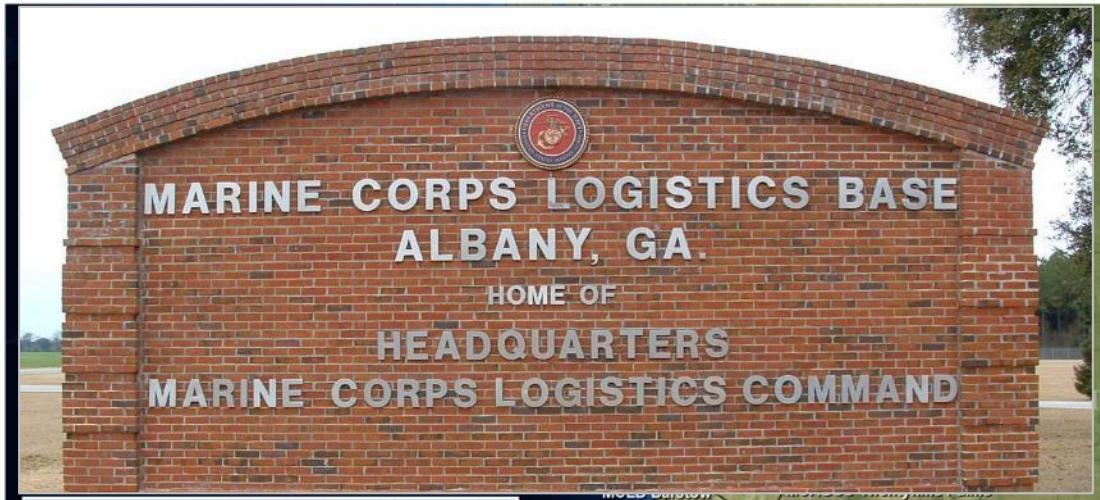
ESPC, EIP

(~70% of power generated onsite)

- 3.5 MW cogeneration plant
- 3.5 MW backup steam generators
- 5.6 MW solar
- 8 MWh solar battery
- All elements tied to micro-grid system with controls, islanding ability



MCLB Albany



<u>Mission</u>: Repair, refurbish ground combat equipment and global supply chain management

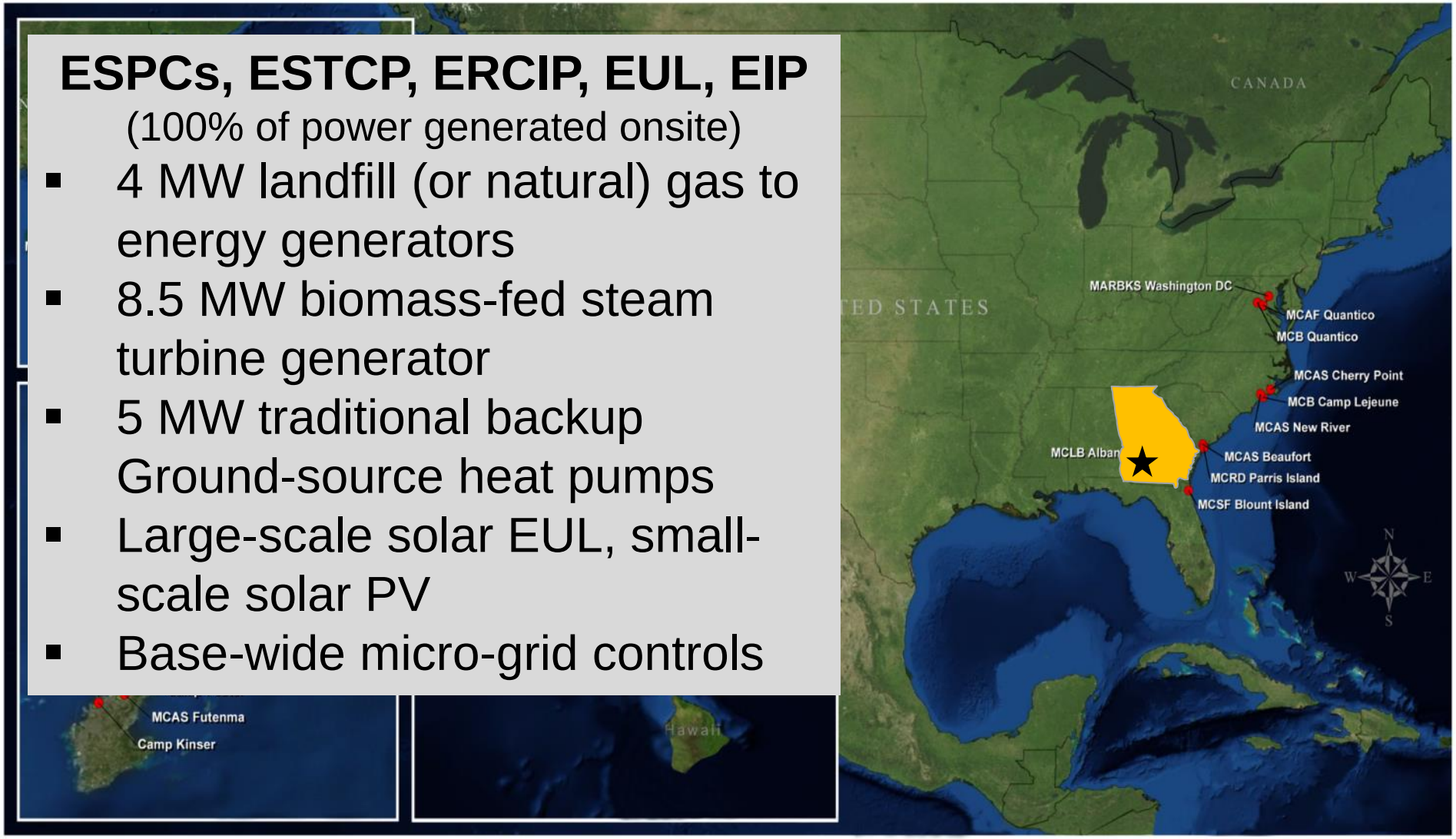
<u>Key Challenges</u>: Remote location, vulnerable to weather; 24/7 industrial operations

