Nuclear Energy

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GUIDING QUESTIONS

I. What are the parts of a nuclear power plant, and how do they contribute to creating nuclear energy?
II. How does nuclear energy work?
III. How does nuclear energy positively and negatively affect us?
IV. Why is nuclear energy use is not that common?
V. Why do we need nuclear energy?

Vocabulary

Fuel rod- a part of the light water reactor

Light water reactor- The energy process begins here, and nuclear fission happens here.

Fission-Fission happens when Uranium 235 and a fast moving neutron collide, splitting the uranium. The uranium releases protons, neutrons, and heat.

Moderator- A moderator is what controls, or moderates the neutrons. In this situation, the moderator, normally water will slow down the neutrons so they have a chance at hitting the uranium during the fission process

Parts of an nuclear power plant and their contribution to making nuclear energy

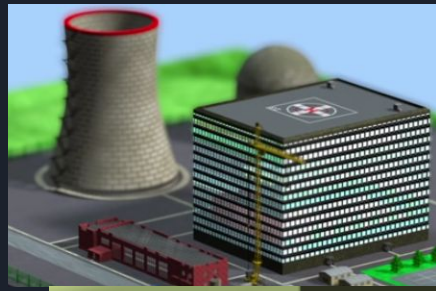
The process of making nuclear energy also relies on proper buildings and an organized operation. Here are the most important buildings in a nuclear power plant:

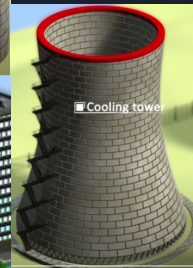
Turbine building - Here, the electrical turbines are built and stored.

Containment building - The nuclear reactor is housed here, and this is where all the nuclear reactions take place. Made with a meter of reinforced concrete.

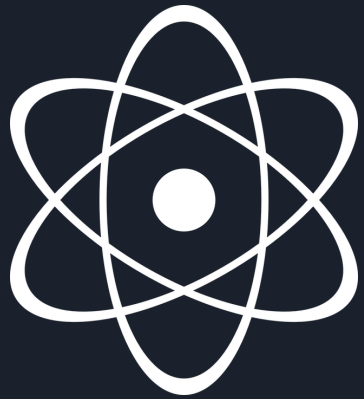
Cooling tower - 200 meters tall and used to cool the hot water

Control rooms - used for security of the fission, so security





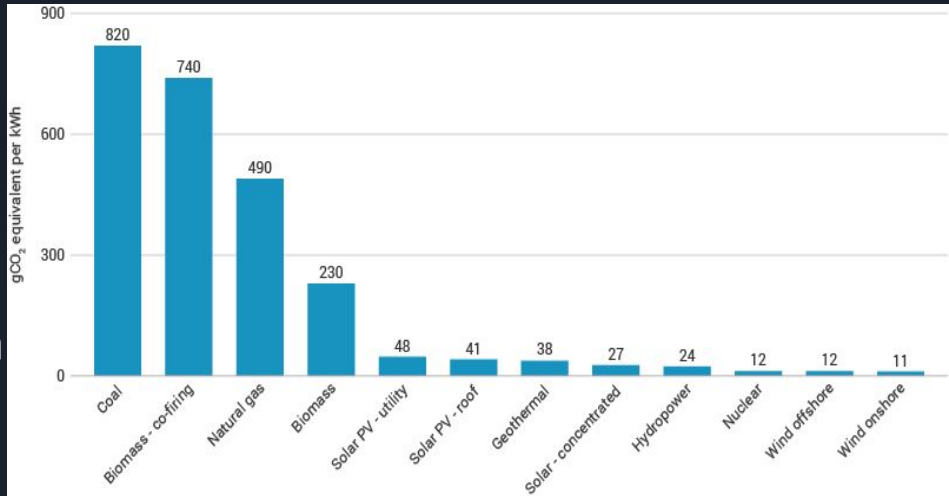
How does Nuclear Energy work?



