

BORREGO SPRINGS MICROGRID

SINCE 2009 | BORREGO SPRINGS, CA | SAN DIEGO GAS & ELECTRIC



BORREGO SPRINGS, CALIFORNIA is a remote desert town whose electricity was generated dozens of miles away and transmitted over a single line. Power outages caused by thunderstorms, flash floods, wind, wildfires, and planned maintenance used to occur several times per year.¹

Daily temperatures exceed 110 degrees Fahrenheit throughout the summer months.² Additionally, roads going into and out of Borrego Springs can close during powerful storms, trapping residents. With extreme temperatures, a fragile connection to the main grid, and a high elderly population, frequent power outages pose a significant public health risk to the residents of Borrego Springs.

A crisis in 2007 left Borrego Springs without power when a wildfire took down the town's only transmission line. Spurred by the crisis, the local utility, San Diego Gas & Electric (SDG&E), won a grant to build a demonstration microgrid, which was completed in 2012. The microgrid brings power to the most critical sites in Borrego Springs whenever the connection to the main grid fails.

In 2013, the microgrid proved successful when a thunderstorm knocked down the same transmission line impacted by the 2007 wildfire. SDG&E disconnected the microgrid from the main grid and used it to direct power to the critical zones: a gas station, a library that was a designated cool zone, and a community of elderly people. These areas had power until the connection to the main grid was completely restored. Since then, the microgrid has kept electricity flowing to these and other critical zones during several power outages and planned maintenance periods.^{3,4}

In 2015, SDG&E won a grant to expand the microgrid and connect it with a nearby solar farm. The expansion and connection project enabled the microgrid to bring power to all of Borrego Springs.⁵ The microgrid has also added technology such as automated switching, which allows it to operate independently and automatically in case of emergency.

Overall the microgrid has reduced extended power outages, so residents of Borrego Springs enjoy more reliable service.⁶

PROJECT GOALS

- Prevent power outages
- Protect the health of the city's elderly residents
- Reduce reliance on diesel generators
- Establish a replicable microgrid model
- Demonstrate possibility of 100% renewables-powered microgrid

POWER OUTAGE COSTS⁷

Power outages in the US cost over \$18 billion per year and up to \$75 billion in years with major storms:



Public health threats



Food spoilage



Lost productivity



Missed school days



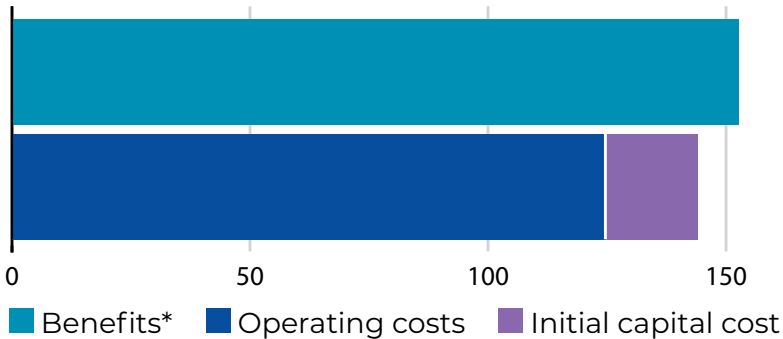
Slow emergency response



Infrastructure damage

MICROGRID COSTS AND BENEFITS⁸

20-Year Net Present Value, in Millions USD



*Includes consumer, system, and societal benefits



LEADERSHIP AND COLLABORATION

SDG&E designed, implemented, and funded the project with the help and advocacy of public and private sector partners, universities, and nonprofits. Several energy, engineering, and technology companies aided implementation, and the US Department of Energy, the California Energy Commission, and the Pacific Northwest National Laboratory provided technical expertise. The Anza-Borrego Desert Natural History Association partnered with SDG&E to create a community outreach program that educates consumers on the connection between energy and nature.^{9,10}

ACADEMIA

University of California, San Diego (I)

SOCIAL MISSION

Anza Borrego Desert Natural History Association, Borrego Springs Chamber of Commerce (A, I)

GOVERNMENT

US Department of Energy, California Energy Commission (F, I), Pacific Northwest National Laboratory (I)

BUSINESS

Energy, engineering, & technology companies (I), SDG&E (C, D, E, F, I)

A: Advocacy, C: Champion, D: Design, E: Evaluation, F: Funding, I: Implementation

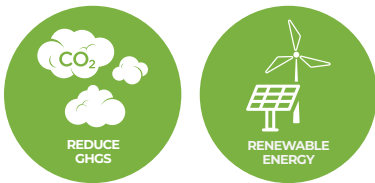
REPLICATION

As a result of its success, cities in California started a program to help other areas develop microgrids. Microgrids continue to grow in popularity as a way to increase resilience against extreme weather events in a cost-effective manner.¹¹ Projects vary widely in size and scope.

NYC built its first microgrid in 2017 at the Brooklyn Marcus Garvey Apartments, a complex of 625 affordable housing units.¹² Princeton University has an on-campus microgrid that provided energy after Hurricane Sandy caused widespread power outages in 2012.¹³ Philadelphia Navy Yard began operating a microgrid in 2016 and will complete the project by 2022.¹⁴ Today, there are over 160 microgrids across the country.

CLIMATE AND RESILIENCE BENEFITS

CLIMATE BENEFITS



RESILIENCE BENEFITS



OTHER BENEFITS



FOOD & WATER
JOBS & ASSETS
HEALTH, WELL-BEING, & SAFETY

CONNECTION
ENERGY & MOBILITY
RESILIENCE

