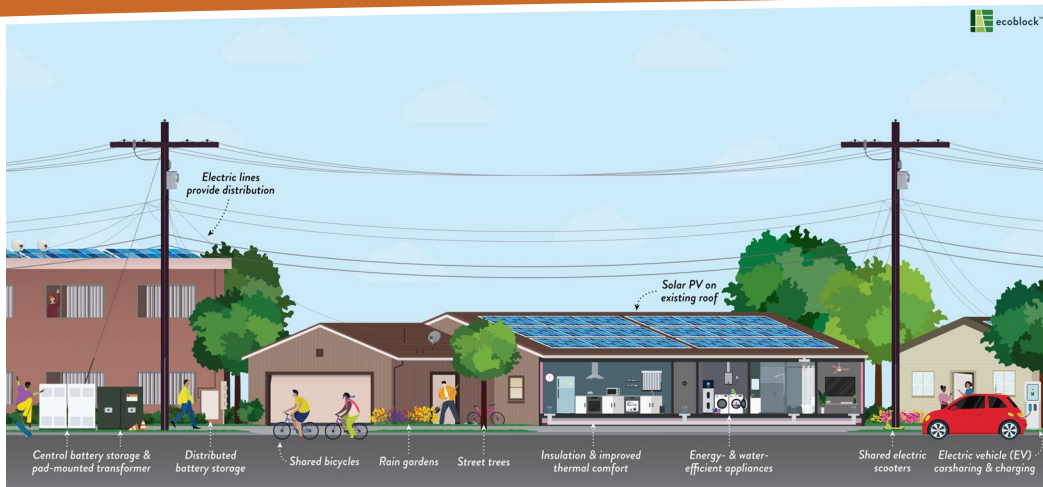


# THE ROLE OF MICROGRIDS IN PROVIDING RELIABLE AND EQUITABLE ACCESS TO ELECTRICITY



For more details  
about this briefing:  
[ccst.us/expert-briefings](https://ccst.us/expert-briefings)



The Oakland EcoBlock combines retrofits of existing homes with a solar microgrid to improve resilience, sustainability, and quality of life for all community members | Oakland EcoBlock / UC Berkeley



## About the CCST Disaster Resilience Initiative:

Ongoing, complex, and intersecting disasters—including climate change, extreme heat, power outages, and the COVID-19 pandemic—are radically disrupting the ways in which Californians live and work. CCST is committed to delivering science and technology advice to improve our resilience to disasters, reduce harm, and improve the lives of all Californians.

## SELECT EXPERTS

The following experts can advise on microgrids:

**PATRICK SAXTON** (Moderator)  
Senior Utilities Engineer  
Resiliency and Microgrids  
California Public Utilities Commission;  
[Patrick.Saxton@cpuc.ca.gov](mailto:Patrick.Saxton@cpuc.ca.gov)  
*EXPERTISE: POLICY ISSUES RELATED TO MICROGRIDS IN CALIFORNIA*

**DAVID CARTER, P.E.**  
Principal Engineer  
Schatz Energy Research Center  
Cal Poly Humboldt  
[David.Carter@humboldt.edu](mailto:David.Carter@humboldt.edu)  
*EXPERTISE: DESIGN AND IMPLEMENTATION OF MICROGRIDS AND OTHER CLEAN ENERGY TECH*

**ROBERT FLORES, PHD**  
Senior Scientist  
Advanced Power and Energy Program  
UC Irvine  
[rjf@aep.uci.edu](mailto:rjf@aep.uci.edu)  
*EXPERTISE: MODELING MICROGRID UPGRADES FOR DISADVANTAGED COMMUNITIES*

**ALEXANDRA VON MEIER, PHD**  
Director, Electric Grid Research,  
CIEE-CITRIS  
Adjunct Professor, Dept. of EECS  
UC Berkeley  
[vonmeier@berkeley.edu](mailto:vonmeier@berkeley.edu)  
*EXPERTISE: POWER DISTRIBUTION SYSTEMS, SMART GRID ISSUES, AND THE INTEGRATION OF DISTRIBUTED AND INTERMITTENT GENERATION*

**YU ZHANG, PHD**  
Assistant Professor  
Electrical and Computer Engineering  
UC Santa Cruz  
[zhangy@ucsc.edu](mailto:zhangy@ucsc.edu)  
*EXPERTISE: MONITORING, LEARNING, AND MANAGEMENT FOR SMART POWER GRIDS*

Contact:  
[Brie.Lindsey@ccst.us](mailto:Brie.Lindsey@ccst.us)  
Director of Science Services

## SUMMARY

- Microgrids provide one or more end-users with access to energy resources when not connected to the main grid.
- Microgrids can be powered by any number of renewable or fossil-based energy sources.
- Microgrids can help increase reliable access to energy and increase resilience during disasters or grid outages.
- There are a growing number of microgrid examples being designed and deployed across the state.

