Utility Role in Microgrids

Thomas Bialek PhD, PE
Chief Engineer

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Microgrids Align with Our Mission

Building America’s Best Energy Company

We improve lives and communities by building the **cleanest, safest** and **most reliable** energy company in America.
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
**Microgrid Design**

**Requirements**

- Define microgrid boundary
  - Industrial customer, campus, substation, circuit
- Match load and generation
  - Voltage, frequency and power factor within tolerances
- Define reliability requirements
  - SAIDI, SAIFI, MAIFI and power quality
- Determine seamless transition
  - How long to restore power in island
- Define loads
  - Critical, demand response, peak load
- Determine island duration
  - Typical outage or extreme event
- Define generation needs
  - Renewables, energy storage, fossil generation
**Borrego Springs - California**

- Located approx. 90 miles northeast of San Diego
- Closest traffic light is 50 miles away.
- No big-box retailers or chain stores in town.
- Year-round population: ~3,500 (thousands more visit during spring flower reason)
- Served by a single transmission line.
- Extreme wind, heat, and storm.
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
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 Solar Integration

• Solar facilities can provide additional generation source

• Potential of islanding all of Borrego Springs during the daytime
May 21, 2015 Islanding Event
Microgrids – Cost Recovery

- Alternative service delivery
  - Lowest cost solution
    - All customers
- Resiliency/National Security
  - Societal
    - All customers
- Individual customer
  - Improved local reliability
    - Customers who benefit
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
Questions?

Thomas Bialek  
Chief Engineer  
tbialek@semprautilities.com  
www.sdge.com/smartgrid/