

Microgrid Resource Guide



Cal OES
GOVERNOR'S OFFICE
OF EMERGENCY SERVICES

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Microgrid Overview

Microgrids are self-powered electrical grid systems that can be used to power a small community, a school, a hospital campus, or even a single-family dwelling, independently of the larger electrical grid. The microgrid technology is an alternative energy generation and distribution system that can provide backup power during emergencies to increase resilience while reducing total energy costs. In addition, microgrids provide cost savings and also allow for energy independence, and they have proven to be more reliable and environmentally friendly than fossil-fuel alternatives.

The following features demonstrate the benefit of microgrids:

- **Standalone capability** – If the main power grid resource goes offline, a microgrid can provide an autonomous source of energy that continues providing power.
- **Resiliency** – Because microgrids are localized, and not distributed over hundreds of miles like traditional electrical power lines, they can be built to withstand common effects of disaster.
- **Green** – Microgrids are generally powered by solar photovoltaic panels, but can also derive power from wind, hydroelectric, geothermal, or a combination of these sources.
- **Profitability** – Excess power produced by microgrids can be directed back into the main grid, for a profit to the microgrid owner.
- **Reliability** – Microgrid reliability can be increased through the establishment of maintenance contracts with third-party vendors. A microgrid is composed of a power source, a power controller that routes electricity, storage batteries, and often a fossil fuel electric generator, which serves as a backup power source if the microgrid goes offline. When a generator runs on a microgrid, it operates at full efficiency until the batteries are recharged, then shuts off (unlike usual generator operation that runs less efficiently to simply meet a load demand.)

Example of a resilient microgrid:

Babcock Ranch in Florida survived Hurricane Ian with little damage. See <https://www.cbsnews.com/miami/news/florida-solar-community-endured-hurricane-ian-with-no-loss-of-power-and-minimal-damage/>

Babcock Ranch Microgrid Project

The microgrid that was constructed within the community of Babcock Ranch in Fort Myers, FL represents an example of a resilient microgrid that was able to survive the devastation of Hurricane Ian (2022) with minimal damage. (Read more...)

This resource guide offers funding options through grants, information articles, and other microgrid resources that may assist your entity.

For more information about the opportunities presented within this guide, as well as any questions or concerns, please reach out to us at longtermrecovery@caloes.ca.gov.

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Funding Opportunities

Energy, Power, Control, and Networks Research Grant (EPCN)	
Application Deadline	Ongoing – Proposals Accepted at Any Time
Program Description	<p>The National Science Foundation, EPCN Program supports innovative research in modeling, optimization, learning, adaptation, and control of networked multi-agent systems, higher-level decision making, and dynamic resource allocation, as well as risk management in the presence of uncertainty, sub-system failures, and stochastic disturbances.</p> <p>EPCN's goal is to encourage research on emerging technologies and applications including energy, transportation, robotics, and biomedical devices & systems.</p> <p>EPCN invests in novel machine learning algorithms and analysis, adaptive dynamic programming, brain-like networked architectures performing real-time learning, and neuromorphic engineering.</p> <p>EPCN additionally emphasizes electric power systems, including generation, transmission, storage, and integration of renewable energy sources into the grid; power electronics and drives; battery management systems; hybrid and electric vehicles; and understanding of the interplay of power systems with associated regulatory & economic structures and with consumer behavior.</p>
Eligibility	Unrestricted
Maximum Award	Unknown
Application Process	https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505249
Website	https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505249
Contact Information	Eyad Abed Email: eabed@nsf.gov Phone: 703-292-8339
Timeline for Funding Availability	Ongoing

California Public Utilities Commission (CPUC) Microgrid Incentive Program (MIP)

