

Brunswick Nuclear Plant

Quick Facts

Groundbreaking: 1970

Commercial operation:
Unit 1 – 1977
Unit 2 – 1975

Number of units: 2

Reactor type:
Boiling water reactor (BWR)

Station capacity:
1,870 megawatts (MW), enough to power more than 1.5 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 600 with additional contract workers during refueling outages

Nuclear fleet taxes:
More than $268 million in 2024 (property and payroll taxes)

General Information

Brunswick Nuclear Plant is situated 2 miles north of Southport, N.C. The facility's personnel remain committed to operating the units safely and reliably, and being a good neighbor.

Since it began operating, Brunswick has accumulated many achievements:

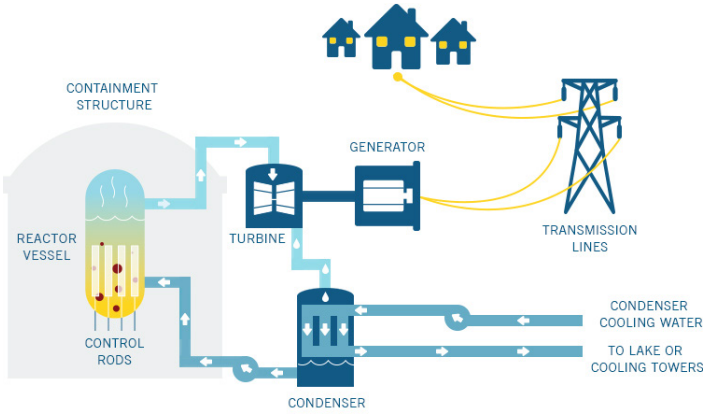
- The Nuclear Regulatory Commission (NRC) granted Brunswick Nuclear Plant a 20-year license extension beyond the original 40-year term required for all U.S. reactors.
- The plant uses a 9-mile-long canal system to circulate approximately 1 million gallons of water per minute from the Cape Fear River for cooling purposes. To safeguard local aquatic life, the plant employs the "slide for life" fish return system, which safely returns fish and shellfish to the estuary.
- Brunswick's biological monitoring program has produced one of the most comprehensive and informative databases of a U.S. estuary system.

Brunswick Energy & Education Center

Take a journey through the Brunswick Energy & Education Center, where visitors of all ages can explore educational exhibits and learn more about energy, the environment and the Brunswick Nuclear Plant. All activities are free and open to the public by appointment only. To plan a visit, call **910.832.2900** or email **Brunswick.Plant@duke-energy.com**.

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Nuclear Fundamentals

Brunswick Nuclear Plant generates electricity using uranium as its fuel. Each uranium pellet, smaller than half an inch long, is enclosed within a metal rod stretching 12.5 feet. Every rod contains about 350 pellets, with 92 fuel rods grouped into a fuel assembly, and 560 fuel assemblies forming the reactor's core.

In a process called nuclear fission, a neutron-emitting source is inserted into the uranium fuel core. The uranium fuel absorbs these free neutrons, resulting in increased instability and the release of additional free neutrons. This ongoing movement of free neutrons produces heat, which is subsequently used to generate electricity.

Here is how it works:

- Heat generation: Water circulates through the nuclear core, absorbing heat produced by nuclear fission and reaching 530 F. Neutron-absorbing control rods can be inserted into the fuel core to slow or stop this process.
- Steam production: This superheated water turns into steam within the reactor vessel and travels toward turbines and a generator.
- Electricity creation: The force of the steam spins the large turbine blades attached by a common shaft to the generator, converting mechanical energy into electricity.
- Cooling and reuse: The steam then flows across a set of metal tubes containing cool water from the Cape Fear River. This condenses the steam back into water, allowing it to be reused in the nuclear reactor's cooling system.
- Environmental discharge: The river water, now warmed, flows down a cooling canal and is released into the Atlantic Ocean a few miles away.
- Foam formation: Because the Cape Fear River contains brackish (a mix of salt and fresh water), foam sometimes appears on the surface of the cooling canal – much like the foam that forms on ocean waves at the beach.

Nuclear Safety

- Nuclear stations have multiple, robust safety barriers in place.
- Each containment building housing the nuclear fuel core consists of concrete 6 feet thick with a 5/8-inch-thick steel liner.
- The reactor vessels containing the nuclear fuel measures 70 feet in height, 19 feet in diameter and are made using 5 1/2-inch-thick steel.
- Each unit has redundant safety systems, including 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 NRC, various federal agencies, state agencies and local governments to maintain emergency response plans that ensure close coordination with these groups.

Nuclear Security

- Nuclear facilities are equipped with extensive visible and concealed security measures.
- Specially trained, armed security professionals provide 24-hour protection.
- Physical barriers and electronic surveillance systems surround Brunswick.
- 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 airplane flight.

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.

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