SDG&E’s Borrego Springs Microgrid 2.0 2014-2018
Borrego Microgrid 2.0 - Overview

- Enhance the Borrego Springs Microgrid to be more flexible, automated and controlled remotely to respond to a variety of potential outage situations.
- Leverage various new technologies and Distributed Energy Resources (DER) for increased Microgrid capabilities.

**Goals**

- Enhance Emergency Readiness
- Increase Operational Flexibility
- Decrease Outage Response Times
- Increase Grid Resiliency
- Demonstrate New Microgrid Technologies
- Increase Microgrid Load Capacity
Project Description Goals Summary

• Expand the Borrego microgrid to the entire distribution substation

• Renewable based microgrid will island the entire substation with a peak load of approximately 14 MW serving approximately 2,800 customers

• Utilize the large 26 and 5 MW\textsubscript{ac} PV systems in addition to rooftop PV systems, two 1.8 MW diesel generators, substation batteries and three distributed batteries

• Island the entire community during the day and dropping to critical loads at night
Utility-Owned Microgrid
Distributed Energy Resources in Borrego Springs

Controller – DERMS – Distributed Energy Resources Management System – software that allows an operator to remotely control the microgrid to seamlessly transition to and from the grid.

Battery Storage:
- 1 MW / 3 MWh battery system
- 0.5 MW / 1.5 MWh battery system
- Three .025 MW CES battery systems

Borrego Springs Solar:
- 26 MW solar plant

Other Assets:
- Two 1.8 MW diesel generators
- 0.25 MW Ultracapacitor

“Borrego Springs is home to America’s first and largest utility-owned microgrids.”
Islanding Event - May 21, 2015
Microgrid powered all of Borrego Springs during a planned outage to repair poles damaged by lightning
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Cir A, B & C Open

Tie Line Open
SES2 Charging
SES1 Charging
NRG De-Energized
May 21, 2015 Islanding Event
Islanding Event - May 21, 2015

Microgrid powered all of Borrego Springs during a planned outage to repair poles damaged by lightning.
Islanding Event – Partly Successful
May 17, 2016

Borrego Planned Outage Load and Voltage Data

- TL687 Breaker Opened
  Island Established
- Microgrid Tripped Offline
- Successful Blackstart Testing
- Full service Restored

Graph showing
- 12kV Bus Voltage
- Borrego Substation Load

Time

Voltage (kV)

Load (Mw)
BRMG Island 2: May 15, 2018
Overview – Successful Operations

• Supported compliance substation maintenance on 69kV breakers and relays

• TST conducted island operations using DERMS from Mission Control

Quick Stats:
• 4.5 hours in duration
• All three circuits (2,790-customers) 100% supported for the duration of event
• Borrego community load was ~1.2 to 2.2 MW (day-ahead was ~3.2 MW)

10:32:58 AM
1. 12kV BK30 opened manually
2. Island 2 permission enabled
3. 12kV BK 31 opened via automation
4. Successful Island 2 established (grid-disconnected service)

3:14:09 PM
1. Parallel permission enabled
2. 12kV BK31 closed via automation
3. Successful parallel to grid (grid-connected service)
4. 12kV BK30 closed manually

Frequency on C170 CB at the Scada Switch
Significance & Impact

• First large scale utility-owned microgrid
• Actually islands real customers
• Alternative service delivery model
• Proved advanced technologies for future applications
• Established a model to be used by other utilities both nationally and internationally
• Operation in a 100% renewable environment
Questions?

www.sdge.com/smartgrid/