Community microgrids united states

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Microgrids are relatively small, controllable power systems composed of one or more generation units connected to nearby users that can be operated with, or independently from, the local bulk (i.e. high-voltage) transmission system, sometimes referred to as the "macrogrid." Since the energy (power and heat) are created close to where they are used, microgrids are a form of distributed generation.

Historically, microgrids generated power using fossil fuel-fired combined heat and power (CHP) and reciprocating engine generators. Today, however, projects are increasingly leveraging more sustainable resources like solar power and energy storage. Microgrids can run on renewables, natural gas-fueled combustion turbines, or emerging sources such as fuel cells or even small modular nuclear reactors, when they become commercially available.

They can power critical facilities after a weather- or security-related outage affects the broader grid. Microgrids can also be the main electricity source for a hospital, university, or neighborhood. While single-user and campus microgrids, such as those that serve an industrial site or military base, have existed for decades, many cities are now interested in systems that can better integrate generation resources and load, serve multiple users, and/or meet environmental or emergency response objectives.

Microgrids provide a tiny fraction of U.S. electricity. At the start of 2023, the United States had 692 microgrids installed, with a total capacity of nearly 4.4 gigawatts. More than 212 of those with a capacity of more than 419 MW has come online in the last four years. Most microgrid projects are in Alaska, California, Georgia, Maryland, New York, Oklahoma, and Texas.

Microgrids are attractive to many large U.S. companies committed to working on their own and in partnership with governments to transition to a sustainable low-carbon economy. For example, NRG Energy, one of the country"s largest independent power producers, has turned its Princeton, New Jersey, headquarters into a fully-islandable microgrid demonstration project laboratory from which the company can test ideas for real-world applications. NRG is also collaborating with grid operator PJM to explore ways that microgrids can help enhance macrogrid operations.

Elements of a microgrid could include: controllable generation like natural gas-fueled combined heat and power (CHP) and fuel cells; limited or non-controllable generation like a photovoltaic solar array or wind turbine (not shown); backup generators; uninterruptible power supply (UPS); and energy storage capability. The microgrid manager (at the center) balances generation and load. The microgrid interacts with the local distribution network or the macrogrid through the points of common coupling.

Microgrids can help deploy more zero-emissions energy sources, make use of waste heat, reduce energy lost through transmission lines, help manage power supply and demand, and improve grid resilience to extreme

weather.

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