Virtual Microgrid "Tour": Successful U.S. Based Projects

The following is a list of microgrid and combined heat and power (CHP) projects located across the country which have successfully provided energy resilience for the projects or communities which they serve. Energy resilience needs and goals vary across communities ranging from providing power in the event of a catastrophic outage, hardening their critical infrastructure against cyber-attacks, to providing energy savings during blue sky conditions. Communities interested in learning about how a microgrid, and CHP, might be able to help meet their energy resilience needs are encouraged to review the projects on this list. The projects range from smaller scale to those providing power to military bases. When available, videos for each project are provided in addition to a link to the project. With new microgrid and CHP projects regularly coming online, communities are encouraged to look at the U.S. DOE Combined Heat and Power and Microgrid Installation Databases for new projects added since this publication date.

Oncor Microgrid and Technology Demonstration and Education Center
Location: Lancaster, TX
Project link: S&C Electric Company Case Study – Oncor Microgrid
Video: https://youtu.be/Hxr7ELpBcMs
Project Description: The Oncor Microgrid and Technology Demonstration and Education Center has nine sources of distributed generation throughout their campus, including a propane microturbine, two solar photovoltaic arrays, an energy storage, and five generators. Each of the four zones within the larger microgrid are also microgrids themselves, and the entire control is autonomous. During a loss-of-power event, a combination of advanced distribution automation equipment and a Microgrid Controller (MGC) use high-speed communications and distributed grid intelligence to automatically detect a problem on the grid and test if it is temporary or permanent. To learn more about this project, please email microgrid@sandc.com.

University of Texas at Austin Microgrid
Location: Austin, TX
Project links: Microgrid Knowledge – UTA Profile, PEER - University of Texas at Austin, USGBC – UTA Finds Sustainable Solutions Through PEER
Project Description: The University of Texas at Austin (UT Austin) is the first PEER-certified campus in the world. UT Austin has generated 100% of its own electric power and thermal energy since 1929, keeping pace with campus growth through increasing their annual energy production efficiency, energy efficiency projects, and capacity upgrades. This campus microgrid, one of the largest in the country, has islanding capabilities from the main grid, and has an excess generation capacity and rapid load shedding capability to ensure that all critical facilities stay powered. During winter storm Uri in February 2021, when much of the Texas power grid had been crippled, the 160+ buildings on campus never lost power. Building occupants on campus receive real time energy-use data to monitor usage and reduce demand.

This publication was prepared by the North Central Texas Council of Governments with funding provided by the State Energy Conservation Office.

Camp Pendleton Energy Security: Fractal Grid
Location: Oceanside, CA
Project link: Microgrid Knowledge - Camp Pendleton
Video: https://youtu.be/IqUEe8HmKOU
Project Description: This 1.1 megawatt microgrid, located at the Marine Corps Camp Pendleton Base, is comprised of four smaller microgrids that provide energy security to critical facilities using renewable energy. This fractal grid allows for scaling up with additional microgrids without the need to add a larger system. A net-zero energy project, it utilizes off-grid and grid-connected renewable energy sources through two solar arrays and a 400-kWh ion flow battery system. This system provides energy resilience and security against cyber threats by allowing users to command, operate, and manage the systems in real-time.

Blue Lake Rancheria Microgrid
Location: Blue Lake, CA
Project links: Schatz Energy Research Center - BLR Microgrid, Blue Lake Rancheria Fact Sheet.pdf
Video: https://vimeo.com/138273658
Project Description: The Blue Lake Rancheria Microgrid utilizes a solar array, plus battery storage, with a control system to allow for tandem control or control outside of the microgrid. This ability is called "islanding" where the control functionality of the microgrid allows it to automatically disconnect from its main grid during an outage and reconnect once energy has been restored. The microgrid provides critical power during emergencies, as well as economic and environmental benefits during blue sky conditions. In periods of peak energy demand, the microgrid can shave demand load from the larger grid by going into island mode and thus provide energy and cost savings to the community. To learn more about this project, please email schatzenergy@humboldt.edu.

