Utility Role in Microgrids

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September 3, 2015

Types of Microgrids

- Utility
  - Borrego Springs
- Military Bases
- Campus Environment
  - UCSD
- Greenfield Development
  - Third World Applications
- Homes

Microgrid Opportunities

- Support the integration of renewable resources
- Improve reliability and power quality
- Support emergency operations
- Ability to “ride through” outages
- Optimize energy usage
- Enable participation in new markets for demand response and ancillary services

Microgrid Project Benefits

- Allow more power to be delivered through existing infrastructure and reduce the need to build more in the future
- Increase in the reliability and security of the grid by adding elements that make the grid more stable and reconfigurable.
- Allow Utility to utilize and control customer-owned resources
- Optimize the design of circuit operations for microgrid capabilities given consumer DG, demand response, automated response, and other advanced tools

Borrego Springs Microgrid

SDGE
A Sempra Energy utility

Real World Experience

- 6/23/12 Planned Outage
  - Microgrid provided power to 2,128 customers for ~ 5.5 hrs
- Q1 2013 conducted 7 planned islanding events over 3 days
- 4/8/13 windstorm
  - Microgrid provided power to 1,225 customers for ~ 6hrs
- 8/25/13 flash flood
  - CES units islanded six customers for ~ 5.5 hrs
- 9/6/13 intense thunderstorms
  - Microgrid provided power for up to 1,056 customers for > 20 hrs

September 6 – 7 Outage

- 9 transmission and 11 distribution poles were down
- All roads into/out of Borrego Springs were closed