MCLB Albany – Resilience Projects

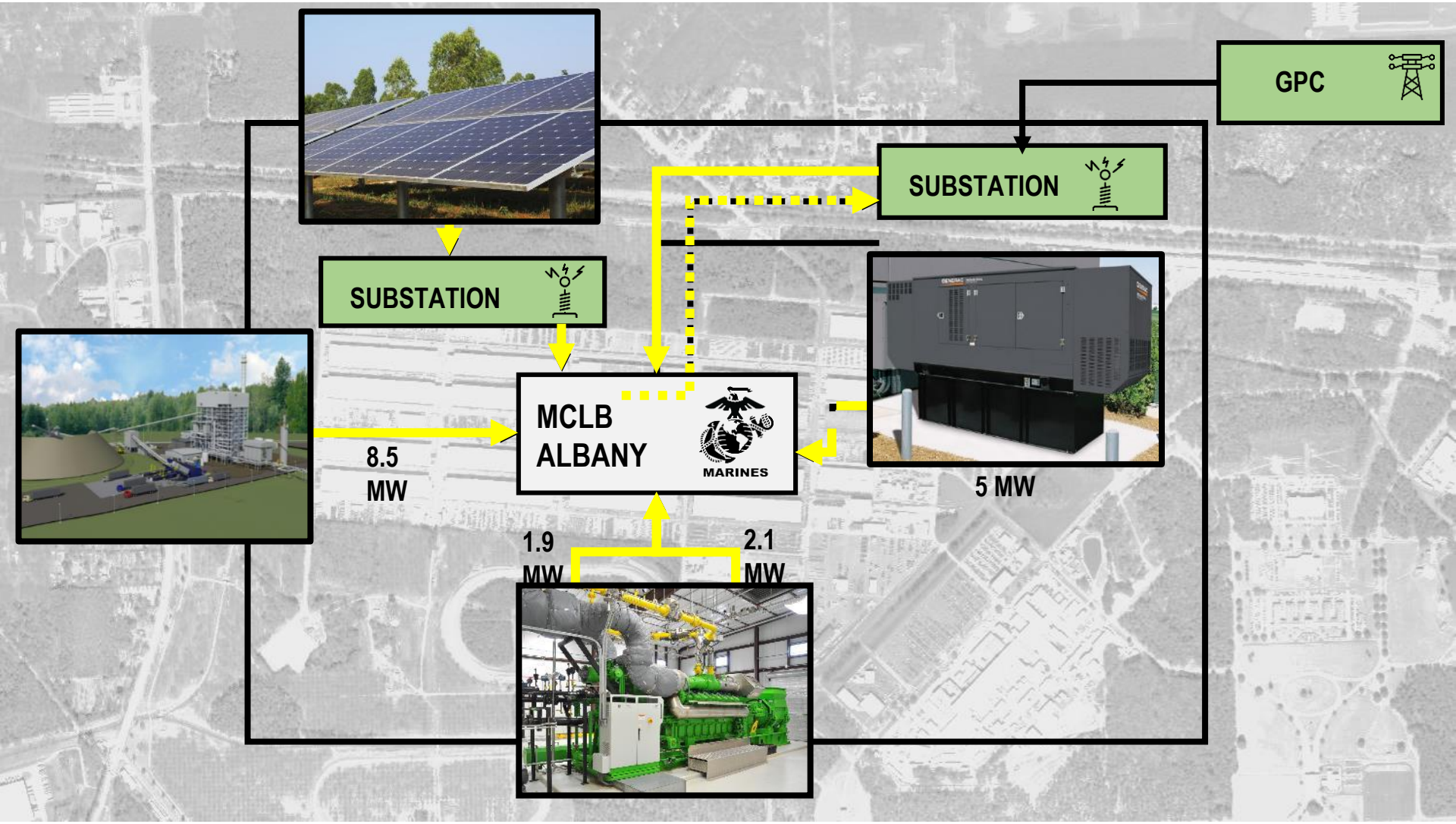
ESPCs, ESTCP, ERCIP, EUL, EIP

(100% of power generated onsite)

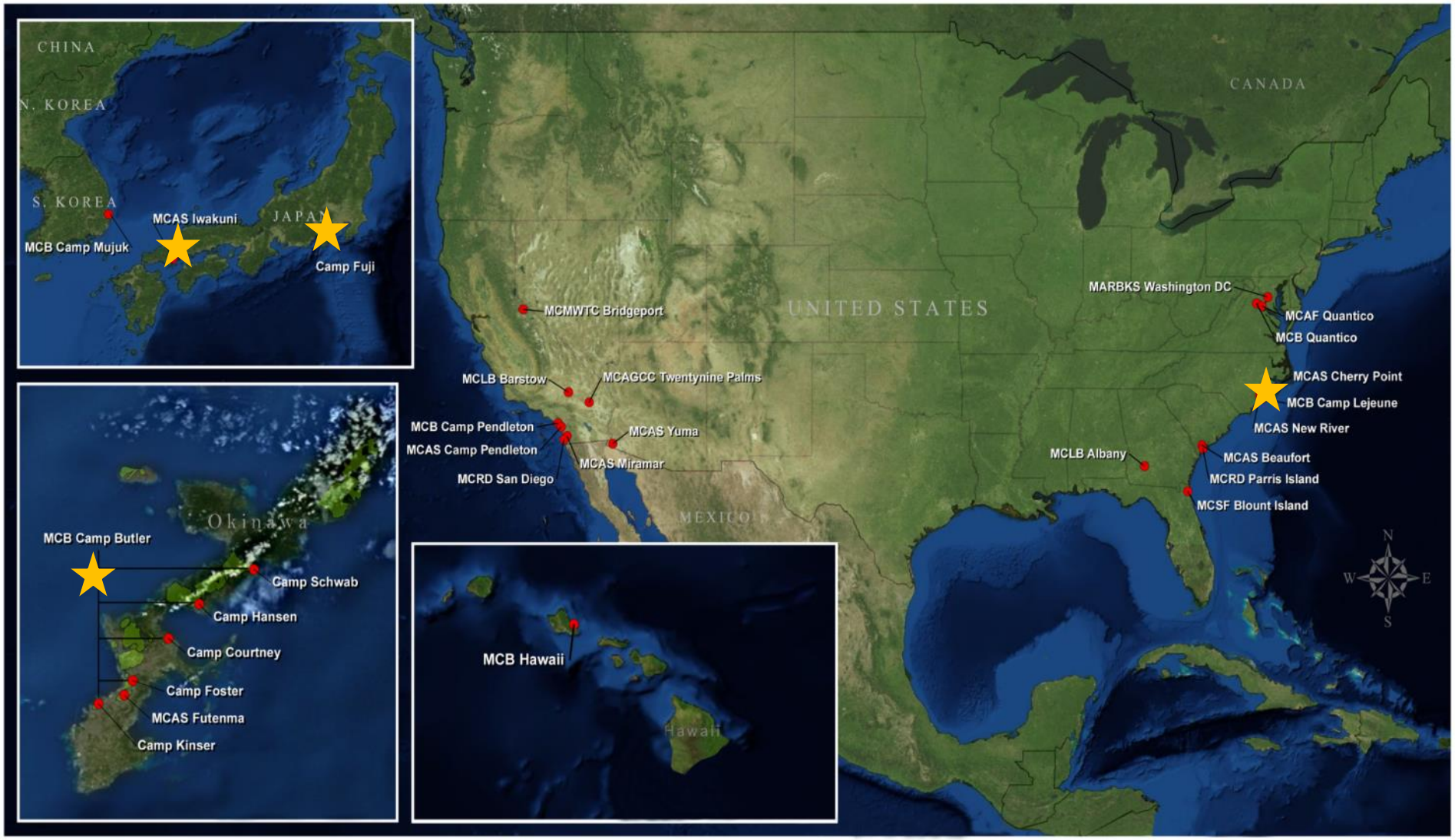
- 4 MW landfill (or natural) gas to energy generators
- 8.5 MW biomass-fed steam turbine generator
- 5 MW traditional backup Ground-source heat pumps
- Large-scale solar EUL, small-scale solar PV
- Base-wide micro-grid controls



