Blue Lake Rancheria Microgrid

Challenges and successes in designing, building, and operating a remote community microgrid

usa.siemens.com/microgrid

Max Majkowski / EM DG SWS

Blue Lake Rancheria Microgrid Content

- **Blue Lake Rancheria**
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Blue Lake Rancheria

- Federally Recognized Tribe
- ~100 Acres of Trust Land
- Variety of Economic Enterprises
- ~400 Employees
- ~2000 visitors daily

Project Overview

Microgrid Objectives

Sustainability

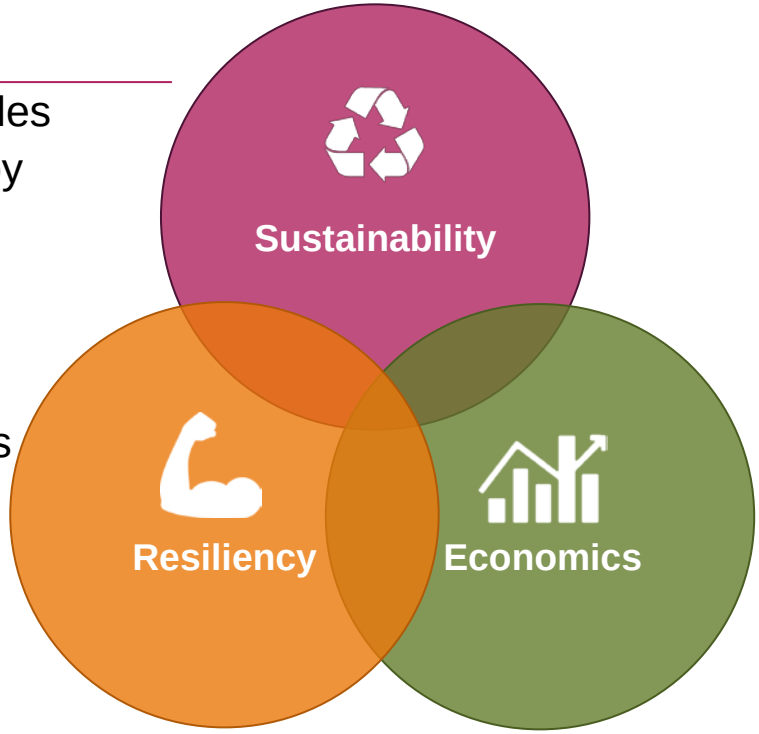
- > 40% annual energy production with renewables
- Displace fossil electrical energy consumption by 680 MWh in one year

Resiliency

- Power a certified American Red Cross shelter
- Ability to maintain islanded operation for 7 days