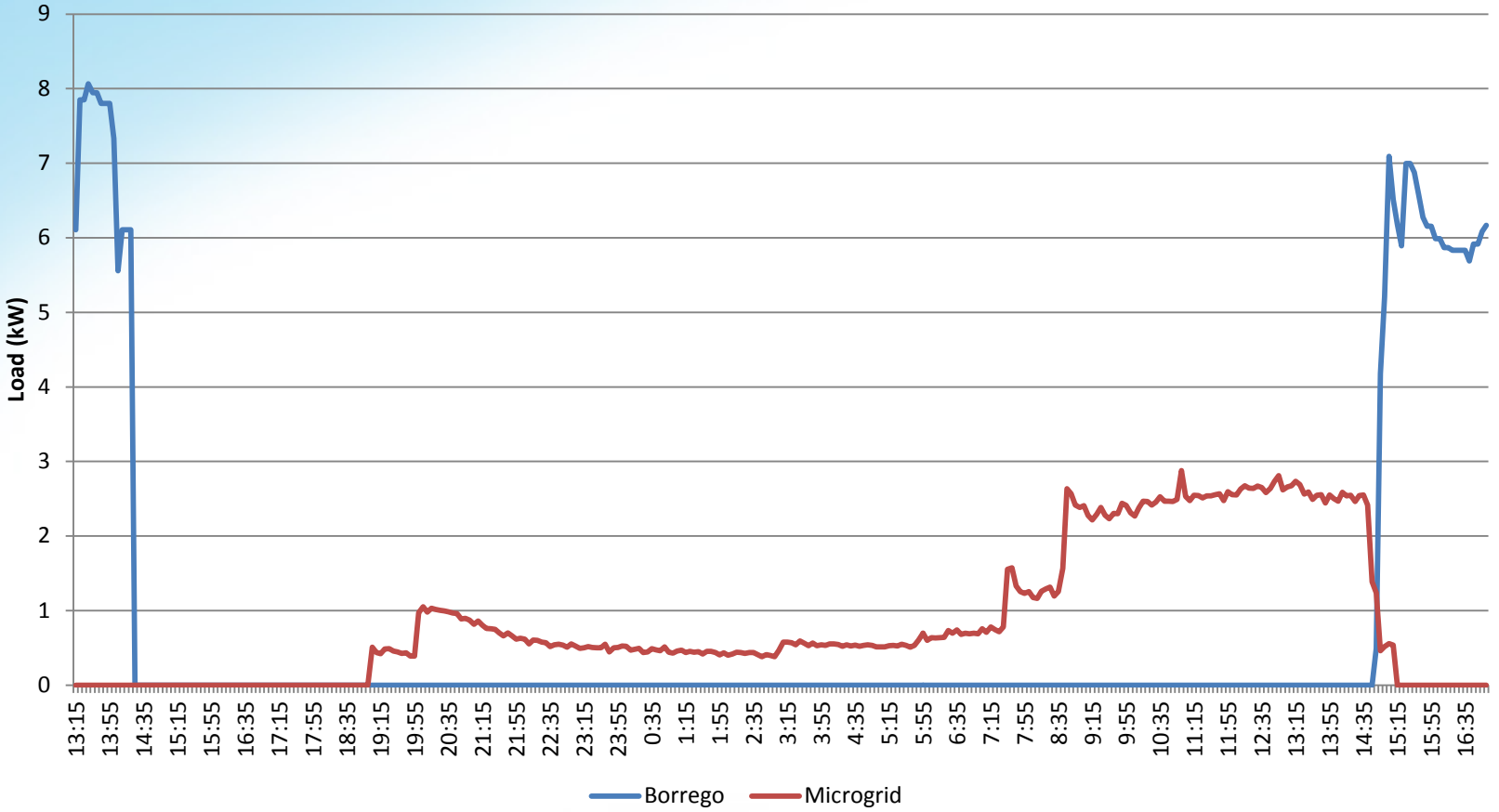
September 6 – 7 Outage

- Restoration efforts took 25 hours
- More than 200 employees involved

September 6 – 7 Outage

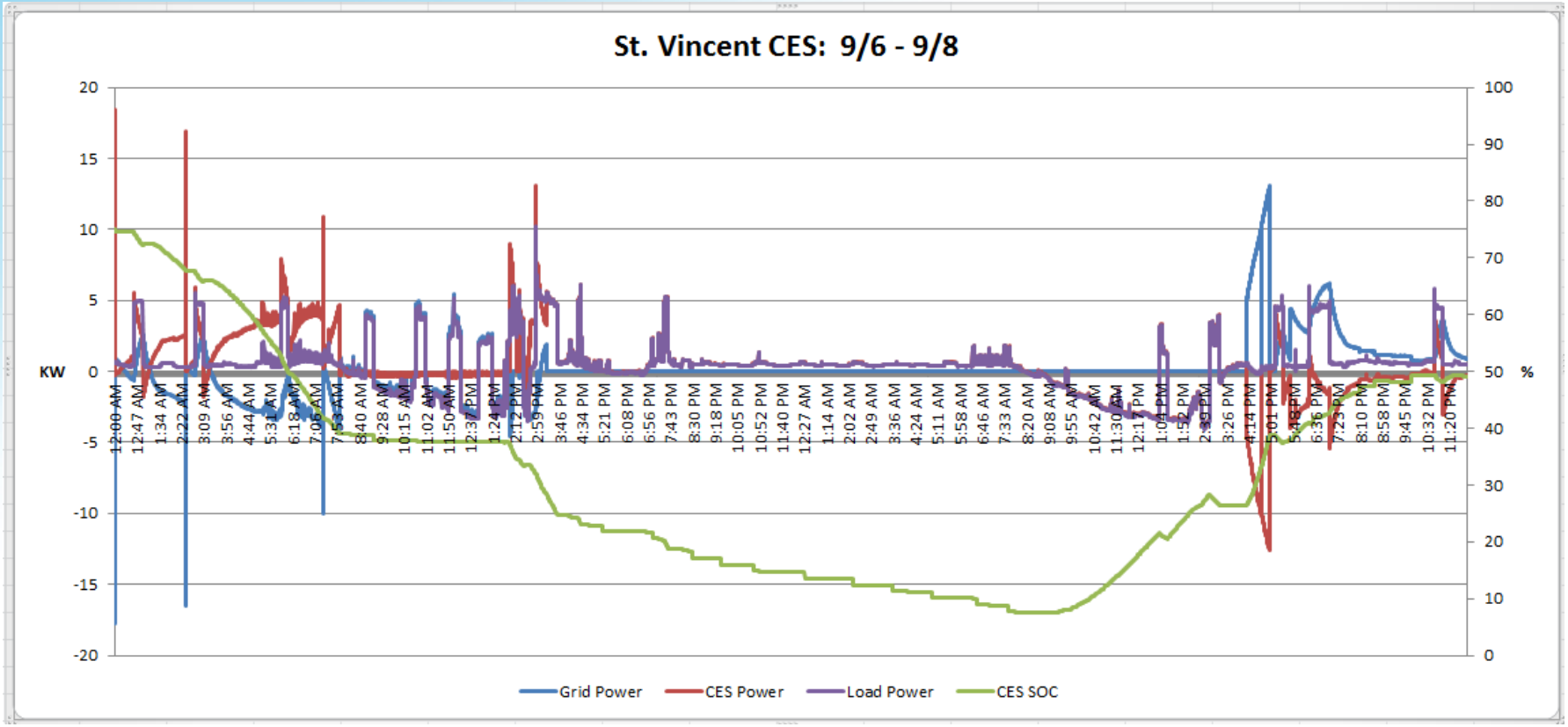
Borrego Outage 9/6-7

- At 1420, single transmission line to Borrego trips out
- 9 Transmission and 11 Distribution poles reported down
- 1056 total customers restored during outage