Nuclear energy is created through **fission**. **Fission** will happen in the **fuel rods** of the **light water reactor**, which will normally be in the **containment building** of a nuclear power plant. The **moderator** will be water, and as the water heats up because of the **fission**, it is sent through pipes and will reach a metal 'bar'. The bar will heat up, and the now radioactive water will be drained. Fresh water will then come in contact with the metal bars, and then, begin to become water vapor. It is sent through a processor (through MORE pipes (We are officially out of the **containment building** because nothing's radioactive anymore!)) and water vapor will be released (in the cooling tower). The water vapor's upward travel will spin electrical turbines to create electricity!

What are the positive impacts of Nuclear Energy?

1. Low to no greenhouse gas emitted
    a. The problem with most energy sources is that they emit greenhouse gasses. Nuclear energy has minuscule emission, and none during the energy-creating process
2. Lots of power
    a. There is a high fuel to output ratio
    b. and can meet city and industrial
    c. needs with just 1 reactor!
    d. A small amount of fuel can
    e. produce 1000 megawatts-
    f. enough for a city with half a million
    g. people!



What are the positive impacts of Nuclear Energy? cont.

1. Economically, 1 new nuclear power plant=
    a. 400-700 permanent jobs
    b. Thousands of construction jobs
        i. Compared to
    c. 90 jobs for a coal plant
    d. 50 jobs for a natural gas plant

THE WORST POSSIBLE ACCIDENT WITH A NUCLEAR POWER PLANT - LESS DESTRUCTIVE THAN OTHER MAJOR ACCIDENTS ON OTHER POWER PLANTS.

What are the negative impacts of Nuclear Energy? cont.

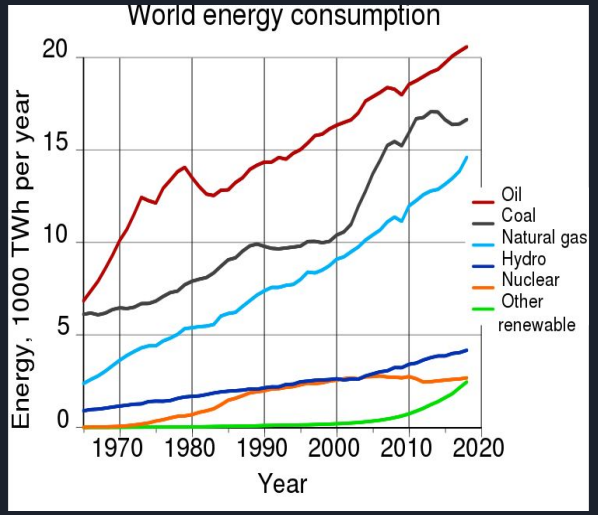
I. Spent uranium is radioactive!
   A. Once the fission process is complete, the uranium is highly radioactive and takes hundreds of years to decompose.
   B. It is very expensive to dispose of it properly

II. Accidents!
   A. Lots of dangerous accidents have happened because of nuclear energy
   B. It is much harder than it seems to prevent these disasters

III. Cost!
   A. Building a nuclear power plant is very expensive
   B. Note: FOSSIL FUELS ARE USED DURING CONSTRUCTION!!

Why is the usage of nuclear energy so low?

The usage of nuclear energy is so low because of what we know and fear. What this means is that most people don't know about nuclear energy, and if they do, they really won't know much. Sometimes people fear nuclear energy because of the destructiveness of nuclear bombs, and gives people a negative mindset about nuclear energy, connecting the two. The fact that nuclear disasters are, well, disastrous doesn't change anyone's mindset. Because of the the fact that either people don't know, or the people who do know have negative mindsets, will not result in nuclear energy usage increases.



Why do we need Nuclear Energy?

The fact that ‘we need nuclear’ is arguable, but the majority of scientists agree that nuclear energy is a necessity if we want to completely get rid of coal...

-Nuclear energy is the only energy source with no carbon emissions during the energy process.

- It provides much more energy than the more common energy sources like solar.

- The capacity factors are higher (a capacity factor is the measure of what percentage of time a power plant actually produces power)

“The sun won’t always shine, nor the wind always blow, nor water always fall through the turbines of a dam” (from yale.edu)

Operation times for different power plants: Nuclear-336 days a year, Hydro-138, Wind-127, Coal and Gas-half a year, Solar-92. NUCLEAR IS THE CLEAR WINNER

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