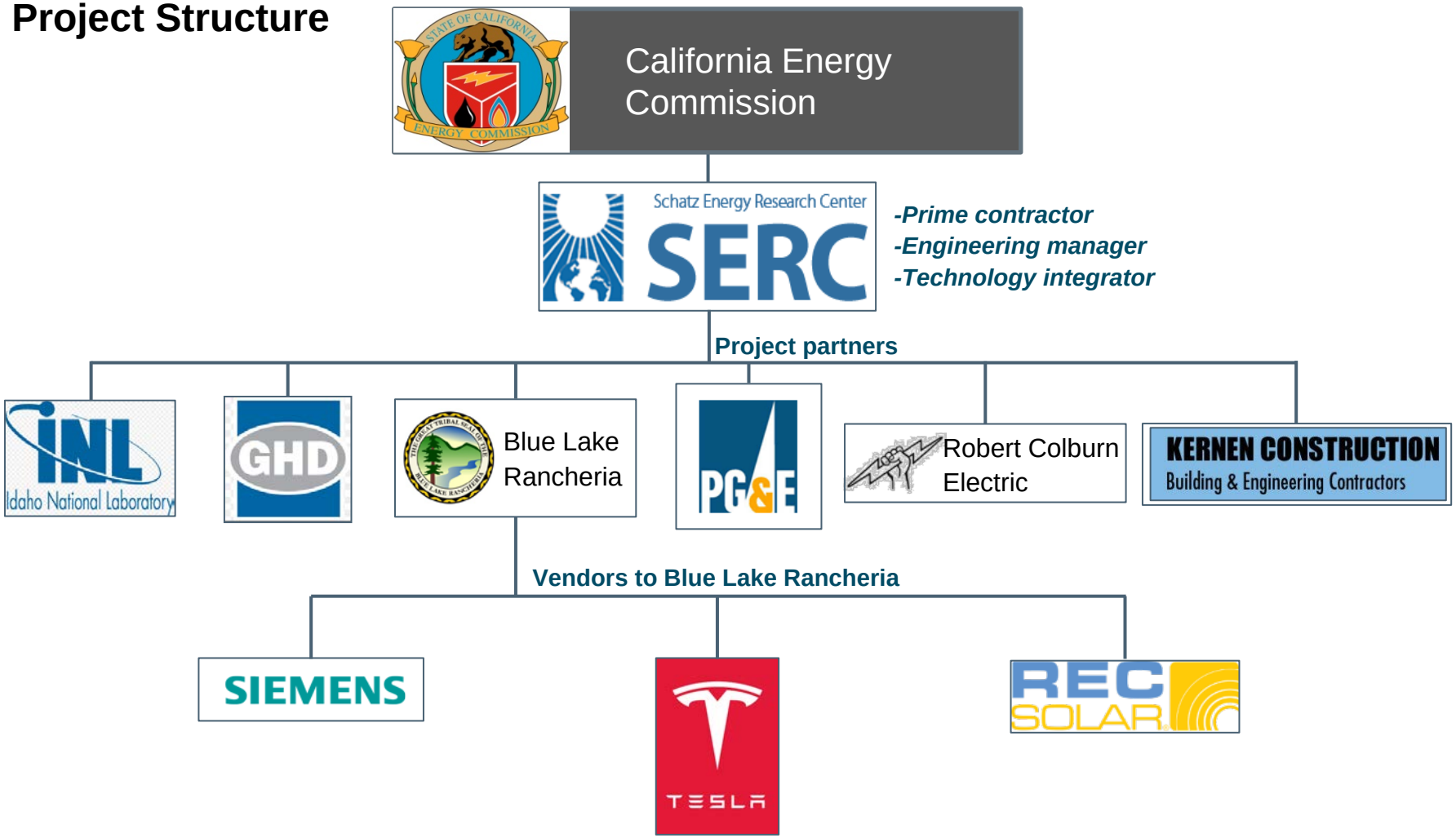
Economics

- Larger demand response capability
- 25% reduction in energy costs



Collaborative Microgrid Approach

Project Structure



