

# **MCAS Miramar Overview**



- Miramar has been a Navy or Marine Corps Air Station since 1940
- Aircraft
  - On average 200 aircraft are assigned to Miramar—Roughly 100 Fixed Wing and 100 Rotor Wing and Tilt Rotor
- People
  - About 9,300 Marines and Sailors are assigned to Miramar
  - ∧ 1,800 or 20% Marines and Sailors are deployed at any given time
  - ¬ Approximately 1,700 civilians work on Miramar
  - Approximately 17,000 dependents of Miramar service members attend schools in San Diego
- On Base Housing

  - ∧ 3,832 bachelor quarters
- Approximately 23,000 acres







### **Installation Level Microgrid**

- Energy Security Microgrid for Critical Facilities
- ► FY2014 ECIP Project
- Awarded in May for \$20M
- Projected Completion 2019
- Integration of Landfill Gas and PV renewables to a central natural gas and diesel power plant
- Energy Storage (CEC EPIC Grant)
- Large Scale HVAC Demand Response (CEC EPIC Grant)



### **Building Level Microgrid**

- Zinc Bromide Flow Battery Installation for Islanding and Backup Power
- ➢ FY2012 ESTCP Project
- ≻ Cost ~\$3M
- Demonstrated June 2016
- > 100% Renewable Island with only PV and battery storage
- Future Vehicle to Grid and Stationary Battery Demo (CEC Project)

May 2, 2019

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**Microgrids** 



### **Project Description**

- Install diesel (4 MW) and natural gas (3 MW) generation with the ability to power 100% of the flight line and support facilities (100+ facilities = 4 - 7 MW).
- Incorporate existing onsite landfill power generation (3.2 MW) and existing PV generation (1.3 MW) ≻ into microgrid islanding as much as feasible.
- Enable generation to participate in demand response during grid connection. ≻
- Build "Energy & Water Operations Center" ≻
- Cyber Security accreditation through Risk Management Framework ≻
- Grid Scale Energy Storage (CEC EPIC Grant) ≻
- Base-wide HVAC Demand Response (CEC EPIC Grant) ≻



## **Project Details**

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## FY2014 ECIP Project

- **Programmed Cost** ≻ \$18M
- Awarded in May 2016 for \$20M
- **Projected Completion** 2019
- 2018 California **Energy Commission** Grant
  - Awarded \$5M to UCSD in 2018
  - **Project Completion** 2022

#### **Project Goals**

- **Energy Resilience** 1) (Back-up Power)
- Maximize 2) Renewable Integration
- **Cost Savings/Grid** 3) Support





# **Energy & Water Operations Center**

















#### Generation

- Two 1400 KW BACT Natural Gas Reciprocating Engines
  - > Prime permitted for 8760 hours per year
  - Two Tier 4 Certified 1825KW Diesel Reciprocating Engines
    - > Prime permitted for 2000 hours per year
- Total Generation = 6.45 MW

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- Building contains Microgrid Server
- 5 position switch will be available path for new BESS and conduit already designed





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# Installation Microgrid Map

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**AWEMS HVAC Controller** (80 Buildings) DEMAND REPONSE (EPIC Grant)





University of California

SanDiego

**FUTURE V2G and Energy Storage Demonstration Site** (CEC and Navy Funded)



511 kW PV Carports

May 2, 2019

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# **Microgrid Modes of Operation**



## Normal Mode

- 尽 Grid connected, landfill power production, SDG&E providing power
- Power plant online and available (no automatic dispatch), running monitoring, forecasting and optimization tools – creating "lost opportunity report"

## Economic Mode

- 尽 Grid connected, landfill power production, SDG&E providing power
- Power plant available for automatic dispatch of generation assets, based on economic algorithms in various opportunity categories
  - Peak Optimization system will keep track of each billing cycle with SDG&E and dispatch allocated generation in order to avoid the peak each month. Once peak has been avoided with new peak is created and generation will not dispatch unless necessary to avoid new peak (will not run if it does not have to)
  - > Landfill Gas Back Up allocated generation supports landfill power plant
  - Energy Optimization allocated generation will run if the price of production is cheaper than price from WAPA/SDG&E
  - Demand Response On notification from SDGE, battery storage will be used to participate in SDG&E DR programs; currently a CPUC rule prohibits use generators in these programs despite having prime permits

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# Microgrid Modes of Operation, Cont'd



## Test Mode

- K Half of the base remains grid connected, other half is powered in island mode with the power plant, landfill and other onsite generation
- Purpose is to "practice" and exercise the system for islanding to ensure that when called upon in an emergency that the system will function as designed
- Tests expected 1-2 times per year in conjunction with other operational readiness drills/activities for mission assurance
  - Reference DODI 4170.11, Energy Resilience (2) (b) 4. "DoD Components shall conduct full scale and routine testing..."

## Island Mode

- Microgrid will use Power Plant to black start the critical loops at Miramar to create the microgrid island
- ▹ Microgrid will utilize as much renewable as possible while maintaining power quality

## **California Energy Commission EPIC Grant**



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#### Addition of 3 MW Battery Energy Storage System

- Displacing diesel generators as the primary source of backup power for the LFG
- Reducing demand charges when SDG&E is utilized as backup power for the LFG
- > Allowing for increased renewable penetration in microgrid
- Improving power reliability and quality to allow 3.2 MW of LFG to be integrated into the DoD-funded microgrid when operating in islanded mode



#### Enhanced Demand Response from Basewide HVAC Controls

- Up to 1.6 MW of controllable building load
- Priority customization of over 80 connected bldgs.
- > 3 available load shed levels
  - Thermostat adjustment
  - Compressor shut down
  - Complete Shutdown









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**Microgrids** 

# **Building Level Microgrid Overview**





- > Existing 200 kW Carport PV system firmware upgrades for control
- > New 250 kW / 1 MWh ZnBr Flow Battery
- > New microgrid system to control DERs and island Public Works building
- No fossil fuel generation 100% renewable
- > ESTEP Project Integrate HVAC controls into microgrid, public display, and cyber security evaluation

May 2, 2019













# 2017 Project Award