Fort Carson Microgrid
Location: Colorado Springs, CO
Project link: NREL Targeting Net Zero Energy at Fort Carson: Assessment and Recommendations
Video: https://youtu.be/5S8Cb48M4bQ
Project Description: The Fort Carson Army Base microgrid is part of a project known as Smart Power Infrastructure Demonstration for Energy Reliability and Security, or SPIDERS. It allows the base to harden its infrastructure and be prepared in the event of a catastrophic outage to the main power grid. By islanding from the main electricity grid, the microgrid can ensure that energy remains flowing to the base's most important buildings. Reliable energy infrastructure within the microgrid includes solar panels, battery storage, diesel generators, and electric trucks.

Decatur Island Microgrid
Location: Decatur, WA
Project links: Decatur Island Microgrid Project, OPALCO Quick Fact: Decatur Island Batter Storage Project, OPALCO's First Local Microgrid
Video: https://www.youtube.com/watch?v=nUgR7y4rokU
Project Description: Built on 3.6 acres on Decatur Island in Washington state, this smaller scale microgrid is one-megawatt with 2.6 MWh large scale battery storage and can power about 500 homes for 4 hours. This project is the first of several planned to help provide greater local energy resilience for remote island communities. Through transmission deferral, the system saves energy by reducing loads giving longer life to transformers and saving peak charge costs.

Alameda County Santa Rita Jail Microgrid
Location: Dublin, California
Project link: Almeda County Santa Rita Jail Smart Grid Fact Sheet
Video: https://youtu.be/HR2pHOCsJGs
Project Description: With a prison population the size of most small American towns, the Santa Rita Jail requires 3 megawatts (MW) of reliable and secure electricity 24 hours a day, seven days a week to power their million-square-foot facility. The jail's self-sustaining smart grid integrates the entirety of its onsite energy generation into energy storage. If a disturbance to the larger energy grid occurs, the jail's microgrid can disconnect and operate independently in island mode. Alameda County installed a 1.2 megawatt solar photovoltaic system on the roof, a 1 megawatt fuel cell cogeneration plant, multiple energy efficiency and water conservations measures, five small wind turbines, a 2 megawatt advanced energy storage system, and an automatic disconnect switch to complete the microgrid.

NYU Microgrid
Location: New York City, NY
Project link: NYU News Release: NYU Switches on Green CoGen Plant
Project Description: New York University (NYU) has produced power on site since the 1960's but has made the transition away from oil-fired technology towards a modern natural gas-fired CHP facility and microgrid. The NYU microgrid, which supplies electricity to 22 buildings and heat to 37 buildings on campus, is connected to the larger grid and purchases electricity when demand exceeds onsite generating capacity. The microgrid can then island itself from the larger grid during disruptions such as Superstorm Sandy. With an evaluated savings on total energy costs of $5 to $8 million per year, the CHP system hosts a capacity of output at 13.4 MW. It has two 5.5 MW gas turbines and a 2.4 MW steam turbine.

Resources:
U.S. DOE Combined Heat and Power and Microgrid Installation Databases - https://doe.icfwebservices.com/chp
Microgrid Knowledge - https://microgridknowledge.com/
National Renewable Energy Laboratory (NREL) – https://www.nrel.gov/index.html
NYU - https://www.nyu.edu/about/news-publications/news/2011/january/nyu-switches-on-green-cogen-plant-and-powers-up-for-the-sustainable-future.html
Orcas Power and Light Co-op (OPALCO) - https://www.opalco.com/
Performance Excellence in Electricity Renewal (PEERS) - http://peer.gbci.org/
Schatz Energy Research Center - https://schatzcenter.org/
S&C Electric Company - https://www.sandc.com/
US Green Building Council (USBGC) - https://www.usgbc.org/