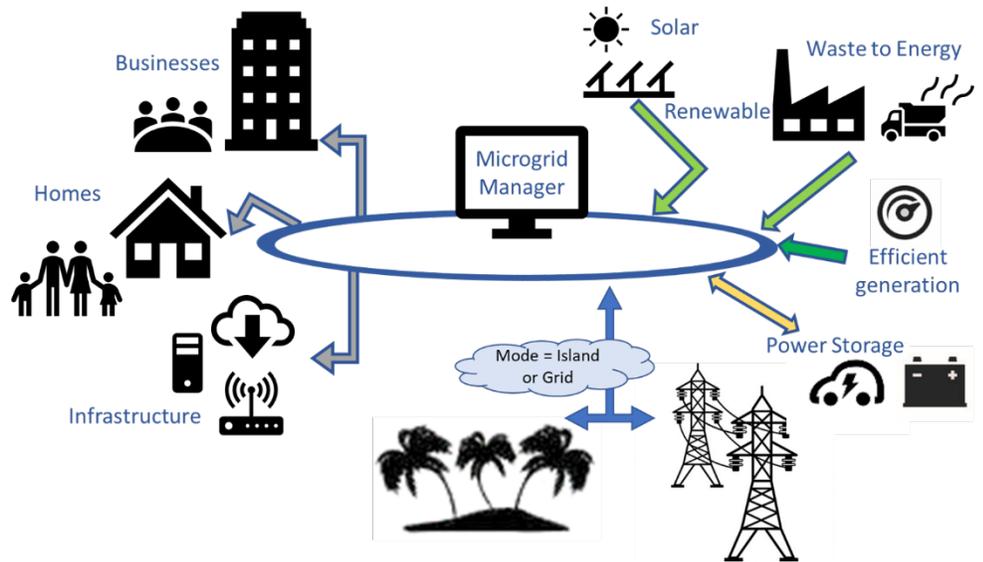


# MICROGRIDS

JULY 2018 TECH BRIEF FOR  
CONSTRUCTION AND  
UTILITIES TALENT NETWORKS



## Island-able Power as Waters Rise

The notion of generating one's own power – a principal of the [1890s Gilded Age](#) – is back in fashion. Instead of a single capitalist building a large dam generating hydroelectric power and transmitting it to Manhattan, we now have a cooperative entity constructing a 'microgrid' with renewable energy sources and a 'smart grid' to distribute the power within a [local community](#). When all is well, the power generated by the microgrid is shared with the utilities' power grid. When calamity strikes, the microgrid acts independently (called "island" mode) and provides power to microgrid members. Then, when the main grid is ready to restart, the microgrid will catalyze the start-up process(es).

Example: When Superstorm Sandy darkened New Jersey, microgrids became beacons and valued partners for the utilities. NYC microgrids became famous following a photo on the cover of [NY Magazine](#). In NJ, [Princeton University](#) went dark for just 20 minutes until it was able to restart its natural gas-fired turbine.

The Christie Administration set a goal to improve energy resiliency and funded ['town center' microgrid studies](#) for 13 entities: Atlantic City, Camden County, Cape May County MUA, Galloways Township, Highland Park, Hoboken, Hudson County, Middletown Township, Montclair Township, Neptune Township, Paterson, Woodbridge Township, and the State of New Jersey Department of Treasury with the partners, Mercer County, Mercer County Improvement Authority and Trenton. The [U.S. Department of Energy](#) is underwriting the cost of [microgrids to power transit systems](#) in Jersey City, Newark and Hoboken.

## Labor Force Takeaway

This tech brief is part of a series focusing on changes to the labor market in its move to a clean energy economy. Governor Murphy is aiming for New Jersey to be powered by [100% clean energy by 2050](#). Furthermore, electric vehicles are shaping up as the ["killer ap"](#) for utility companies and their supply chain. Job growth will follow.

TAN recommends incorporating the study of clean energy tech, including high efficiency systems using fossil fuels, into new educational programs. Utilities have established career paths; entrepreneurial firms in the cleantech area provide career growth opportunities as well.

# Resilient Communities need Microgrids

New Jersey's 'town center microgrids' are equivalent to community microgrids in Connecticut, [New York](#) and other states that foster their development. They keep crucial public services operating during an extended power outage. Microgrids can be owned [privately, publicly or cooperatively, much as with any electric utility](#).

Microgrids connect dedicated power generating equipment with customers via a distribution network. The virgin-site planning enjoyed by a microgrid overlaid on an existing area enables the selection of state-of-the-art controller software. This software is the heart of the grid; it must keep power stable while balancing multiple energy inputs and power demands.

Microgrids do not have to incorporate renewable energy or highly efficient technologies. At military bases for example, power is often generated using conventional technologies. The trend however, is to try to minimize the use of fossil fuels and to maximize sustainability and resiliency. Microgrids incorporating fossil fuel technology and renewable sources are called hybrid systems. Commonly selected [generation and storage technologies](#) include:

- Microturbines symbolized as  in the microgrid schematic. These may burn natural gas or biogas.
- Combined heat and power systems ([CHP](#)) which produce both electricity and heat. Steam heat can be run through radiators in the winter or run through an absorption chiller to produce conditioned air for residences or pre-conditioned input for commercial refrigeration. Fuel can be fossil or renewable.
- Solar panels which produce DC power when exposed to light. There are various [technology choices](#).
- Fuel cells that can both generate and store energy. These can use conventional fuels or hydrogen gas.
- Battery banks, particularly lithium, lithium oxide and gel [technologies](#). They reduce system efficiency but raise reliability and resiliency metrics.

Wind power is not commonly used for microgrid in urban or suburban areas. Advanced metering and automated load-shedding are often included when possible.

**The State's brain trust for microgrid design and construction centers around Princeton.**

Completely off-grid systems are rare and expensive but growing in popularity particularly among [communities at the grid's edge](#). Off-grid or islandable systems require energy storage and specialized equipment that is costlier and more complex to install. Hybrid inverters and other technology with "smarts" built in can reduce cost by relaxing the requirements on controller and switching technologies. Providing slow islanding and allowing for a transitional brownout for microgrid customers can also lower costs.

New Jersey companies in leadership positions within the microgrid design sector are:

- ✓ NRG ENERGY INC.; 804 Carnegie Ctr., Princeton, NJ 08540-6023, Tel: 609/524-4500; Website: [www.nrg.com/](http://www.nrg.com/)
- ✓ PRINCETON POWER SYSTEMS; 3175 Princeton Pike, Bldg. 19, Lawrenceville, NJ 08648, Tel: 609/955-5390; Website: [www.princetonpower.com](http://www.princetonpower.com)
- ✓ TRINITY SOLAR INC.; 800 U.S. Highway 9 South, Freehold, NJ 07728; Tel: 732/780-3779; Website: [www.trinitysolarsystems.com](http://www.trinitysolarsystems.com)