## WHAT IS A MICROGRID?

Microgrids at their most basic refer to a collection of resources that can supply energy independently from the main grid. Typically, a microgrid includes a local source of energy generation, a means of storing energy, electrical cables to connect end-users, and a control system to manage the distribution of energy.

Microgrids can be powered by any number of renewable or fossil energy sources. Examples include diesel generators, fuel cells, wind, or solar. Microgrids can also vary in scale from a single house to an entire region.

The technical, economic, and regulatory considerations of microgrids can vary depending on the number and type of end users, and how the resources are connected to the main grid. Three configurations that each have their own unique set of considerations are **(1)** one or more entities with no connection to the main grid, **(2)** single-entity with connection to the main grid, and **(3)** multi-entity with connection to the main grid.

## KEY CHARACTERISTICS OF MICROGRIDS

### GRID-CONNECTED

A microgrid with connection to the main grid such that it can switch between operating as part of the larger main grid or disconnected in “island mode.”

### OFF-THE-GRID

A microgrid that has no connection to the main grid such that it always operates independently.

### RELIABILITY

The ability to minimize the number and duration of electrical outages.

### RESILIENCY

The ability to respond to and recover from a disruption in energy supply.

### SURVIVABILITY

The ability to maintain the supply of electricity to all important critical loads when disconnected from the main grid.

# MICROGRIDS IN THE COMMUNITY

## OAK VIEW COMMUNITY

The Huntington Beach Advanced Energy Community project developed tools to design an advanced energy community for the disadvantaged community of Oak View in Huntington Beach.

The microgrid is intended to support statewide environmental goals, local resiliency goals, and the desire to include low-income communities in the development of sustainable energy projects.



Oak View Community Buildings  
(Figure 4, Flores et al 2019)

The proposed design uses energy conservation measures to reduce electrical demand by approximately 30 percent, and a solar energy with storage microgrid to further reduce electrical demand by up to 94 percent.

Learn more: [huntingtonbeachca.gov/AEC](http://huntingtonbeachca.gov/AEC)

## OAKLAND ECOBLOCK

The Oakland EcoBlock is a neighborhood retrofit to demonstrate a block-level microgrid as well as efficient energy and water home upgrades, funded primarily by the California Energy Commission.



Oakland EcoBlock Schematic  
(UC Berkeley)

The EcoBlock design includes advanced efficiency measures, a solar-powered microgrid, battery energy storage, and a new approach for coordinating these resources among neighbors.

EcoBlock aims to create an Advanced Energy Community Model that equitably reduces carbon emissions, and uses collaboration to build community and improve community resilience.

Learn more: [ecoblock.berkeley.edu](http://ecoblock.berkeley.edu)

## REDWOOD COAST AIRPORT

The Redwood Coast Airport (RCA) Renewable Energy Microgrid project is a multi-customer, front-of-the-meter microgrid designed to provide clean electricity to Humboldt County and be a lifeline in the event of a natural disaster or other emergency that disrupts the main grid.



Redwood Coast Airport  
(Schatz Center, Cal Poly Humboldt)

Since roads into Humboldt County are frequently closed by fires and slides, energy security at the regional airport and adjacent Coast Guard air station is crucial. In the event of a grid outage, the airport microgrid will allow flight service and rescue operations to continue without interruption.

Learn more: [schatzcenter.org/acv/](http://schatzcenter.org/acv/)

## BLUE LAKE RANCHERIA

The Blue Lake Rancheria microgrid in Humboldt County is designed to supply electricity to the Rancheria during main grid power outages.

End-users include Rancheria houses and tribal government offices, EV charging, convenience store and gas station, a hotel and casino, and energy and water systems, which collectively serve as an American Red Cross emergency evacuation center.



Blue Lake Rancheria Microgrid  
(Schatz Center, Cal Poly Humboldt)

During a 2019 power safety power shut-off (PSPS) the microgrid ensured continued operation of critical services including the gas station, municipal water and sewage systems, and medical equipment.

Learn more: [schatzcenter.org/blrmicrogrid/](http://schatzcenter.org/blrmicrogrid/)



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