Application Deadline	<ul style="list-style-type: none"> • Early October 2023 - Within 180 days upon issuance of the decision, the utilities shall make available the MIP Handbook. • Early July 2024 - The first MIP application window opens no later than nine (9) months after the publication of the MIP Handbook.
Program Description	<p>The California Public Utilities Commission (CPUC) has established a Microgrid Incentive Program (MIP) under a January directive tied to Senate Bill 1339 (2018) to help fund clean energy microgrids and increase resilience of communities vulnerable to power loss.</p> <p>MIP objectives include the following:</p> <ul style="list-style-type: none"> • Increase electrical reliability and resiliency in communities at higher risk of electrical outage. • Increase electrical power reliability for critical infrastructure such as fire stations, schools, and nursing homes that keep communities safe. • Reduce impacts of power outages and minimize disruptions for low-income households, persons requiring uninterrupted power, needing assistive or medical equipment, or having other access and functional needs. • Reduce Greenhouse Gas emissions by deploying clean power generation technologies and expanding the market for resiliency solutions that do not rely on diesel power generation.
Eligibility	Local and tribal governments
Available Funding	To be determined. Total available funding is \$200,000,000.
Application Process	To be determined
Website	https://www.cpuc.ca.gov/resiliencyandmicrogrids/
Contact Information	Jason Ortego Email: Jason.ortego@cpuc.ca.gov Phone: 415-470-0958
Timeline for Funding Availability	To be determined

CA Infrastructure & Economic Development Bank (IBank)

California Infrastructure State Revolving Fund (ISRF)

Application Deadline	Ongoing
Program Description	California Infrastructure and Economic Development (IBank) IBank's ISRF Loan Program provides low-cost, direct loans to local governments and nonprofits sponsored by public agencies for a wide variety of public infrastructure and economic expansion projects (excluding housing) that improve and sustain communities, helping individuals and families thrive. We focus on small and mid-to moderate-sized local governments and special districts – including those in underserved regions and communities. Eligible infrastructure projects include, but are not limited to, educational, cultural, and social facilities, power and communications facilities, and city streets, among many others (see web page).
Eligibility	Public agencies in CA including any subdivision of local government, including cities, counties, special districts, assessment districts, joint powers authorities, and eligible non-profit corporations.
Financing Amount	Financing is available from \$50,000 up to \$25 million with loan terms for the useful life of the project up to 30 years. Funding is through reimbursement. No match requirement.
Application Process	Online. See funding guidelines at website.
Website	Infrastructure Loans California Infrastructure and Economic Development Bank (IBank)
Contact Information	(916) 341-6600, infrastructureloans@ibank.ca.gov
Timeline for Funding Availability	Ongoing

California Lending for Energy & Environmental Needs (CLEEN)

Application Period	Ongoing
Program Description	To fund projects to help meet the State of California's goals for Greenhouse Gas reductions, water conservation, and environmental preservation. Projects to include: <ul style="list-style-type: none"> • Power generation: solar, wind, biomass, and hydroelectric.

	<ul style="list-style-type: none"> • Energy conservation: energy efficient retrofits, LED lights, building automation and controls, environmental mitigation, and water treatment and distribution. • Energy storage: power transmission and distribution, and electric vehicle charging stations.
Eligibility	Local governments, special districts, approved private non-profits, public universities, and hospitals.
Loan Amounts	Loans available from \$50,000 to \$30,000,000.
Application Process	Financing Application
Website	California Infrastructure and Economic Development Bank (IBank)
Contact Information	Phone: 916-341-6600 Email: LoanProgram@ibank.ca.gov P.O. Box 2830, Sacramento, CA 95812-2830
Timeline for Funding Availability	Ongoing.

GFO-22-302 – Valuation of Investments in Electricity Sector Resilience	
Application Period	Various
Program Description	Provides information on funding resources and funding workshops that offers advancement of the State's transition to clean energy and transportation through innovation, efficiency, and the development and deployment of advanced technologies.
Eligibility	Business, Individual, Nonprofit, Public Agency, Tribal Government
Maximum Award	N/A
Application Process	Online: https://gss.energy.ca.gov/Login.aspx
Website	Solicitations (ca.gov)
Contact Information	Crystal Willis Email: Crystal.Willis@energy.ca.gov Phone: 916-529-1108
Timeline for Funding Availability	N/A

FEMA Hazard Mitigation Grant Program (HMGP)