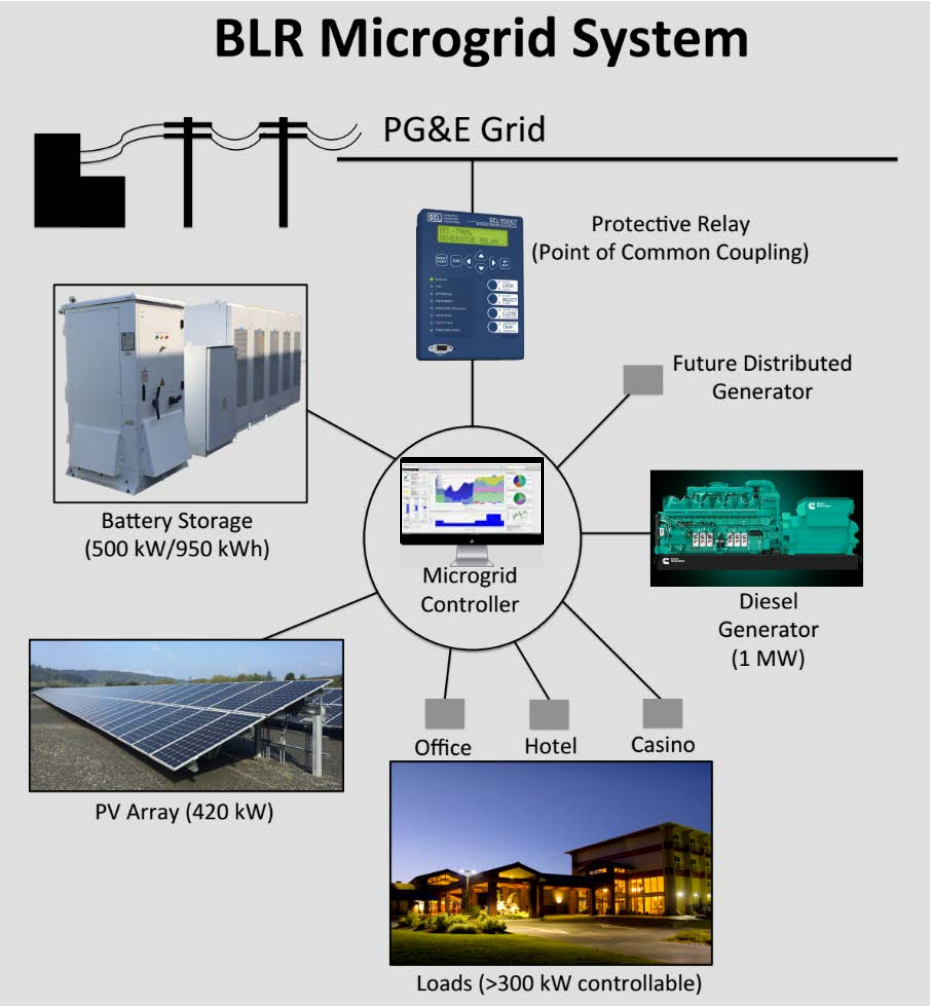
Microgrid Overview

Load: 700kW peak, 500kW avg:

- Office
- Hotel
- Casino

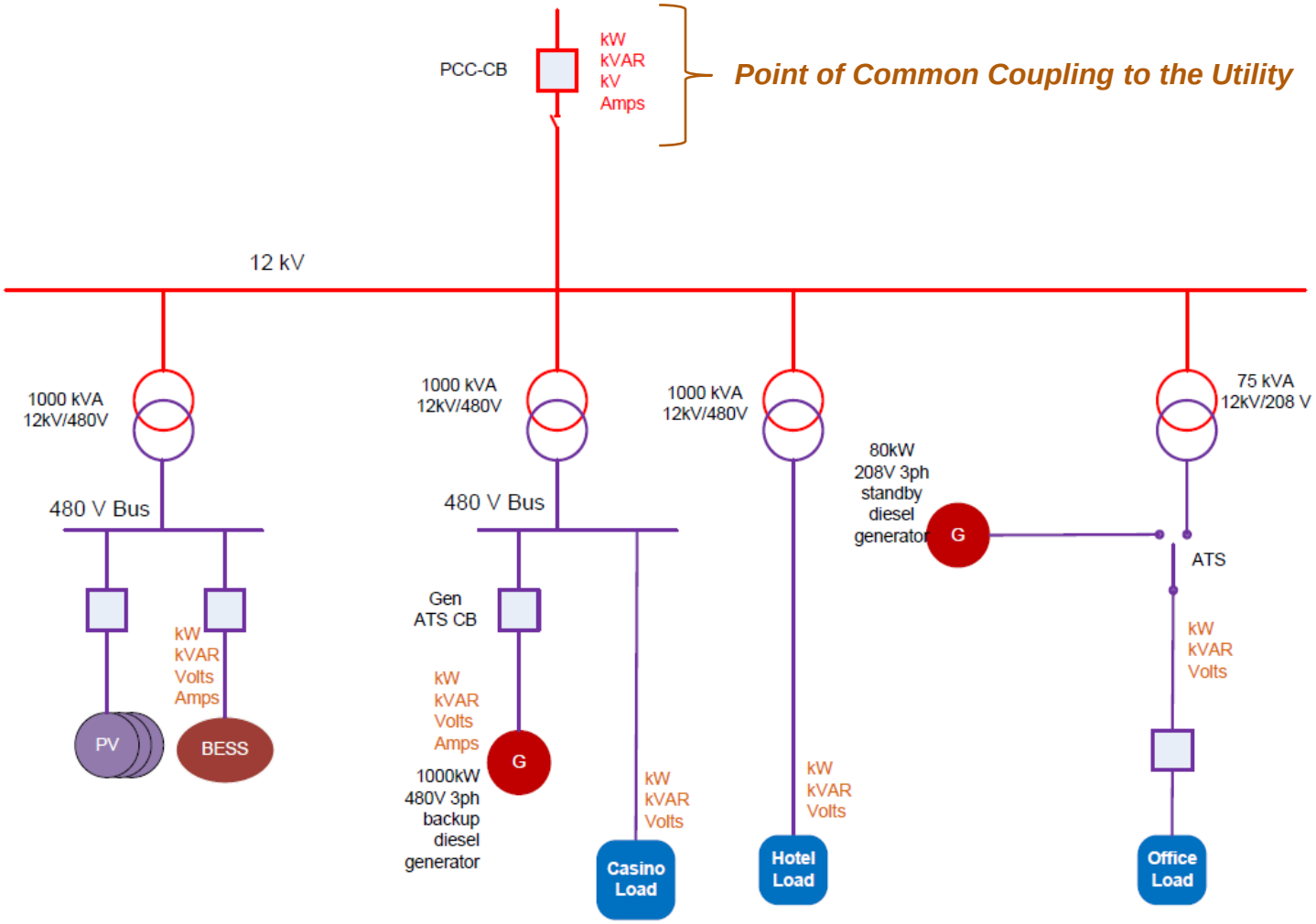
Resources:

