

Starting Up A Nuclear Reactor

مؤسسة الإمارات للطاقة النووية
Emirates Nuclear Energy Corporation

شركة برakah للطاقة
Barakah One Company PJSC



شركة نawah للطاقة
Nawah Energy Company

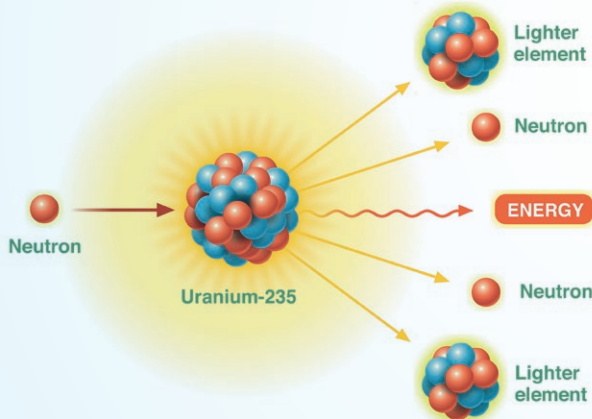
How does a nuclear plant work?

A nuclear plant uses uranium as fuel to generate heat. The heat makes steam, which spins a turbine connected to a generator, producing electricity.

Where does the heat come from?

Inside the nuclear fuel assemblies, we have fuel pellets made of Uranium. One pellet is the size of your fingernail, but it contains the same amount of energy as 1 ton of coal, or 471 liters of oil.

Uranium is a special element and has an interesting property – if it absorbs a small particle called a neutron, it will split into two lighter elements, releasing a lot of heat together with more neutrons (see graphic below). This process is called fission.



The new neutrons then hit more Uranium atoms, which split, releasing more heat and neutrons and so on. This is called the chain reaction and it goes on and on by itself.

Doesn't this process go out of control?

No, because in a nuclear plant, workers control the reaction by using special equipment that absorbs neutrons. In that way, we limit the number of neutrons absorbed by the Uranium, and we so we limit the amount of heat generated as well. This also means that the plant workers, known as reactor operators, can completely stop the reaction, and safely shut the reactor down.

So, what is reactor startup?

Reactor startup is when we launch the chain reaction. It is the first time we send a neutron at a Uranium atom, which releases heat and more neutrons. We then allow the reaction to continue, increasing the amount of heat inside the reactor.

With Barakah Unit 1, this was the first time that a nuclear energy plant started up in the Arab World.

What's next?

The rate of the chain reaction and the amount of heat produced inside the reactor is slowly increased to make enough steam to turn the turbine, which spins the generator and make clean electricity. This process takes months to complete safely and we conduct a lot of tests on the plant's equipment.

When we reach about 15% reactor power, and after we obtain permission from the electricity grid operator TRANSCO, we connect the plant to the UAE electrical grid. Months later, and after more testing is completed at different power levels, we bring the reactor to 100% power, delivering 1,400 MW of electricity. When we successfully finalize the last rounds of testing, the unit becomes commercially operational.

