



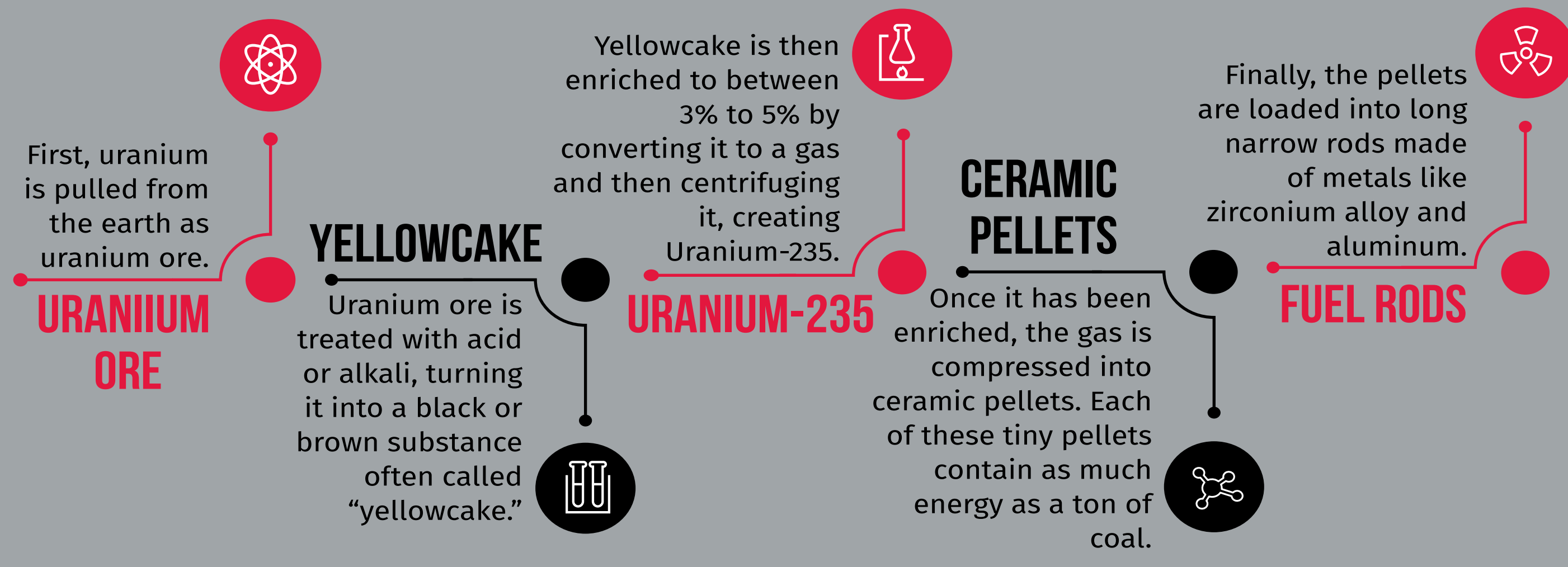
Nuclear Basics

**CURTISS-
WRIGHT**

URANIUM FUEL FOR NUCLEAR POWER PLANTS

Most modern nuclear reactors use uranium, a common element found in the earth's crust, to produce this heat. **However, uranium in its basic form is not ready to heat water in a light water reactor.**

Uranium
92
U
238.02891



Nuclear reactors contain **HUNDREDS** Of fuel rods containing **THOUSANDS** Of uranium pellets.

FISSION

The Chemical Reaction That Occurs Within the Uranium Pellets

ENERGY

Is Released During Fission, Heating the Water within the Reactor

NONE

Amount of Greenhouse Gases Emitted From Nuclear Reactors



NUCLEAR BASICS:

Uranium Fuel for Nuclear Power Plants

Written by Brenna Wolfe, Technical Writer at Curtiss-Wright Nuclear Division

Both boiling water reactors (BWRs) and pressurized water reactors (PWRs) use steam to turn turbines and create power; but to produce that steam, the water in the reactor must be heated. Most modern nuclear reactors use uranium, [a common element found in the earth's crust](#), to produce this heat, but uranium in its basic form isn't ready to heat water in a light water reactor. Uranium is pulled from the earth as uranium ore, which is then treated with an acid or alkali to isolate and concentrate the uranium, [turning it into a black or brown substance often called 'yellowcake' \(\$U_3O_8\$ \)](#). However, it is still not ready for prime time; yellowcake has to be enriched to between 3% and 5% by converting it into [gas and then centrifuging it, creating Uranium-235 \(\$^{235}U\$ \)](#).

Once it has been enriched, the gas is compressed into compact ceramic pellets – these are very efficient, since [each of these tiny pellets contains as much energy as a ton of coal](#). The pellets are loaded into long, narrow rods made of inert metals like zirconium alloy or aluminum, [which protect them from corrosion by the coolant and prevent them from releasing fission products into the coolant itself](#). Though other arrangements exist for other reactor types, the rods in [PWR and BWR reactors are arranged into square lattices called a fuel assemblies](#), which are ready for use in reactors.

Inside the reactor, [hundreds of these rods containing thousands of uranium pellets](#) produce the heat needed for power generation; when a neutron is fired at the pellets, [starting a chain reaction of fission that splits the atoms inside the pellets](#), releasing the energy needed to heat the water in the reactor. Because of the contained nature of the reaction, [nuclear power plants don't "burn" fuel like other types of plants](#), making them a much cleaner option that doesn't produce greenhouse gas emissions.