- PCC circuit breaker
- Diesel Generator (1000kW)
- Solar PV (430kW)
- Battery Energy Storage (500kW/1MWh)
- Five controllable load groups (300kW)



Microgrid Overview

Microgrid One-Line



Sustainability

In Design:

- ~500kW of Solar PV: decision based on average load profile for grid emission offset

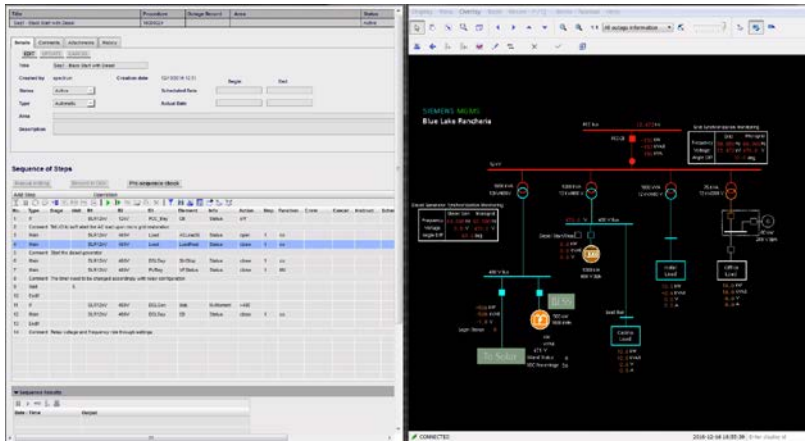
In Operation:

- Intelligent black start capability: Maintain island with Solar and Battery
  (alternate to diesel generator emissions)

Resiliency

In Design:

- Battery and solar capacity, back up diesel
- Synchronizing relay at PCC
- Relaxed inverter ride through settings
- Microgrid controller to execute sequences



In Operation:

- Autonomous system operation
- Black start restoration:
  -intelligent resource selection
  -soft load start through BAS
- Excess solar curtailment in island
- Seamless grid resynchronization with battery

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Unplanned Outage

Sequence Illustration

Version 4

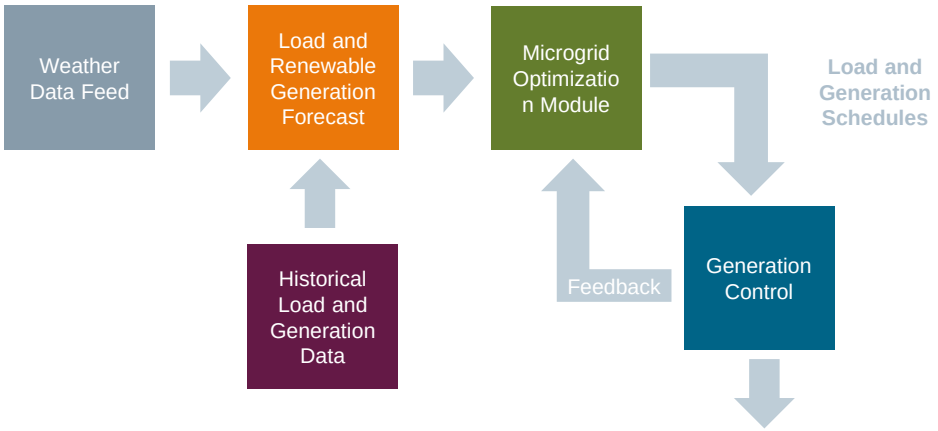
Economics

In Design:

- Energy charge reduction kWh
- Demand charge reduction kW
- Diesel fuel reduction: solar and battery

In Operation:

- Battery dispatch optimization
- Use of solar & battery in island
- Demand response participation



Project Challenges

Brown field equipment

- 1 MW isosynchronus generator (grid interconnection, transition to/from battery)

System design

- Island with inverter-based resources, operational sequences with brownfield equipment, zero export restriction

Inverter specifications

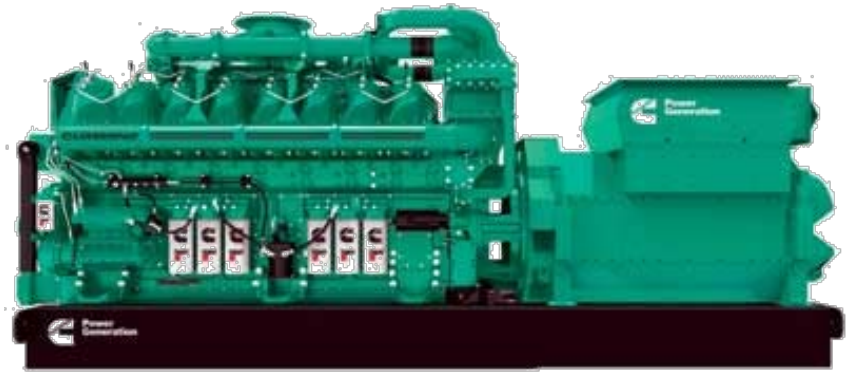
- Support ride through setting adjustment and allow curtailment

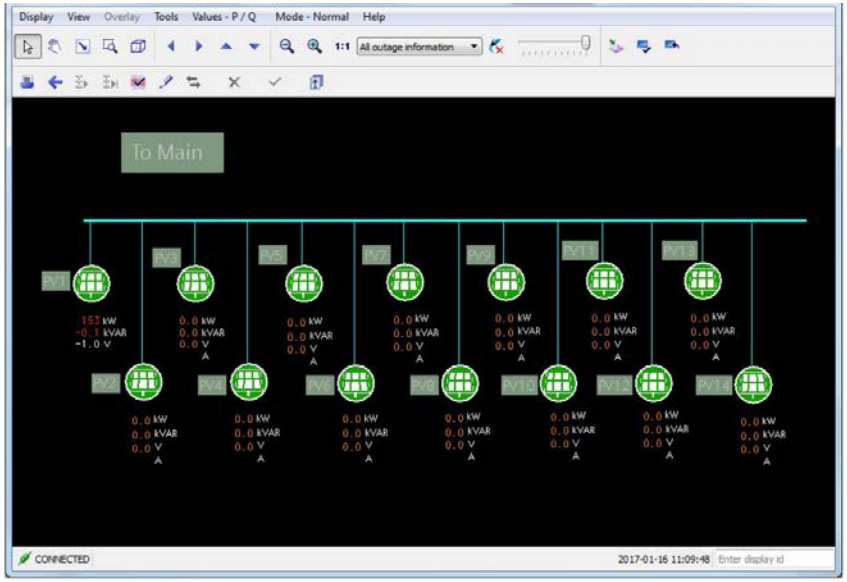
Testing

- Hardware in the loop to test operational sequences and microgrid controller functionality

Ongoing operations

- Electrical engineer, electrician, facilities manager, microgrid operator





Project Successes

Microgrid Results

Sustainability

- 500kW of solar PV generation
- Offset grid fossil import with Battery + Solar
- Offset diesel use in island with Battery + Solar

Resiliency

- Unplanned islanding
- Intelligent Black start restoration (resource selection)
- Grid Resynchronization

Economics

- Demand response
- Energy and demand charge reduction:
  -Expected retail energy savings for 2017: ***$200,000***

Contact Page

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