Application Period	Annual Grant – Check back to see when funding becomes available. (Dependent on Presidential Disaster Declaration)
Program Description	<p>This opportunity provides funding for communities to implement mitigation activities to reduce risk to life and property from natural hazards. In CA, natural hazards include wildfire, earthquake, drought, extreme weather, flooding, and other impacts of climate change.</p> <p>HMGP funding can also support the development of Local Hazard Mitigation Plans (LHMP) and project scoping activities. Projects must be eligible, feasible, and cost effective per FEMA's Hazard Mitigation Assistance Guidance. Projects must be stand-alone activities that will reduce risk as their primary benefit, but Cal OES strongly encourages the submission of projects that achieve multiple benefits. See information under "Application Process" for more information.</p> <p>[Microgrids serve to reduce climate impacts and protect communities from power outages due to natural or man-made causes, so they can meet the attached criteria.]</p>
Eligibility	State, local, and tribal governments, and private non-profit organizations.
Maximum Award	Varies – Dependent on application and amount of funding available.
Application Process	Hazard Mitigation Grant Program (HMGP) California Governor's Office of Emergency Services – Sign-up for Cal OES Engage Portal to submit a Notice of Intent
Website	Hazard Mitigation Grant Program (HMGP) California Governor's Office of Emergency Services
Contact Information	Email: HMA@caloes.ca.gov
Timeline for Funding Availability	Ongoing dependent upon Declared Disaster status

Rural Energy for America Program (REAP) Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans & Grants

Application Deadline	Open for fiscal years 2023 and 2024
Program Description	The program provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable

	energy systems or to make energy efficiency improvements. Agricultural producers may also apply for new energy efficient equipment and new system loans for agricultural production and processing.
Eligibility	Agricultural producers with at least 50 percent of their gross income coming from agricultural operations. Small businesses in eligible rural areas (populations under 50,000) Tribal corporation or Tribal business entity.
Minimum to Maximum Awards	Renewable Energy System Grants: <ul style="list-style-type: none"> • \$2,500 minimum. • \$1 million maximum. Energy Efficiency Grants: <ul style="list-style-type: none"> • \$1,500 minimum. • \$500,000 maximum.
Application Process	To complete an application for this program, you must be pre-registered with the System for Award Management (SAM) and also have a Data Universal Number System (DUNS) number. Neither of these applications cost money, but they can take time so be sure to get this taken care of right away. If you are already registered with these systems, you do not need to do it again.
Website	https://www.rd.usda.gov/programs-services/energy-programs/rural-energy-america-program-renewable-energy-systems-energy-efficiency-improvement-guaranteed-loans
Contact Information	Dan Johnson Phone: 661-281-2736 Email: daniel.johnson@usda.gov Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans & Grants in California Rural Development (usda.gov)
Timeline for Funding Availability	Ongoing

Solar for All	
Application Deadline	September 26, 2023 (See Section IV Funding Opportunity for more information)
Program Description	Expand the number of low-income and disadvantaged communities primed for distributed solar investment and enable

	millions of low-income households access to affordable, resilient, and clean solar energy. Grantees will use funds to expand existing low-income solar programs or design and deploy new Solar for All programs nationwide. EPA will not fund individual projects under this competition.
Eligibility	States, Territories, Tribal Governments, Municipalities, Eligible non-profit entities
Maximum Award	\$400,000,000
Application Process	Solar for All US EPA
Website	Solar for All US EPA
Contact Information	ggrf@epa.gov
Timeline for Funding Availability	July 2024

USDA Community Facilities Direct Loan & Grant Program in California	
Application Deadline	Ongoing
Program Description	This USDA Rural Development program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial, or business undertakings.
Eligibility	<p>The following entities are eligible to apply:</p> <ul style="list-style-type: none"> • Public bodies • Community-based non-profit corporations • Federally recognized Tribes <p>Rural areas including cities, villages, townships and towns including Federally Recognized Tribal Lands with no more than 20,000 residents according to the latest U.S. Census Data are eligible for this program.</p>
Maximum Award	Maximum of 75% of total project costs when guidelines are met.
Application Process	Community Facilities Direct Loan & Grant Program in California Rural Development (usda.gov)

Website	Community Facilities Direct Loan & Grant Program in California Rural Development (usda.gov)
Contact Information	USDA Rural Development Attn: Community Programs 430 G St, Agency 4169 Davis, CA 95616 Phone: 530-792-5800
Timeline for Funding Availability	Ongoing

Self-Generation Incentive Program (SGIP)	
Application Deadline	Ongoing
Program Description	<p>The California Public Utilities Commission (CPUC) SGIP provides incentives to support existing, new, and emerging distributed energy resources. SGIP provides rebates for qualifying distributed energy systems installed on the customer's side of the utility meter.</p> <p>Qualifying technologies include battery systems, wind turbines, pressure-reduction turbines, and projects involving onsite, directed, or vented biogas.</p> <p>The following projects are eligible if powered by 100% biogas: fuel cells, internal combustion engines (generators), microturbines, and gas turbines.</p> <p>The following projects are ineligible: solar, and projects involving the flaring of biogas.</p>
Eligibility	Non-residential customers of PG&E.
Maximum Award	\$5,000,000 with 50% of funding provided up front, and the other 50% provided in increments over a five-year period that is adjusted in accordance the performance of the installed system.
Application Process	Non-residential PG&E customers may apply at https://www.selfgenca.com/register/ Project developers may apply at https://www.selfgenca.com/home/dev_register/
Website	www.pge.com/sgip/
Contact Information	Email: SelfGen@pge.com

