McGuire Nuclear Station



Quick Facts

Groundbreaking: 1971

Commercial operation:
Unit 1 - 1981
Unit 2 - 1984

Number of units: 2

Reactor type: Pressurized water reactor (PWR)

Station capacity: 2,316 megawatts, enough to power more than 1.7 million homes. According to the Nuclear Energy Institute (NEI), 1 MW of electricity produced by nuclear energy would produce enough electricity to power more than 750 homes.

Employees: About 650 with additional contract workers during refueling outages

Nuclear fleet taxes: More than $264 million in 2023
(property and payroll taxes)

General Information

McGuire Nuclear Station is located on Lake Norman in Mecklenburg County.

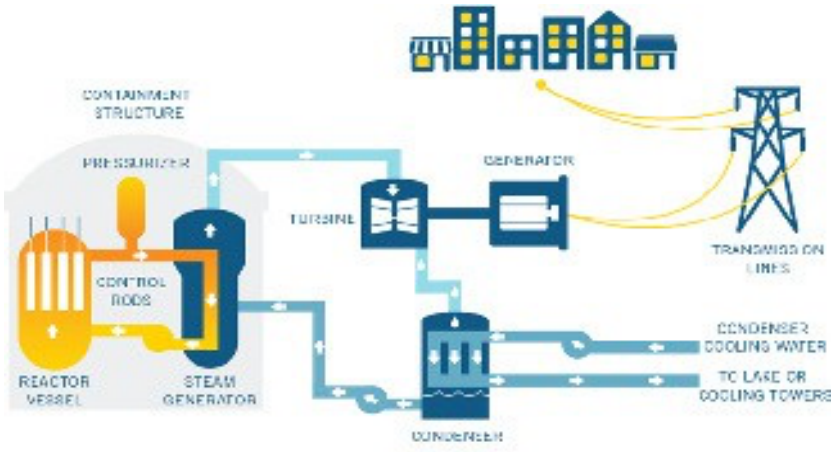
McGuire Nuclear Station personnel remain committed to operating the units safely and reliably and being a good neighbor.

Since it began operating, McGuire has accumulated many achievements:

- Lake Norman is the state's largest manmade lake, built by Duke Energy in 1963 by damming the Catawba River with Cowans Ford Hydroelectric Station.
- Issued a 20-year extension on its license by the Nuclear Regulatory Commission or NRC (all U.S. reactors were initially licensed for 40 years).
- McGuire has upgraded plant equipment, including the generator stators and transformers in the past few years, ensuring safe and efficient operation of its two units.

Energy Explorium

Learn how electricity is made using different energy sources and view educational exhibits throughout the EnergyExplorium, McGuire Nuclear Station's education center. All activities are free and open to the public. To inquire about the education center's current schedule, visit Duke-Energy.com/EnergyExplorium.



Nuclear Fundamentals

McGuire Nuclear Station uses uranium as its fuel. Each uranium pellet, less than one inch long, is enclosed in metal rods 12 feet tall. There are 365 pellets per rod, 264 fuel rods in a fuel assembly and 193 fuel assemblies in each of the two reactor cores.

In a process called nuclear fission, a source emitting free neutrons is inserted into the uranium fuel core. The uranium fuel absorbs these free neutrons, becomes less stable and releases additional free neutrons. This movement of free neutrons creates heat that is used to generate electricity.

Here is how it works:

- Water circulates through the nuclear core reaching 600 degrees F by removing heat from the fission process. (Neutron absorbing control rods are lowered into the fuel core to slow or stop this process.)
- This heated water travels to large steam generators or “heat exchangers.”
- This 600-degree F water flows through thousands of tubes inside the steam generators while cooler water circulates on the outside of these tubes and becomes steam.
- The steam flows to a turbine and spins large blades attached to a shaft and generator, producing electricity.
- This steam then flows across a set of metal tubes containing cool lake water which condenses the steam for reuse in the steam generators.
- This lake water flows down a cooling system before discharging back into Lake Norman.

Conserving Resources

Because nuclear power plants do not burn fuel, they produce no greenhouse gas emissions while generating electricity. More than half of America’s carbon-free electricity comes from nuclear energy.

Nuclear Safety

- Nuclear stations have multiple, robust safety barriers in place.
- Each containment building housing the nuclear Each containment building housing the nuclear fuel core is made of concrete 3 feet thick with a 3/4-inch-thick steel liner.
- The reactor vessels containing the nuclear fuel are 44 feet tall and 14 feet in diameter and constructed of 8 1/2-inch-thick steel.Each unit has redundant safety systems, such as multiple pumps and backup electrical supply systems.
- Nuclear stations are built to withstand a variety of external forces, including hurricanes, tornadoes, fires, floods and earthquakes.
- Duke Energy works closely with the Nuclear Regulatory Commission (NRC), various federal agencies, state agencies and local governments to maintain emergency response plans that ensure close coordination with these groups.

Nuclear Security

- Nuclear stations have numerous security features, seen and unseen.
- Armed, highly trained security professionals provide 24-hour protection.
- Physical barriers and electronic surveillance systems surround McGuire.
- Access is tightly controlled, and nuclear employees must pass strict background, psychological and drug/alcohol screenings.

Radiation

- Radiation is a natural part of our environment.
- We receive radiation from the sun, minerals in the earth, food, etc.
- The amount of annual radiation at a nuclear plant site boundary is less than a passenger receives during a round-trip, coast-to-coast flight.