CES - Borrego Outage 9/6-7

- No outage seen at St. Vincent CES unit site



Borrego Microgrid 2.0 – Overview

Enhance the Borrego Springs Microgrid to be more flexible and automated in responding to a variety of potential outage situations, and leverage various new technologies and Distributed Energy Resources for increased Microgrid capabilities.

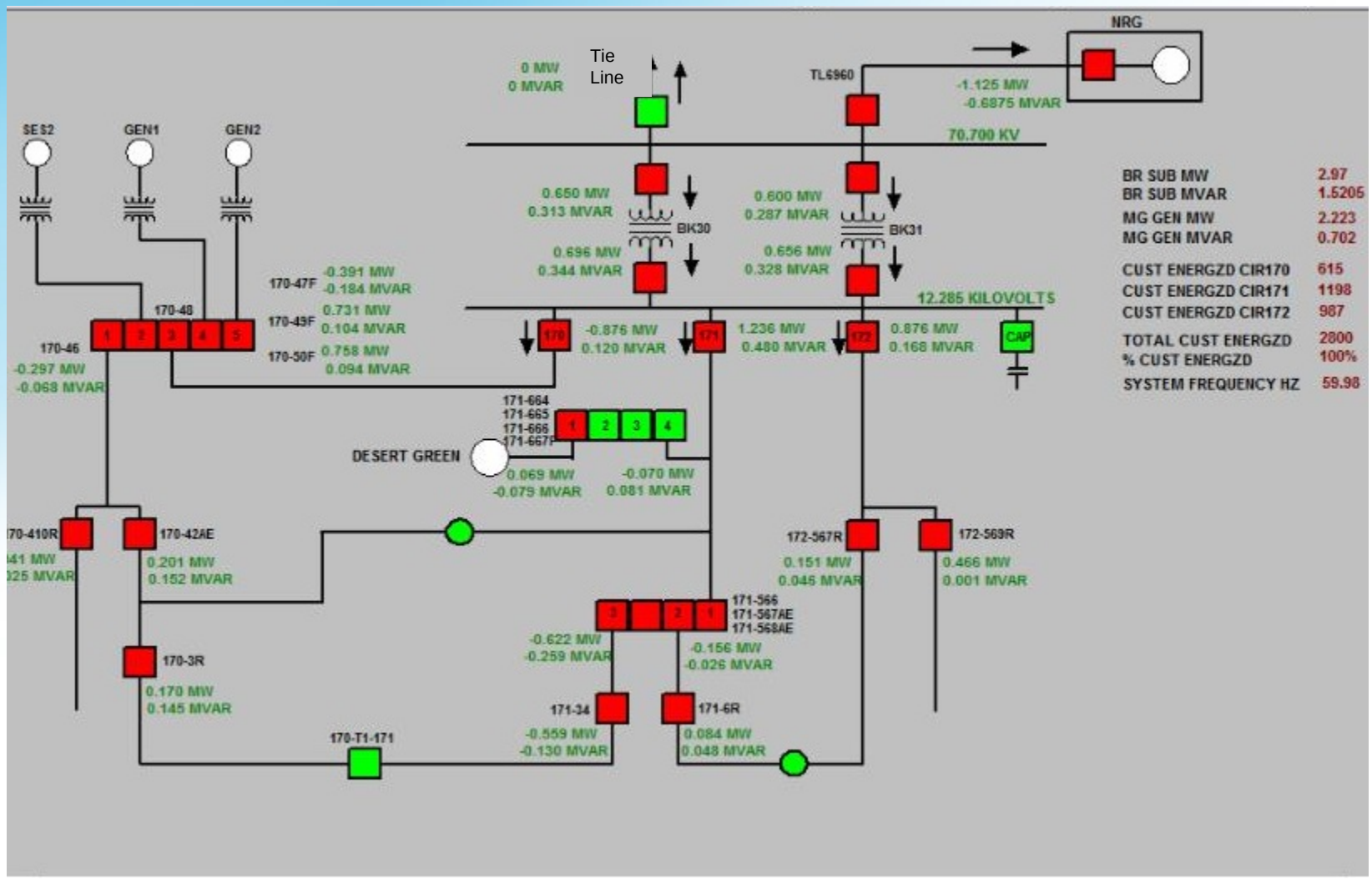
Goals

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

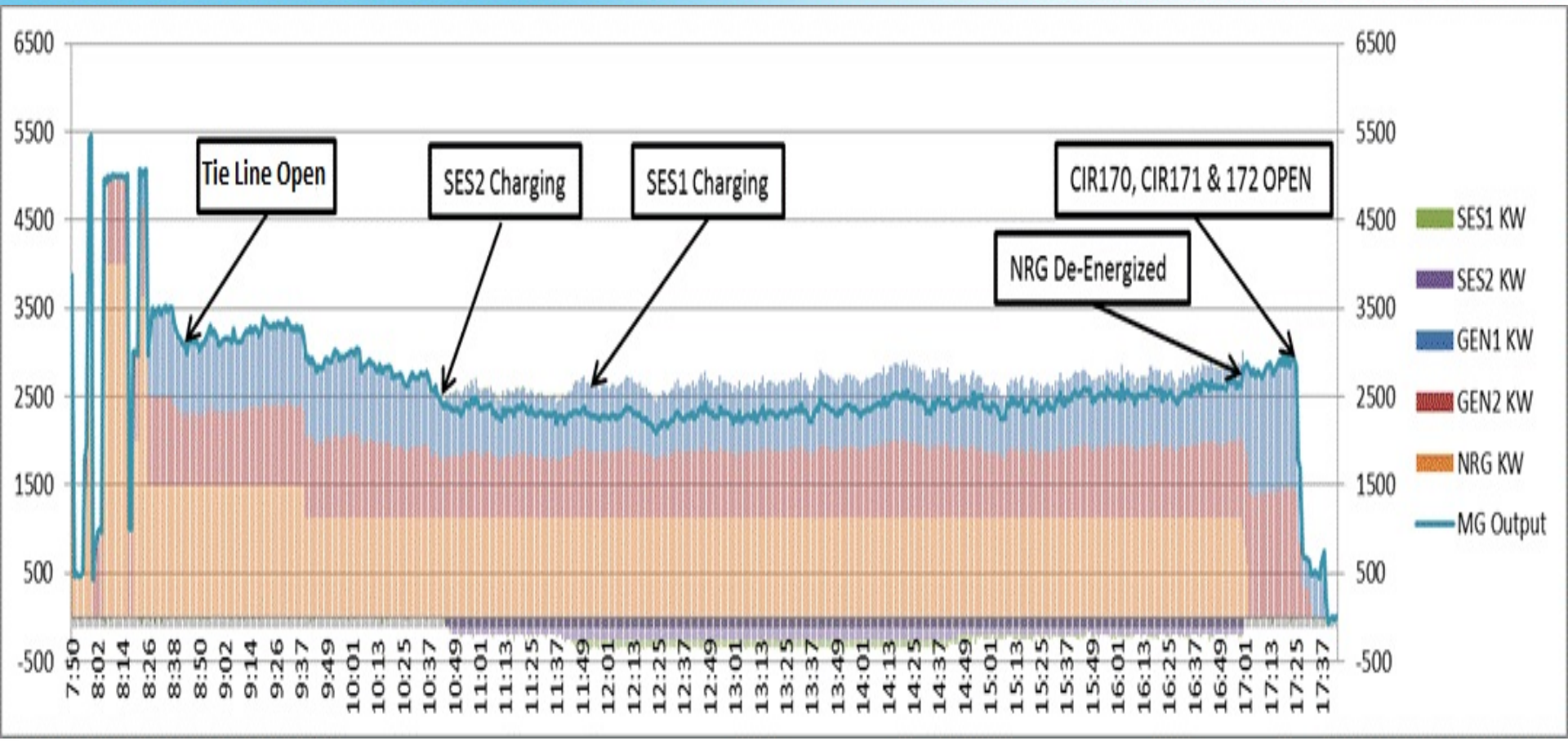
Borrego Microgrid 2.0 – Local PV Integration

- Solar facilities can provide additional generation source
- Potential of islanding all of Borrego Springs during the daytime

May 21, 2015 Islanding Event



May 21, 2015 Islanding Event



Significance and Impact

- First large scale utility microgrid
- Actually island real customers
- Alternative service delivery model
- Prove advanced technologies for future applications
- Establish model to be used by other utilities

Key Takeaways

- Microgrids can be utilized for grid resiliency
- Microgrids are cost effective in some applications
- Technology cost reductions will drive new applications
- Regulatory framework evolving

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