Timeline for Funding Availability	Ongoing
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Technical Assistance Resources

Microgrid Articles	
California Climate & Energy Collaborative	Active Funding Opportunities Funding Resources – California Climate and Energy Collaborative (eecoordinator.info)
Sierra – National Magazine of the Sierra Club	California Tribe's DIY Electric Grid https://www.sierraclub.org/sierra/2019-2-march-april/faces-clean-energy/california-tribes-diy-electric-grid
Microgrid Knowledge	California Microgrid To Demonstrate that Hospitals Don't Need Diesel Generators https://microgridknowledge.com/hospital-microgrid-diesel/
Microgrid Knowledge	California Senior Community Persists on Microgrid https://microgridknowledge.com/oakmont-california-seniors-community-microgrid/
Wood MacKenzie	Record number of microgrids installed in US https://www.woodmac.com/press-releases/record-number-of-microgrids-installed-in-us-last-year/
Renewable Energy World	DOE targets Native communities with solar and microgrid funding (renewableenergyworld.com)

Microgrid Resources	
Wood MacKenzie webinars (formerly Greentech)	Natural Resources & Energy Industry Events https://www.woodmac.com/events/
News and feature articles about community microgrids	Community Microgrid Knowledge
Clean Energy	Home – Lawrence Berkeley National Laboratory (lbl.gov)
Microgrid Resources Coalition	Conferences - Microgrids (districtenergy.org) Webinars - Microgrids (districtenergy.org)
Grid and Transmission Program Conductor	Grid and Transmission Program Conductor Department of Energy Clearinghouse for Grid Deployment Office's (GDO) transmission and grid resilience financing programs, as well as other existing DOE transmission and grid programs.

Grid Deployment Office	Smart Grid Grants Department of Energy Provides information on past Grid webinars and has an information resources section.
Recovery & Resilience Resource Library	https://gcc02.safelinks.protection.outlook.com/?url=https://lnks.gd//eyJhbGciOiJIUzI1NiJ9.eyJidWxsZXRpbl9saW5rX2kljoxNTIsInVyaSI6ImJwMjpiYGljaylsmJ1bGxldGluX2kljoiMjAyMjEyMTQuNjgyMzMyNzEiLCJ1cmwiOiJodHRwczovL3d3dy5mZW1hLmdvdi9lbWVvZ2VuY3ktbWVudlcnMvchJhY3RpdGlubmVycy9yZWVudmVyeS1yZXNpbGllbmNILXJlc291cmNILWxpYnJhcnkifQ.iyy5DDV63YVNMdgcM-cztOSjgdjL-4bb3zUW-0WVoZg/s/2895569127/br/150512367084-l&data=05 01 Wendy.Boemecke@CalOES.ca.gov 5a4da21aa8dc4550c41108dade0b1c54 ebf268ae303647149f69c9fd0e9dc6b9 1 0 638066436593402050 Unknown TWfpbGZsb3d8eyJWljoimc4wLjAwMDAiLCJQljoiv2luMzliLCJBTil6Ik1haWwiLCJXVCI6Mn0= 3000 &sdata=HrPRJrcYDwJ8XjPASM9kQqaBueVJ/T5ltcTfD9+AU=&reserved=0 Recovery and Resilience Resource Library FEMA.gov The tool helps users to find and research federal disaster recovery resources that would be beneficial in pre-disaster recovery planning or in the wake of a disaster
California Financing Coordinating Committee	California Financing Coordinating Committee (CFCC) Resources of four State and two Federal funding agencies to provide a one-stop shop for available grants, loans, and bond financing for infrastructure projects.
Clean Coalition	Community Microgrids - Clean Coalition (clean-coalition.org) The Clean Coalition has had significant impact shaping policies and programs that enable the deployment of clean local energy to address climate change and secure economic, environmental, and resilience benefits for communities,