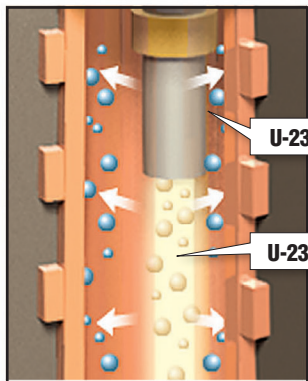


Centrifuges and uranium enrichment

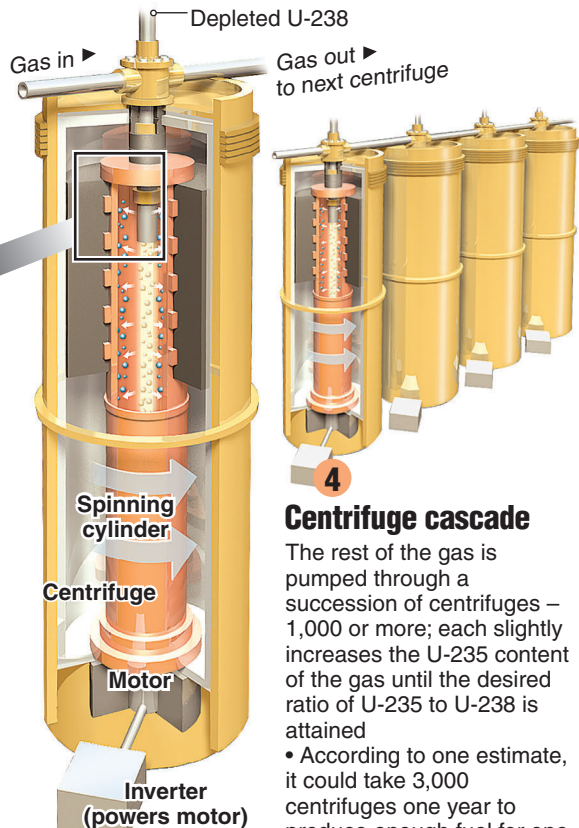
Less than 1 percent of naturally occurring uranium is composed of unstable U-235 atoms. To be useful as nuclear fuel, a uranium mass must have a higher percentage of these atoms. Centrifuges, large cylinders that spin rapidly, are used to remove some of the more stable U-238 atoms.

Inside the centrifuge

- 1 Uranium hexafluoride gas is pumped into the cylinder; motor spins the cylinder, which is held in a vacuum, at very high speeds



- 2 Centrifugal force presses some of the heavy U-238 atoms toward the wall of the cylinder; the lighter U-235 atoms stay near the center
- 3 Depleted U-238 gas is pumped out of the system; gas from center, which now has a higher proportion of U-235, is pumped into next centrifuge



Centrifuge cascade

The rest of the gas is pumped through a succession of centrifuges – 1,000 or more; each slightly increases the U-235 content of the gas until the desired ratio of U-235 to U-238 is attained

- According to one estimate, it could take 3,000 centrifuges one year to produce enough fuel for one nuclear weapon

Iran's uranium facilities



Ardekan	Uranium reserves, yellowcake production
Isfahan	Uranium gas conversion facility, research reactors
Karaj	Radioactive waste storage
Natanz	Gas centrifuges located in underground complex
Saghand	Uranium mines

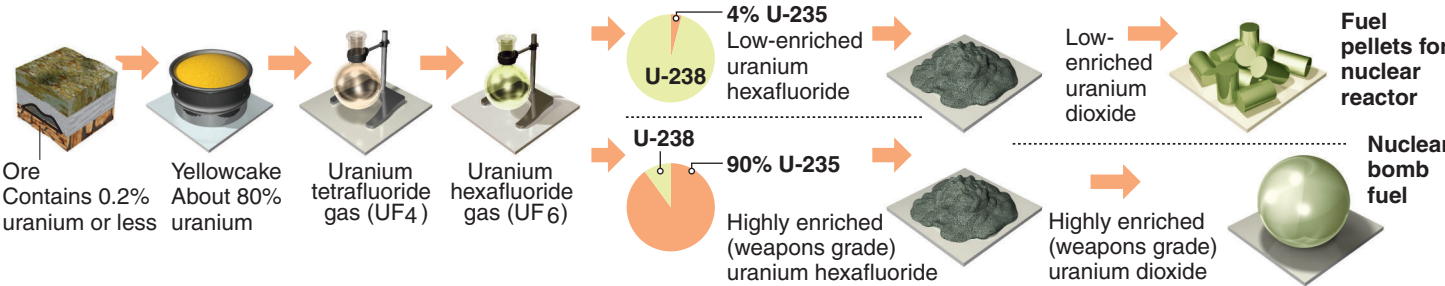
Centrifuges in operation

328	Previously known
3,000	As of April, 2007
50,000 to 60,000	Number needed to consistently produce nuclear fuel

Making nuclear fuel: Start to finish

Preparing uranium for use as nuclear fuel is a multistep process involving a lot of technology and raw materials.

- 1. Mining and refining: Ore is purified to a powder called yellowcake
- 2. Conversion to gas: Fluorine is added in two steps, making a gaseous uranium compound
- 3. Enrichment: Gas is treated in centrifuges to increase proportion of unstable uranium (U-235)
- 4. Reconversion: Gas is converted to uranium dioxide, a solid
- 5. Fabrication: Enriched uranium is shaped into fuel for power plants or bombs



Source: U.S. Nuclear Regulatory Agency; U.S. Dept. of Energy; USEC Inc.; Uranium Information Center (Australia); Encyclopaedia Britannica; Reuters; CNN; Global Security.org; South Florida Sun-Sentinel; AP