Net Zero and Resilience in one Micro-grid

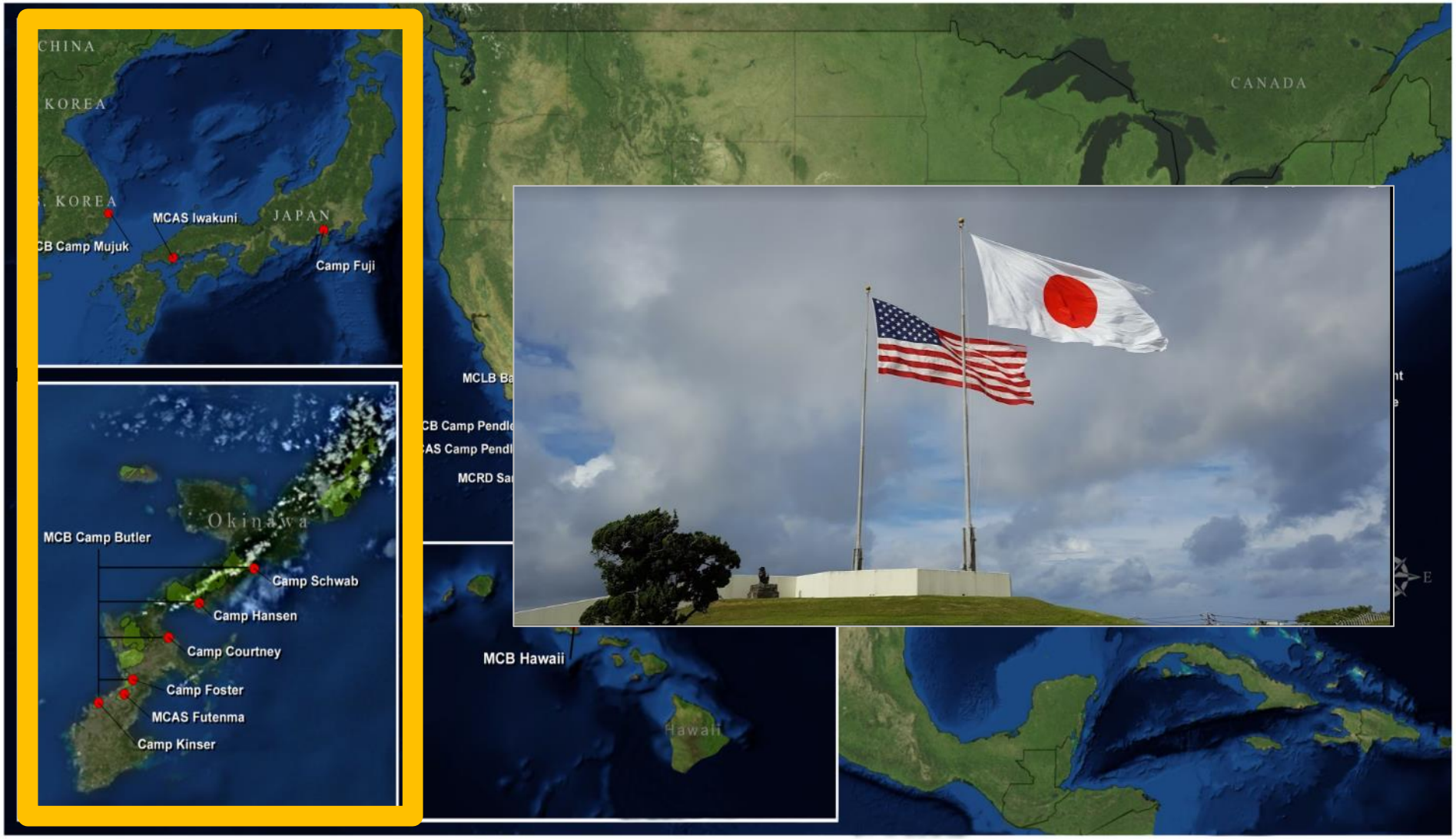


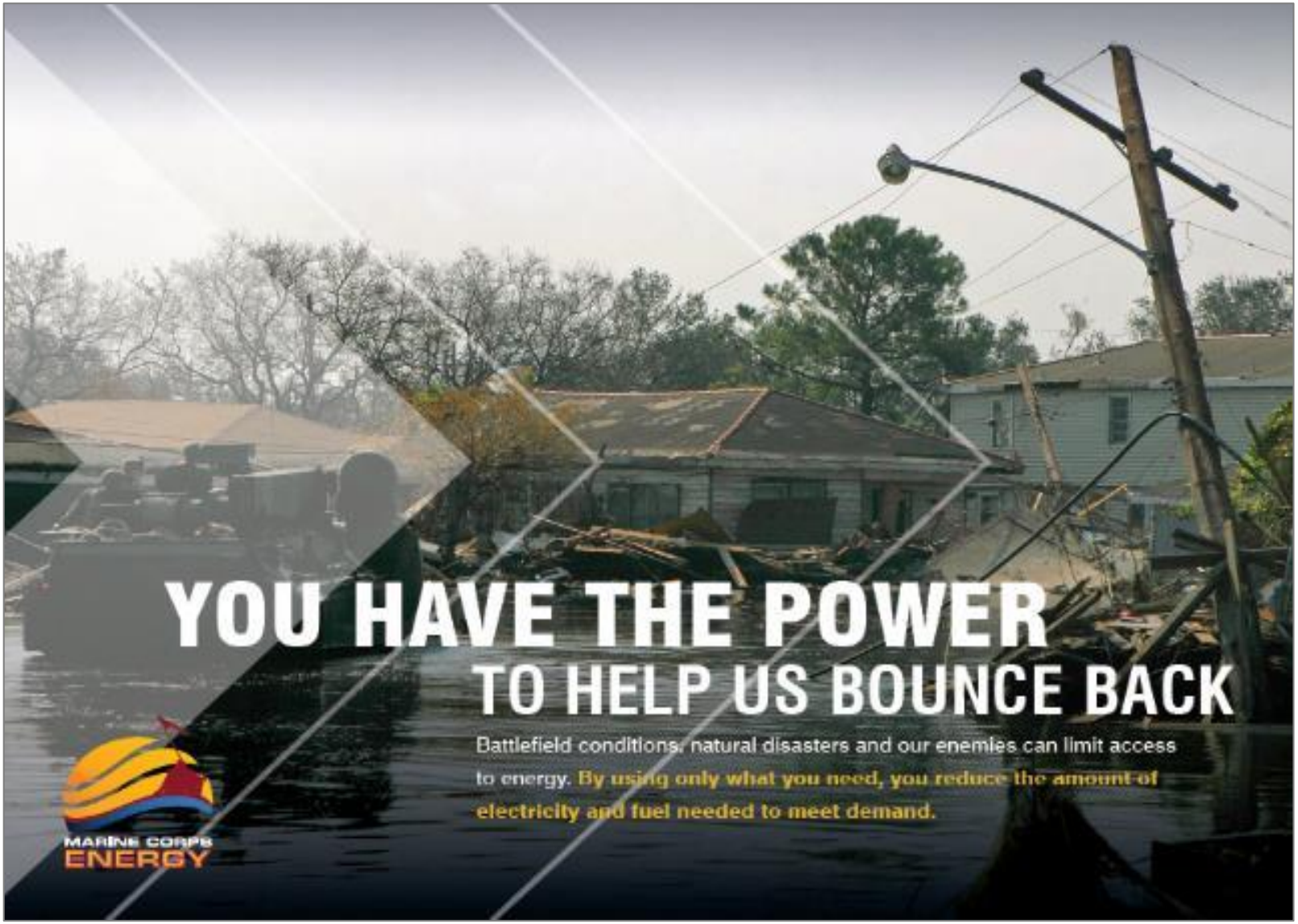
Marine Corps – Future Resilience Projects



MCB Camp Lejeune / MCAS Cherry Point

MCB Camp Butler, MCAS Iwakuni, CATC Camp Fuji



Marines' Lives Depend on Resilience

I'll leave you with this: