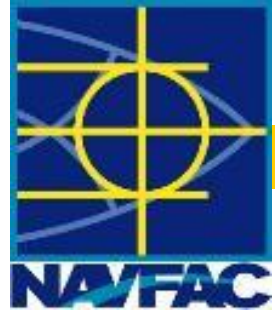




Installation Microgrid Project Overview (P-906)



Project Details

- **FY2014 ECIP Project**
 - Programmed Cost \$18M
 - Awarded in May 2016 for \$20M
 - Projected Completion 2020
- **2018 California Energy Commission Grant**
 - Awarded \$5M to UCSD in 2018
 - Project Completion 2022

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 – 6 MW, represented by the **red island outline above**)
- Incorporate existing onsite landfill power generation (3.2 MW) and existing PV generation (1.3 MW) into microgrid islanding as much as feasible.
- Build “Energy & Water Operations Center” at B6311
- Economic Mode creates costs savings through grid connected generation.
- Cyber Security accreditation through Risk Management Framework
- **Grid Scale Energy Storage (CEC EPIC Grant)**
- **Base wide HVAC Demand Response (CEC EPIC Grant)**

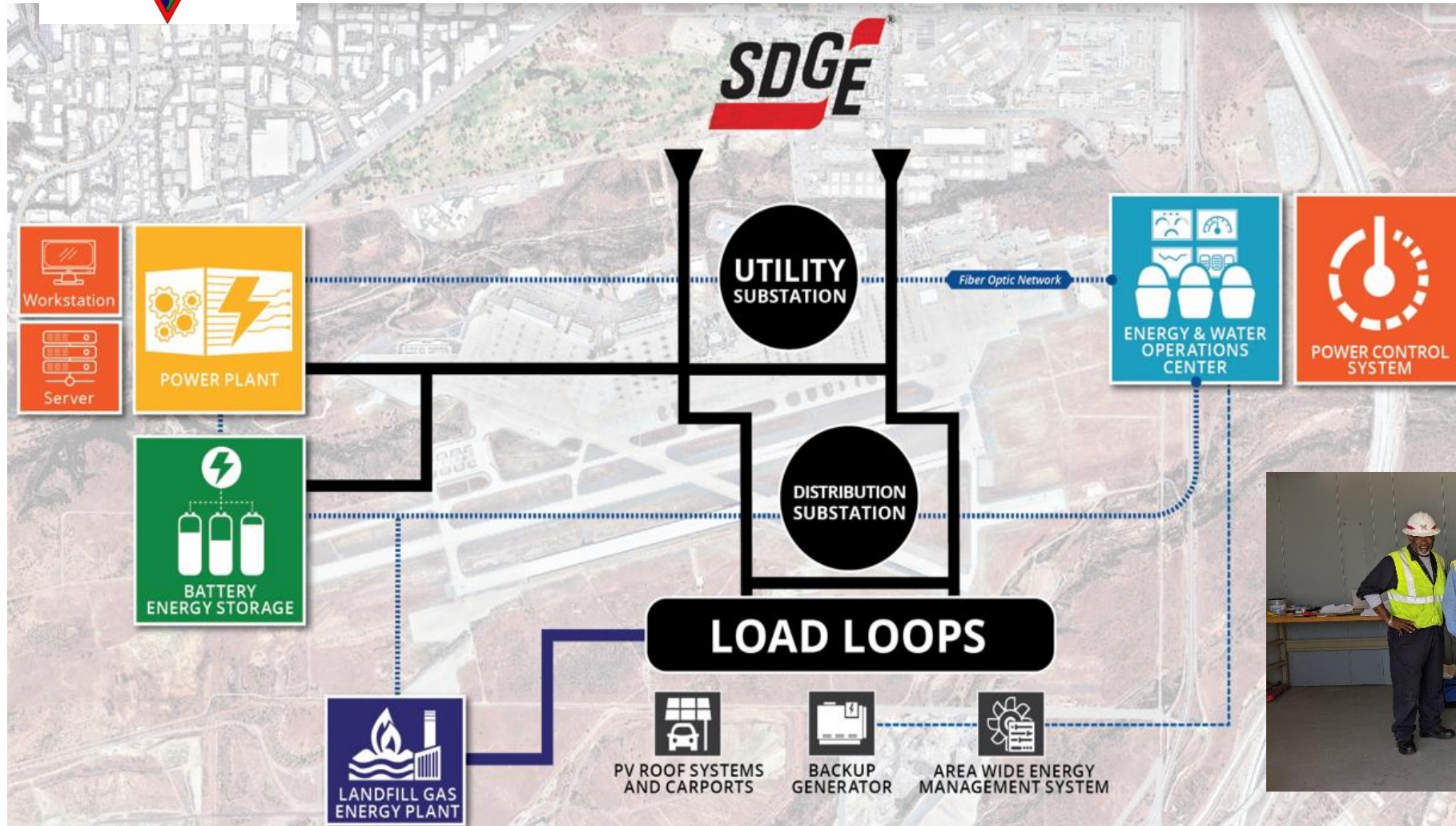


Project Goals

- 1) Energy Resilience (Fully Redundant Utility Power)
- 2) Maximize Onsite Energy Resource Integration
- 3) Cost Savings/Grid Support



Microgrid Operations



Modes of Operation

- Normal (stand by)
- Economic
- Island
- Test





Installation Microgrid Map



Thermal Energy Storage Plant



AWEMS HVAC Controller
(80 Buildings)

❖ DEMAND REPONSE (CEC Grant)



Microgrid Backup Power Plant

- 4MW Tier 4 Diesel Generator Set
- 3MW BACT Natural Gas Generator Set
- Central Microgrid Controller
- ❖ 2MW Li-ion Battery (CEC Grant)



Thin-Film PV Roof Systems



3.2 MW Landfill Gas Energy Plant

Critical Island Load



PV Carports



PV Carports

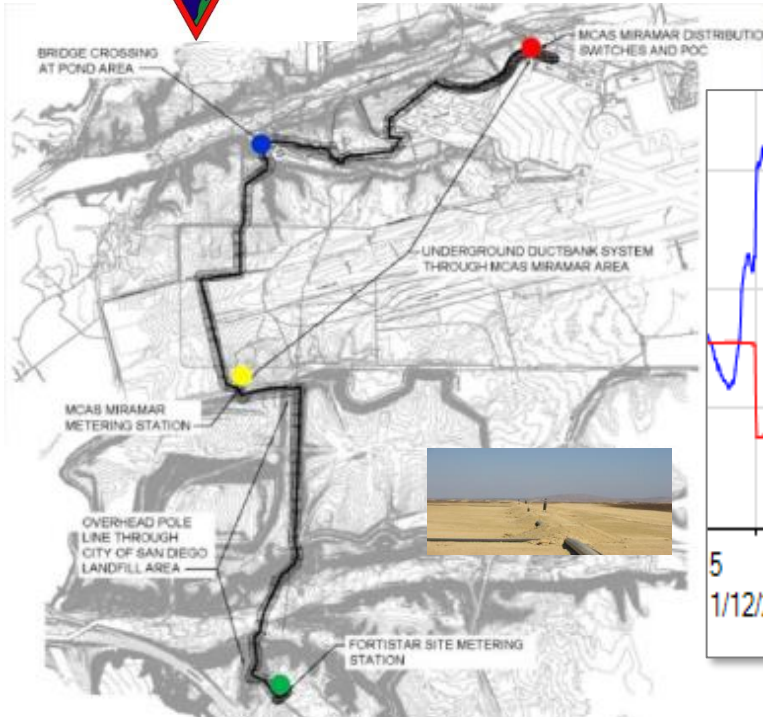


❖ 2MW Backup Generator w/ATS Paralleling Switch Gear

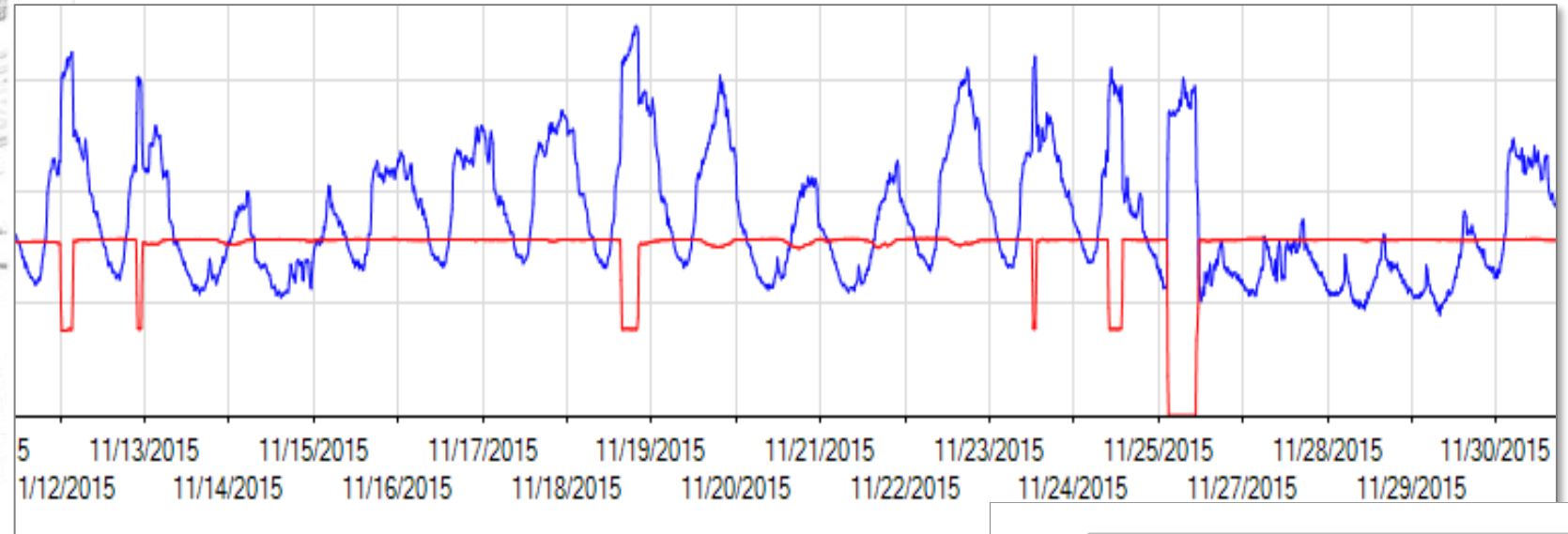


Landfill Power

FORTISTAR
METHANE GROUP

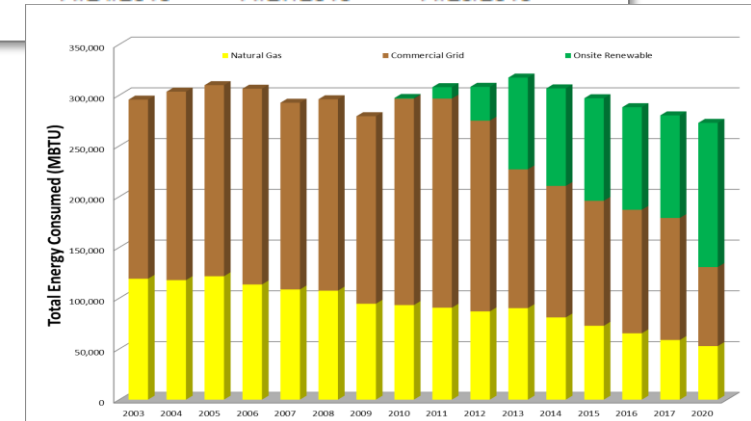


— SDG&E Import — Landfill Power



Project Details

- Power Purchase Agreement (PPA)
- Began Production 2012, Contract ends 2026
- Estimated savings = \$50 - 350k
 - Depending on availability during demand

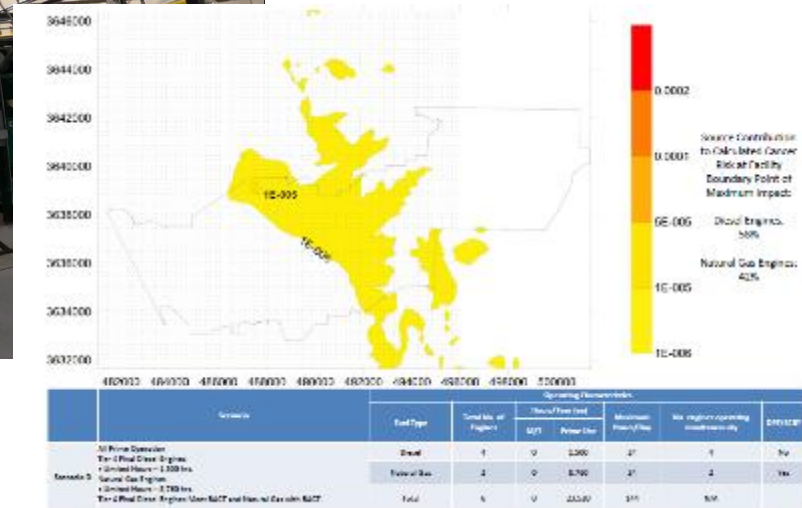
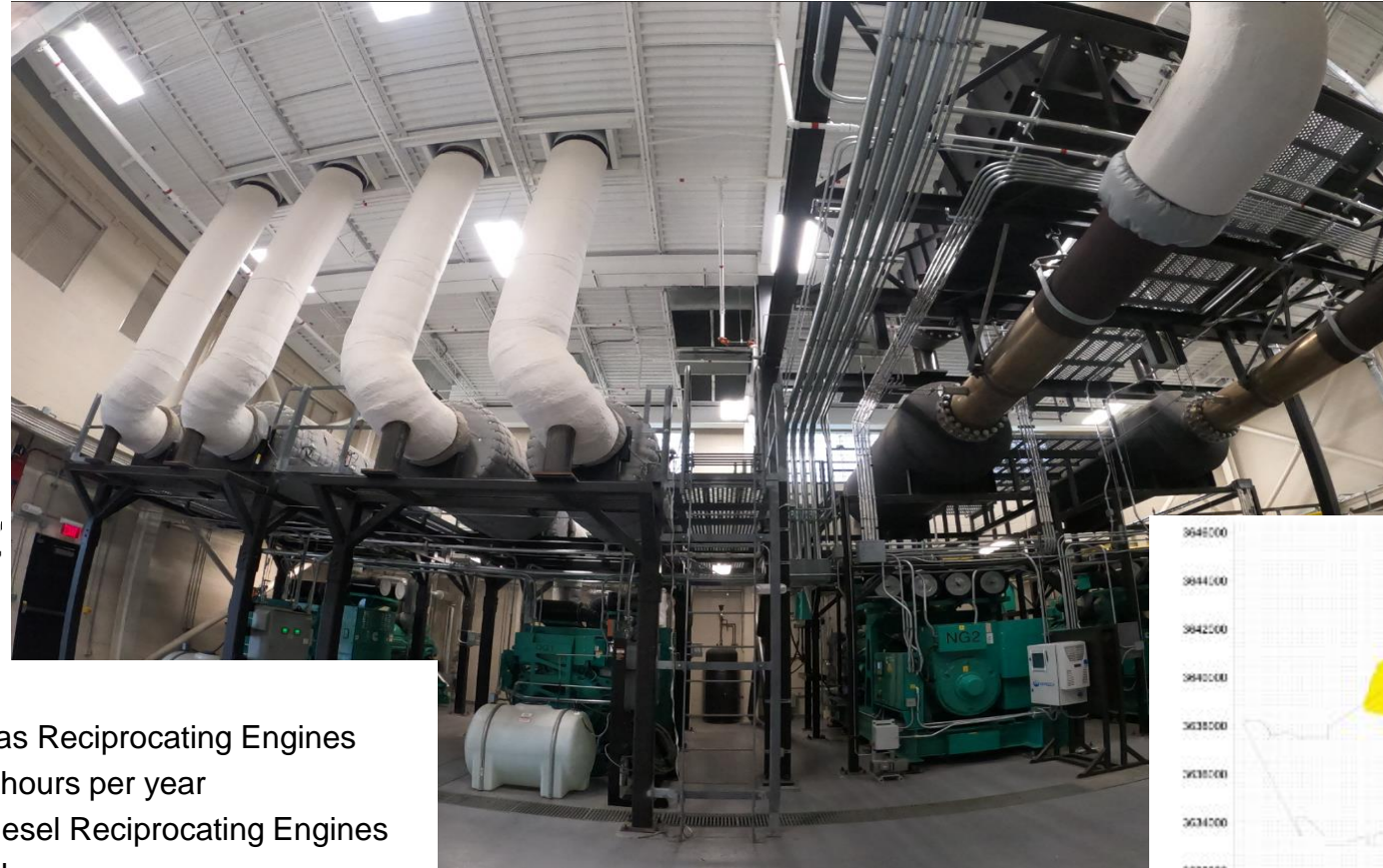
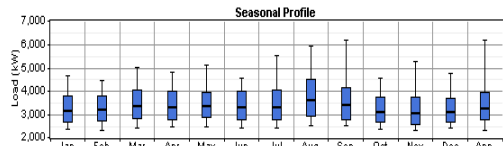
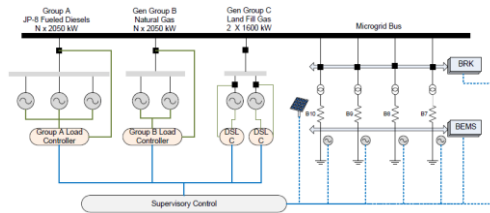




Solar



| NEM | | | |
|-------------|----------------------------|--------------|---------------------------------------|
| Projects | Gen. Type | Net NPR (kW) | Expect Annual Energy Production (kWh) |
| 1 | Photovoltaic | 10 | 19,000 |
| 2 | Photovoltaic | 201.2 | 382,280 |
| 3 | Photovoltaic | 26.3 | 49,970 |
| 4 | Photovoltaic | 49.6 | 94,240 |
| 5 | Photovoltaic | 151.9 | 288,610 |
| 6 | Photovoltaic | 72.7 | 138,130 |
| 7 | Photovoltaic | 309.5 | 588,050 |
| 8 | Photovoltaic | 104.3 | 198,170 |
| 9 | Photovoltaic | 7.3 | 13,870 |
| 10 | Photovoltaic | 9.1 | 16,380 |
| 11 | Photovoltaic | 462.4 | 877,800 |
| 12 | Photovoltaic | 118.6 | 225,340 |
| 13 | Photovoltaic | 131.8 | 237,240 |
| 14 | Photovoltaic | 36.1 | 64,980 |
| 15 | Internal Combustion Engine | 2930 | 20,533,440 |
| NEM TOTAL | | 4620.8 | 23,727,500 |
| Solar Total | | 1,691 | 3,194,060 |



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
- ❖ Building contains Microgrid Server
- ❖ BESS in design



Naval Information
Warfare Center

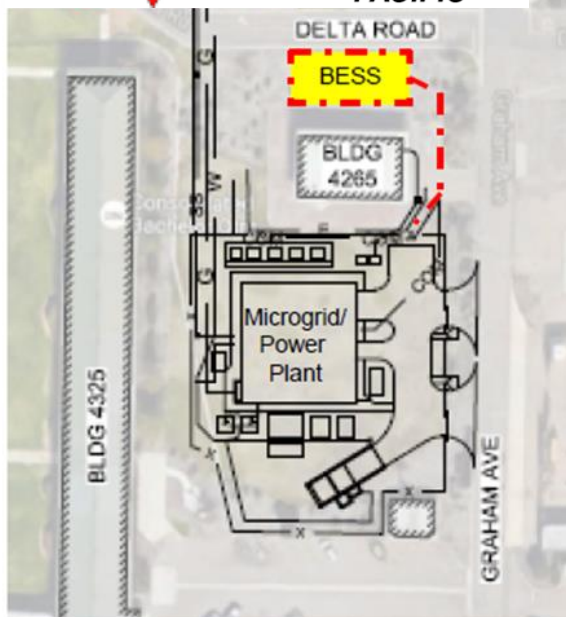
PACIFIC

Energy Storage + Demand Management (CEC Grant)



CER
Center for Energy Research

University of California
San Diego



Schneider Electric

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



Johnson Controls



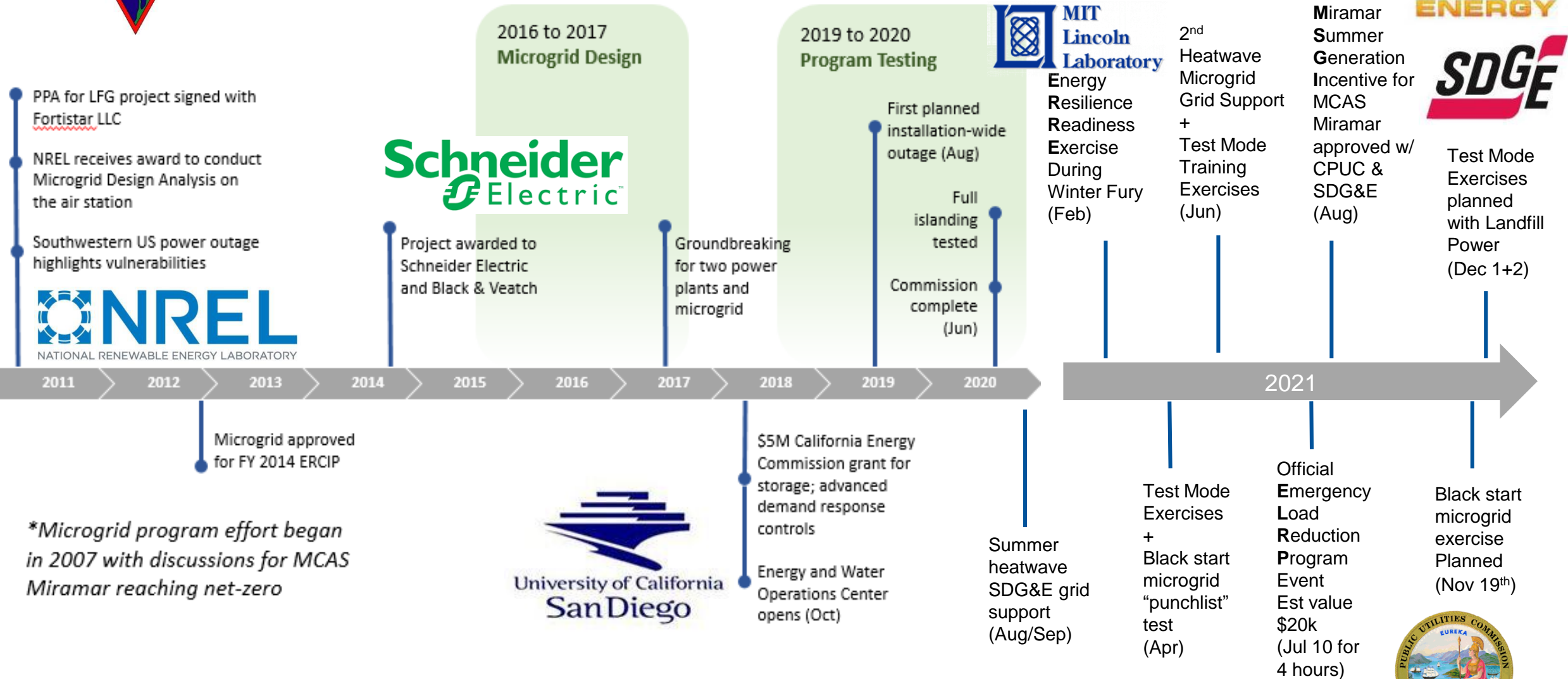
Enhanced Demand Response from Basewide HVAC Controls

- 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

| GLOBAL COMMANDS TO ALL BUILDINGS | | | | | | |
|----------------------------------|--------|--------|--------|--|----------|------------------------|
| | | | | | Activate | Release |
| Building Name | Step 1 | Step 2 | Step 3 | | | Actual Reduction |
| 6011 | X | | | | | 420 kW |
| Estimated Reduction | 25 | 55 | 125 | | | |
| 6033 | | X | | | | 280 kW |
| Estimated Reduction | 40 | 68 | 100 | | | |
| 6100 | | | | | | 0 kW |
| Estimated Reduction | 20 | 35 | 140 | | | |
| Total Estimated Reduction | | | | | 93 kW | Total Reduction 700 kW |



Microgrid Timeline



**Microgrid program effort began in 2007 with discussions for MCAS Miramar reaching net-zero*

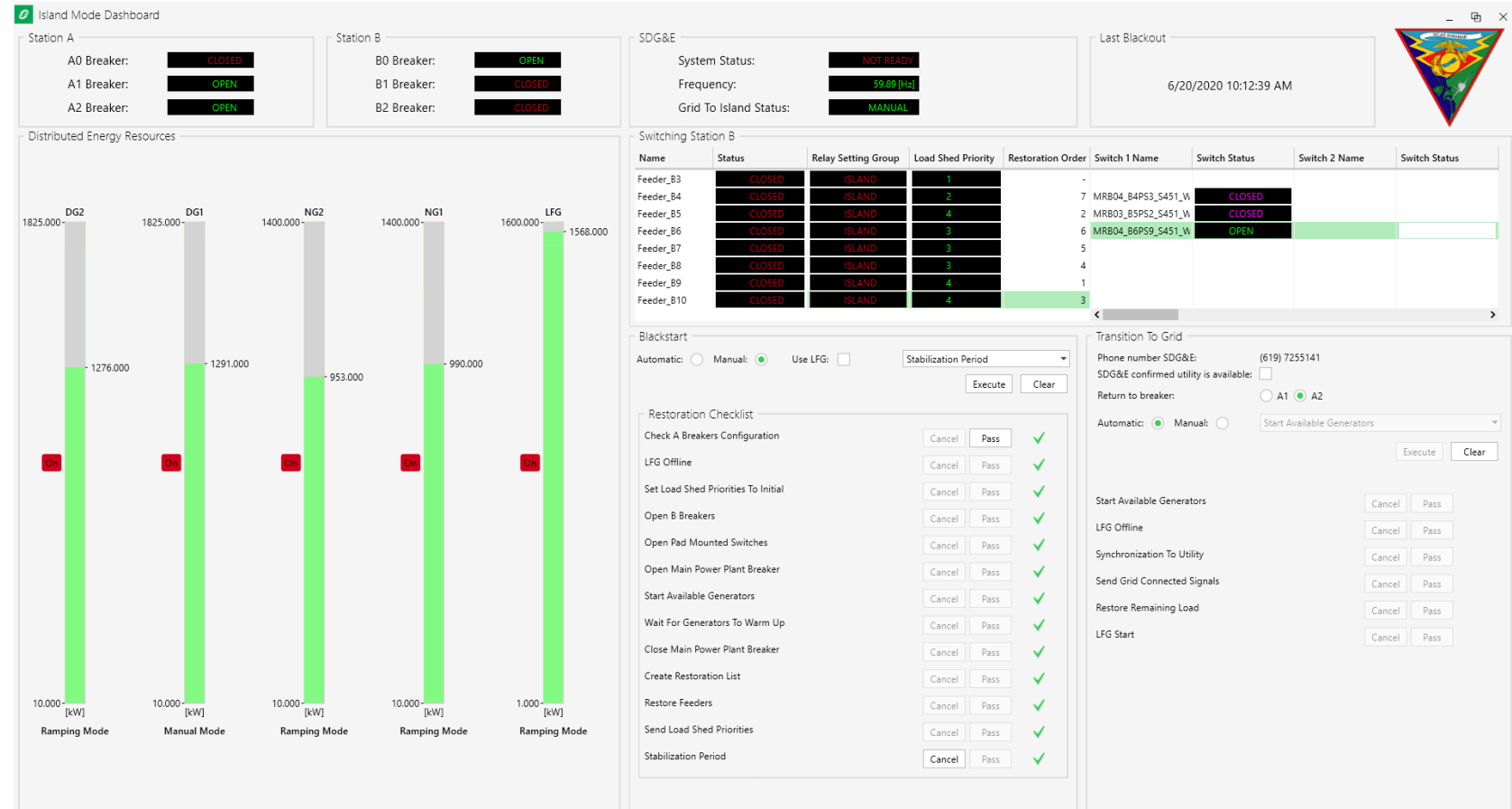


Island Testing



Microgrid Testings Accomplishments to Date

- ✓ First planned base wide outage August 2019
- ✓ 9 Microgrid tests involving base wide outages
- ✓ 2 Microgrid island tests involving outages to limited areas
- ✓ 17 Microgrid island tests to limited areas with seamless transition (no outage)

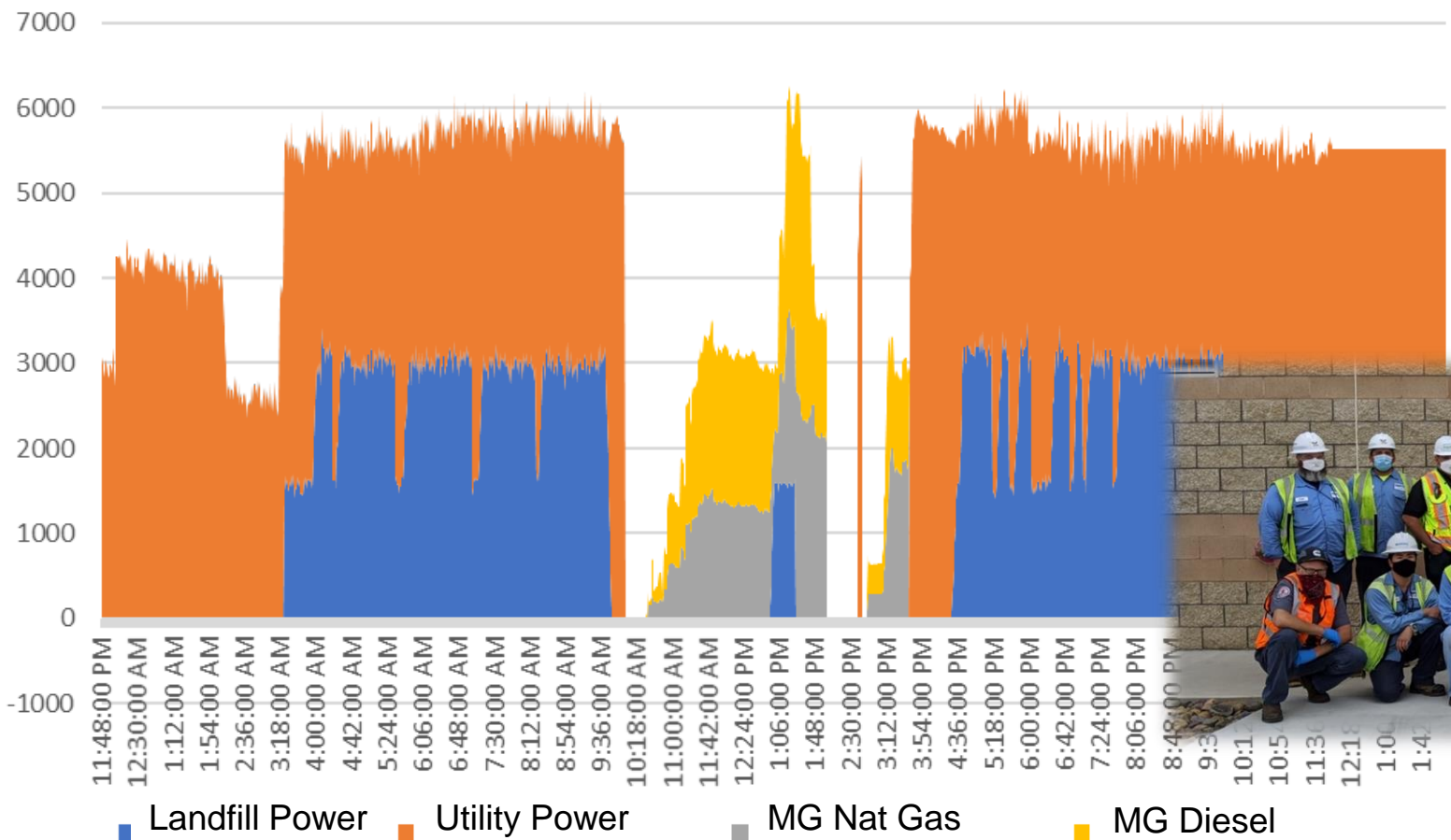




June 2020 Island Testing



June Microgrid Commissioning



Commissioning Accomplishments

- ✓ First full black start test of the microgrid
- ✓ Powered entire installation with power plant (non-op/COVID/low load)
- ✓ Successfully integrated landfill power for the first time in island
- ✓ Successfully accomplished various extreme “stress tests” and maintained island stability





Energy Resilience Readiness Exercise



“You don’t even know what you need to be worried about until you start poking and prodding.”

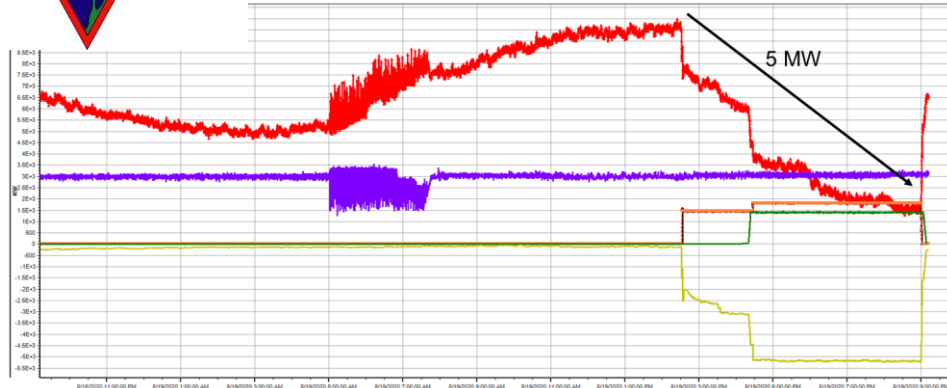
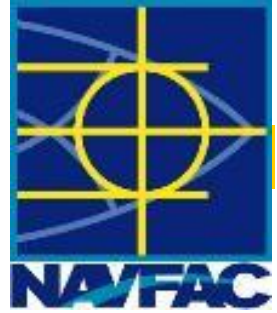
“This has caused a 20 year conversation to happen in one 1 hour meeting.”

“This exercise allowed us to see ourselves better.”

“I am buying risk every day and I don’t know it.”



Heatwave Response



Demand Response

Emergency Load Reduction Pilot (ELRP) - NEW

| Program Eligibility | Program Trigger & Measurement | Parameters & Incentive | Notable Provisions |
|---|---|---|--|
| Group A: <ul style="list-style-type: none">Commercial and Industrial Customers that are not in a DR Program (CCA & DA are eligible)BIP CustomersCustomers with onsite generation who can export under Rule 21 Group B: <ul style="list-style-type: none">CBP AggregatorsThird Party DRPs enrollment (e.g., DRAM & Rule 32) | Day-Ahead Dispatch (CAISO AWE) Day OF Dispatch to be voted out by CPUC on 6/24. Group A: Performance method: 10 in 10 baseline Compensation bundled by 50% floor and 200% ceiling for nomination relative to performance Group B: Different prescribed methodology | Min load shed: 100kW Availability: May - October, 7 Days a week, 4 - 9 p.m. Event Duration: 1-hr min; 5-hr maximum, 1 event per day Annual Dispatch: up to 60 hours Consecutive Days: No constraint Performance Incentive: \$1.00 per kWh (energy) Penalty for non-performance: None | Able to Dual Participate <ul style="list-style-type: none">Base Interruptible (BIP)Capacity BiddingDRAM & Rule 32 Allows use of prohibited resources during emergency events (ie. fossil fuel back-up generation) |



California Public Utilities Commission

ADVICE LETTER SUMMARY

ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: San Diego Gas & Electric (U902)



August 30, 2021

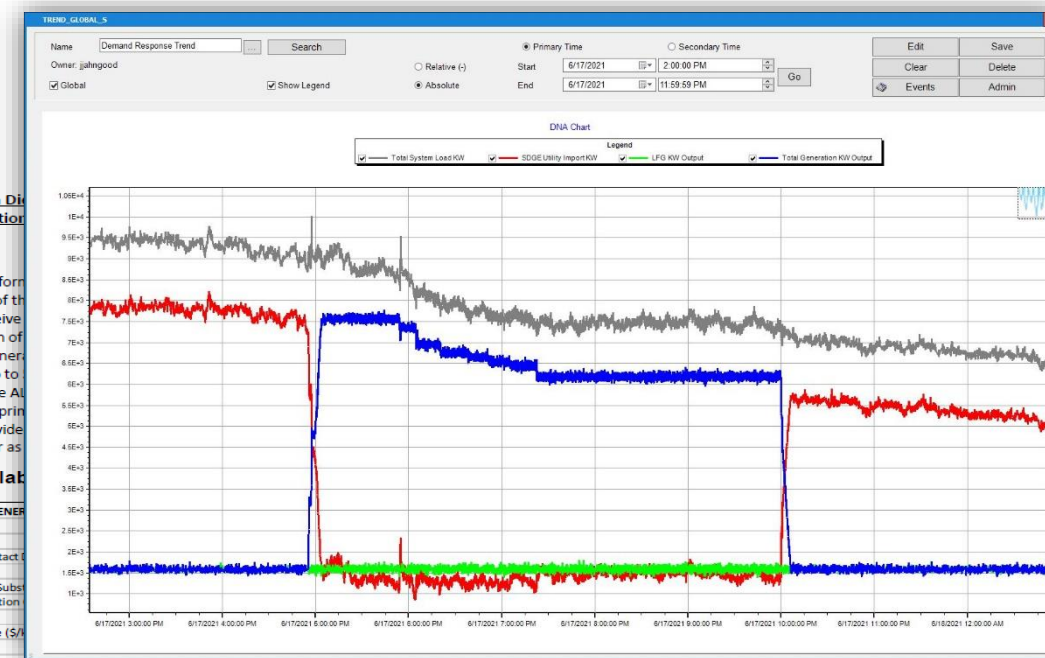
RE: Agreement Between San Diego Gas & Electric and Miramar Regarding a Summer Generation

To Whom It May Concern:

Pursuant to Section 9.2.3 of California Agencies) and under the terms of the Account ending in 2768 will receive maximum contracted generation of the table below, the monthly generation payable on a per event basis (up to difference between the Schedule A1 the account and the Schedule S primary availability incentive will be provided generation provided by Miramar as

1. Generation Available

| MIRAMAR MONTHLY GENERATION | |
|----------------------------|---|
| Line No. | |
| 1 | Maximum Generation Contract |
| 2 | |
| 3 | Schedule AL-TOU Primary Substation |
| 4 | Schedule S Primary Substation |
| 5 | |
| 6 | Demand Charge Difference (\$/kWh) |
| 7 | |
| 8 | Monthly Bill Generation Incentive (\$): Line No. 1 multiplied by Line No. 6 |
| 9 | |
| 10 | Maximum Times A Request for Generation can be Made Per Month |
| 11 | |
| 12 | Incentive Paid Per Event: Line No. 8 divided by Line No. 10 |

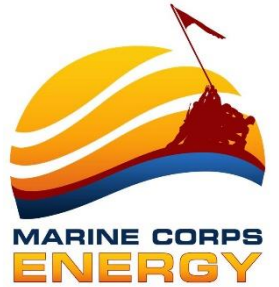




If we have time...



Vehicle to Grid (V2G)

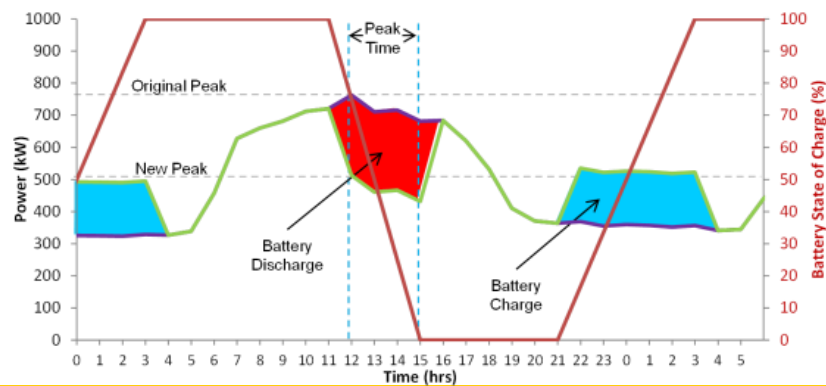
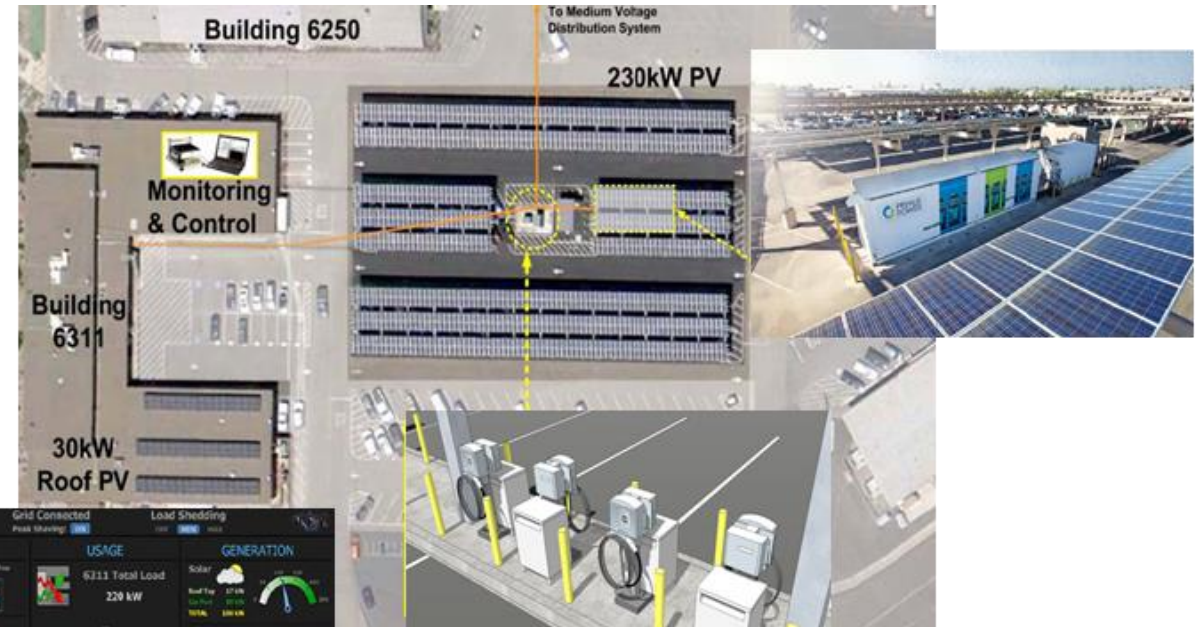


BERKELEY LAB

LAWRENCE BERKELEY NATIONAL LABORATORY

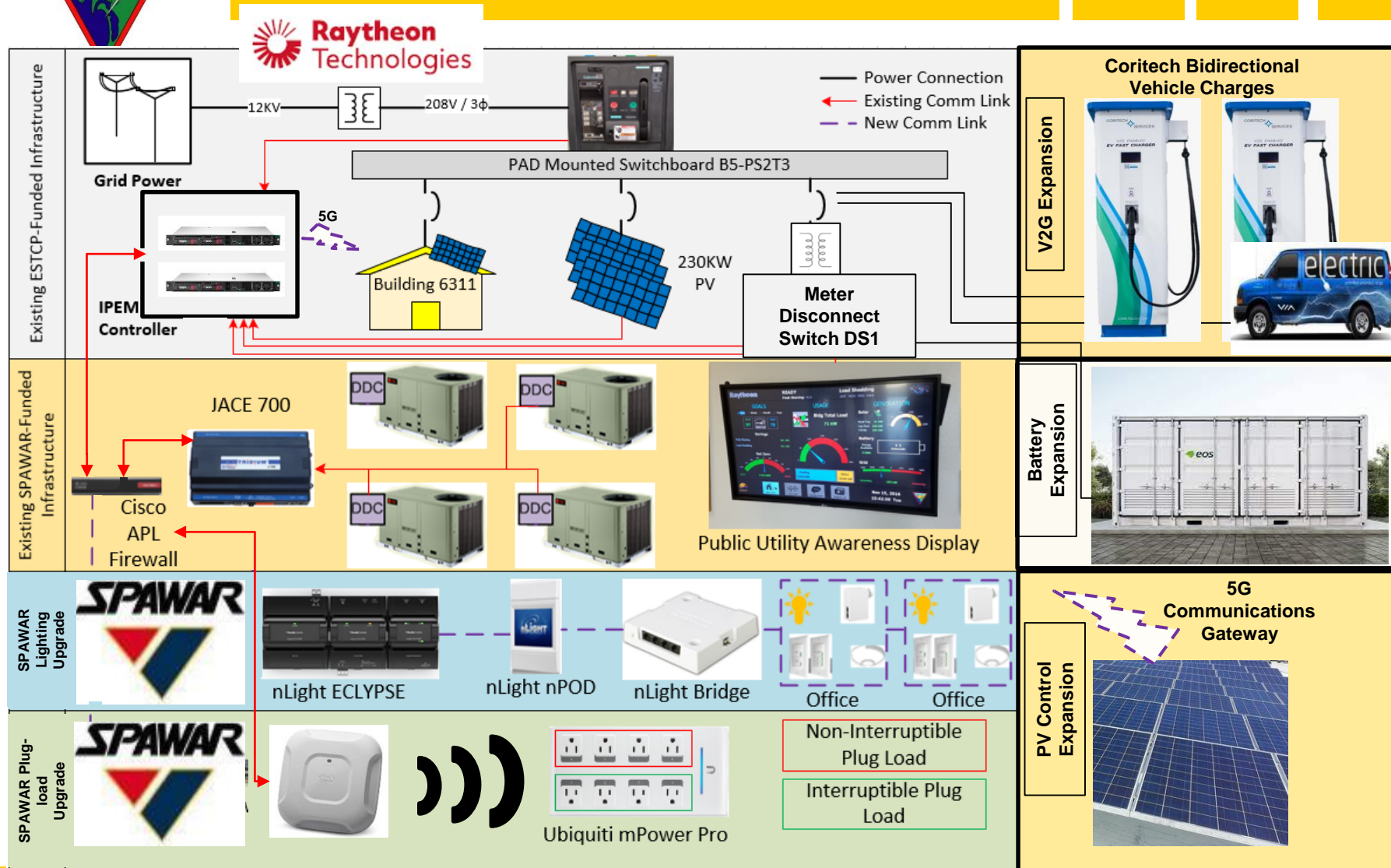
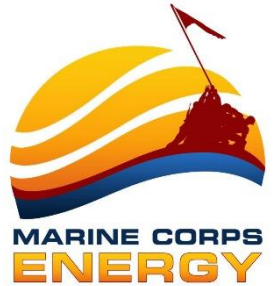


U.S. DEPARTMENT OF
ENERGY





Building Microgrid Demonstration





Rapid Integration and Commercialization Unit



INDIAN ENERGY LLC



CA Energy Commission Grant at MCAS Miramar

@ CPV Site

