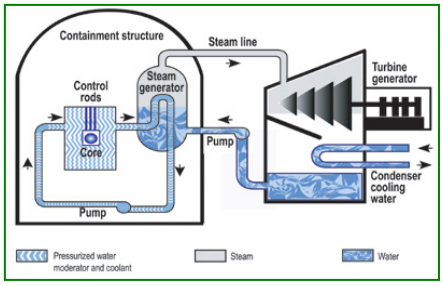
# How Southern California Edison's Nuclear Plant Makes Electricity

Many power plants, including nuclear facilities, are a little like tea kettles. They use a fuel to turn water into steam, and use the steam to turn the blades of a turbine generator, producing electricity.




*Source: World Nuclear Assoc., www.world-nuclear.org/how/npreactors.html*

Fossil fuel plants burn natural gas, coal, or oil to create heat, one of the sources of greenhouse gases. In contrast, nuclear plants do not burn their fuel – uranium. Instead, nuclear plants use a process called fission in which atoms are split in a controlled reaction producing large amounts of heat energy.

The large domes you see when you drive past the San Onofre power plant are up to 4½ feet thick concrete "containment" structures that house steel nuclear reactor vessels where the fission process occurs. The domes are designed to contain any radioactive material that might escape from the reactor vessels. Like many other types of power plants, the heat is used to boil water and the resulting steam is used to turn turbines, producing electricity.

The electricity then travels to an electrical switchyard on plant property, where it is routed through a series of transmission lines to neighborhood substations. Driving past the San Onofre plant, you will notice these lines on the opposite side of Interstate 5 carrying the plant's power south toward San Diego and north toward Southern California Edison's 15-county service territory.

## Reactors

The reactor vessels found in nuclear plants are 8-inch thick steel structures. Within the vessel, the nuclear fission occurs. This energy heats water to more than 600 degrees Fahrenheit and 2,200 pounds per square inch of pressure. The reactor water serves two purposes. First, it creates a source of heat for the unit's steam generators.

*Artist's depiction from Edison's "How it Works" animation*

Second, it slows the movement of neutrons within the fuel's atoms, increasing the probability of fission. Just as in a baseball game, where a batter is more likely to hit a slow ball than a fast ball, a slow-moving neutron is more likely to hit a uranium atom and split it, creating the desired energy.

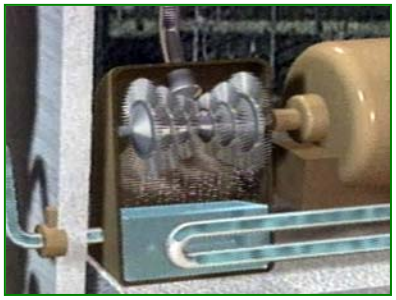
## Fuel and Control Rods

Nuclear plant fuel is made up of small uranium pellets, about as big as the end of your finger. These pellets are dense, ceramic materials placed end-to-end inside long metal tubes called fuel rods. The rods are then 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. Moving them in or out of the reactor controls the nuclear reaction, including the amount of heat produced.

## Steam Generators

After leaving the reactor, the hot pressurized water passes through pipes submerged in a second water system in the steam generators. The reactor water heats this second, separate water system to a boil, creating steam to turn the turbine generators. Each of the water systems is a closed loop so that water from the nuclear reactor does not enter the turbine generator, a non-nuclear part of the plant. Both the reactor vessels and steam generators are enclosed in the massive, reinforced, air-tight concrete structures, known as containment buildings.

## Turbine Generators



Steam from the steam generators moves through a pipe system into turbine generators, striking propeller-like blades and causing them to rotate just as the wind causes the blades of a windmill to turn. This rotation spins the shaft of the generator. Inside, coils of wire and magnetic fields interact to produce electricity. A third, separate cool water system using ocean water, is used to condense the steam back into water for recycling to the steam generator.

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