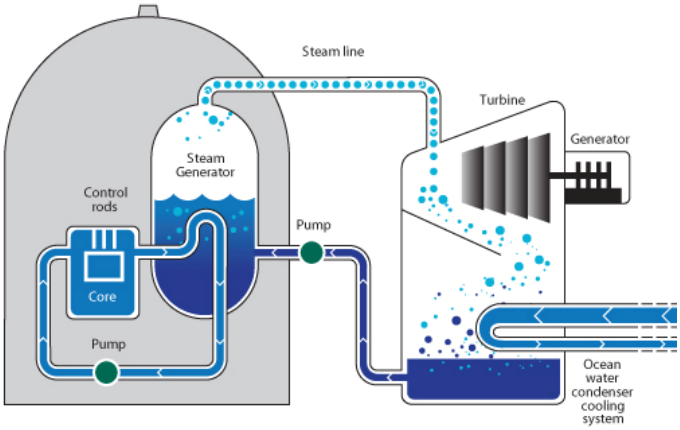
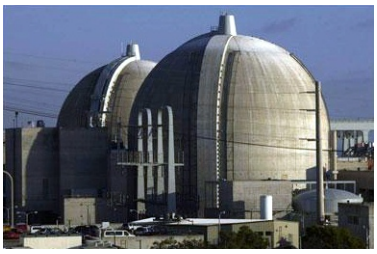
How Southern California Edison's Nuclear Plant Makes Electricity



Most large utility-scale power plants generate electricity in fundamentally the same way. They produce steam that turns turbines that rotate generators that produce electrical current. Such plants differ primarily in the fuel they use to boil water – oil, coal, natural gas, or uranium. There is another difference that has led policymakers and the energy industry to take a fresh look at the benefits of nuclear power. Fossil fuel plants burn their fuel, which sends particulate and greenhouse gas emissions up their smoke stacks. Nuclear plants have no smoke stacks. Their fuel does not burn and therefore virtually no emissions are produced.

Domes



The large domes you see when you drive past the San Onofre power plant are 160-foot high, 4-foot thick concrete structures that house steel nuclear reactors vessels where the fission process occurs. The domes are one of multiple, overlapping safety barriers designed to contain radioactive material that might escape from the reactor vessels during the unlikely event of an emergency.

Reactors

The reactor vessels are 8-inch thick steel structures within which the nuclear fission occurs. The energy released heats water to more than 600 degrees Fahrenheit and 2,200 pounds per square inch of pressure. The reactor water serves two purposes, creating heat for the unit's steam generators and slowing the movement of neutrons within the fuel's atoms, which enables fission to occur.

Fuel and Control Rods

Nuclear plant fuel is made up of small uranium pellets, about the size of the end of your finger. The pellets are dense, ceramic materials placed end-to-end inside long metal tubes called fuel rods. The rods are grouped together in bundles, and arranged so that control rods can be placed into them. Control rods contain a substance that absorbs neutrons and are used to slow or stop the fission process.

Steam Generators

After leaving the reactor, the hot pressurized water passes through pipes submerged in a second water system inside the steam generators. The reactor water heats this separate water system to a boil, creating steam to turn the turbine generators. Each of these water systems is a closed loop. Water from the nuclear reactor never enters the turbine generator. Both the reactor vessels and steam generators are located inside the air-tight, concrete containment domes while the turbine generators are part of the non-nuclear part of the plant.

Turbine Generators

Steam from the steam generators strikes propeller-like blades causing them to rotate just as wind causes the blades of a windmill to turn. This spins the shaft of a generator. Inside the generator, coils of wire, and magnetic fields interact to produce electricity. A third, separate cooling system using ocean water condenses the steam back into water for recycling to the steam generator.

Overlapping, High-Tech Safety and Security Measures Protect the Public

Multiple physical barriers prevent the release of radioactive particles from inside the reactor into the atmosphere, for example the fuel casing, the reactor vessel, the water system piping and the concrete dome. Multiple, overlapping electronic and visual technologies monitor the integrity of each around the clock, as do SCE's highly trained plant operators and independent observers stationed at the San Onofre plant by the Nuclear Regulatory Commission. These expert watchdogs have full access to all plant operations.

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