

WHY NUCLEAR POWER?

From heating and cooling our homes to running our cars, energy innovation is necessary. To celebrate Nuclear Science Week, the Department of Energy (DOE) Office of Legacy Management (LM) is highlighting some of the distinguishing characteristics of nuclear power and how it compares to some alternatives.

ENERGY WASTE

DOE specializes in handling hazardous waste, a primary concern about nuclear power. While LM oversees the safeguarding of waste created from our nation's nuclear past, how does the future of nuclear energy look today?

90,000
METRIC TONS
of spent fuel
generated
since the
1950s from
U.S. commercial
reactors



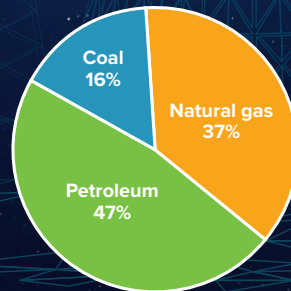
If you could stack all of it together, it would fit on a single football field less than 10 yards deep. By comparison, how much waste do other forms of fuel create?

Nuclear power plants create energy almost identically to other forms of fuel, with the key difference being steam is the only byproduct. Despite media depictions of "radioactive sludge" as nuclear waste, the uranium pellets that are used in nuclear power plants go in as a solid and come out as a solid about the size of a gummy bear. Spent fuel is then stored at reactor sites.

Carbon dioxide emissions is another way to measure the waste of fuels, but nuclear power doesn't even present as a small sliver on our chart. Nuclear power plants make up almost half of all carbon-free energy sources.

4,794,000
METRIC TONS

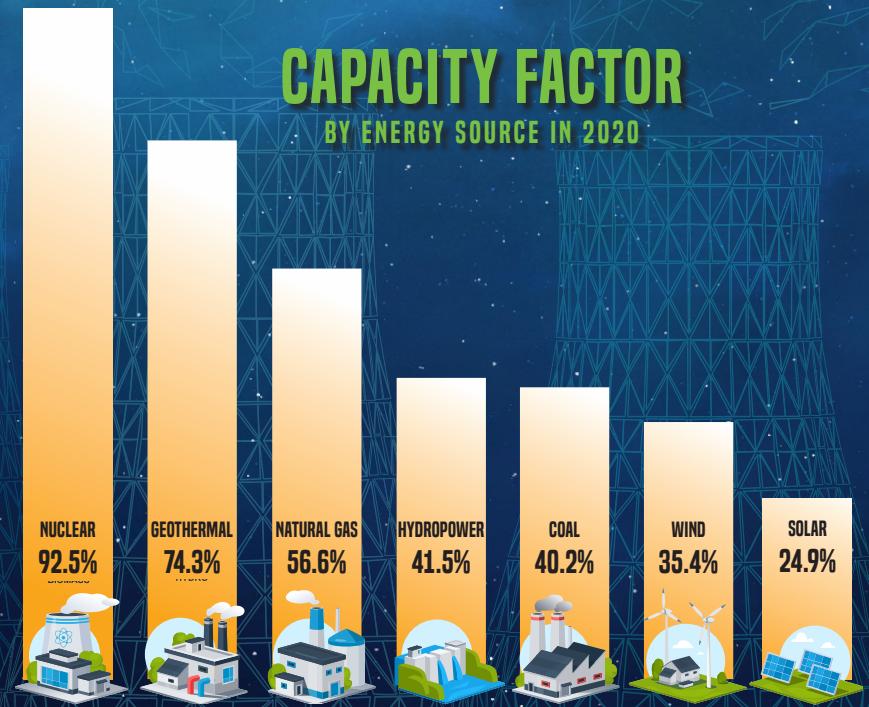
U.S. energy-related carbon dioxide emissions by source, in 2023



CAPACITY FACTOR

To understand capacity factor, consider wind and solar power. Wind can only produce when it's windy, and solar can only produce when it's sunny, meaning they have a low-capacity factor. Similarly, coal and natural gas plants must be refueled and undergo regular maintenance, which stifles their output. Nuclear power, however, isn't dependent on weather conditions and only needs refueling every 18 to 24 months! This allows nuclear power plants to produce peak energy for long, uninterrupted periods, meaning it has a very high capacity factor.

CAPACITY FACTOR BY ENERGY SOURCE IN 2020



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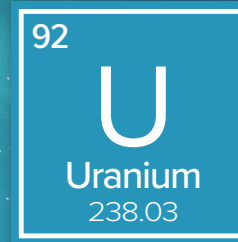


Nuclear Science Week™

HOW DOES IT MEASURE UP?

If we measure energy production pound for pound, what source produces the most energy? Coal? Oil? Let's find out

The symbol for Uranium on the periodic table of elements is U. We will use U-235, the highly radioactive isotope of uranium used for fuel, to compare to other sources.



THE POWER OF A URANIUM PELLET

Uranium pellets, which are energy dense and highly efficient, are packed into fuel rods to generate nuclear energy.

URANIUM "vs." FOSSIL FUELS

ENERGY EFFICIENCY COMPARISON

A one-inch uranium pellet, about the size of a gummy bear, generates the same amount of energy as these fossil fuels:

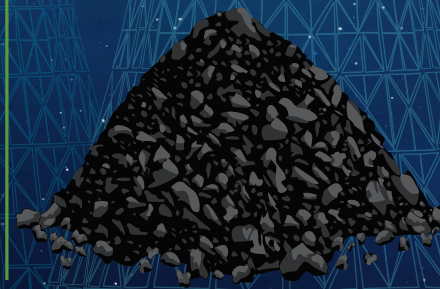
120 GALLONS OF OIL



17,000 FT³
OF NATURAL GAS



1 TON OF COAL



While the U.S. generates about 2,000 metric tons of used nuclear fuel a year, spent fuel still contains more than 90% of its potential energy, allowing it to be recycled into new fuel and other byproducts.

FLASHLIGHT ACTIVITY

Test out the emergency crank flashlight on the table.

You would have to wind the light for about one minute to get 30 minutes worth of light.

1. How many minutes would you have to crank it to last for a day?
2. By comparison, how long do you think a single pellet of uranium would power this flashlight?
3. How long would you have to crank the emergency flashlight to equal the same amount of energy as one uranium pellet?

Answers: 1. 48 minutes 2. 189 years 3. About 6.3 years



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