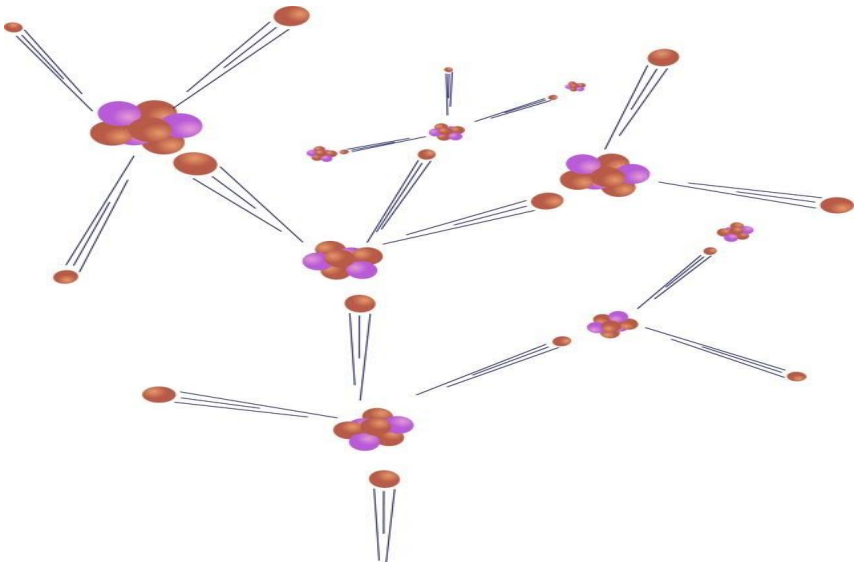
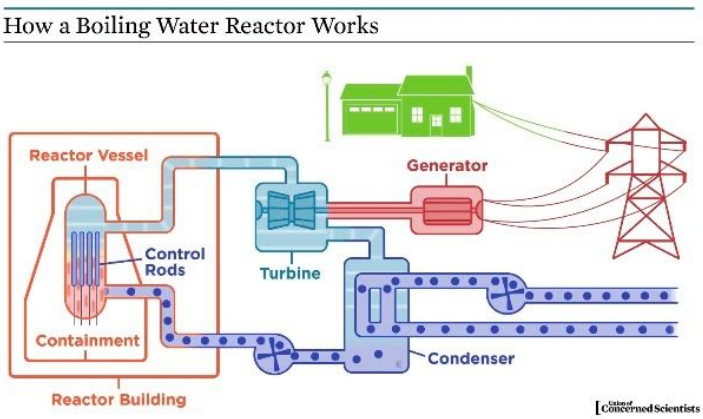
Nuclear Power, the Solution and the Problem.

In the 1950, the world started to embrace nuclear technology for energy production rather than just for weapons. Just like sources of electricity they began to charge the consumer for the power and distribution.This industry uses nuclear reactors to generate its electricity. Reactors use uranium rods which undergo nuclear fission. Fission is when an atom of uranium is hit with a neutron causing it to split apart. The initial split releases neutrons from the uranium that collide with more atoms and so on and so forth until manually stopped. Reactors stop this chain reaction by using elements such as cadmium boron or hafnium which are all efficient neutron absorbers.

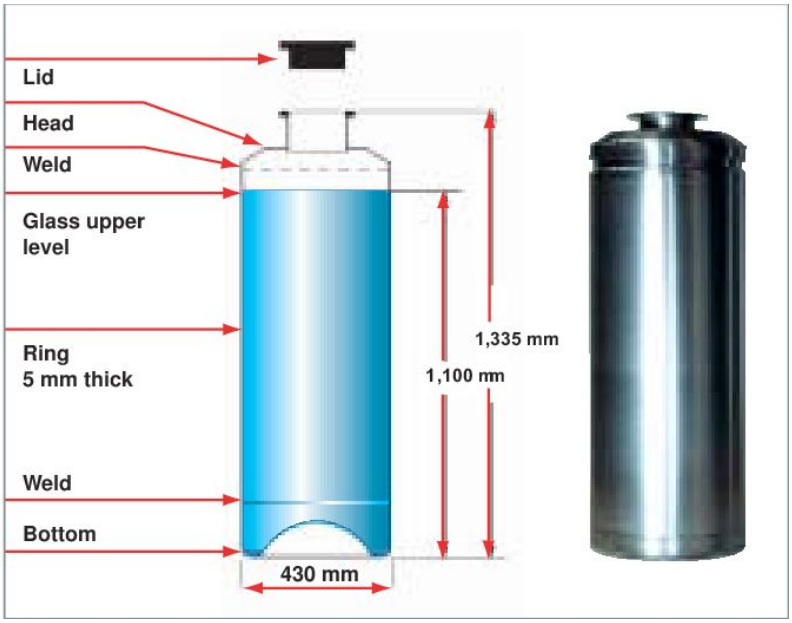


This splitting releases great amounts of heat energy.The heat energy is then used to heat water, which releases steam. The steam pushes a turbine that creates electricity.



How Things Have Changed in the Nuclear Power Industry Since the 50s

In the 50s nuclear power was still relatively new and so the containment and disposal of waste was not fully understood. The industry did not foresee that the containers of radioactive materials would begin to corrode and leak. In recent years most countries have learned from their mistakes and have designed containers that are more resistant to damage over time while also built vaults that can properly protect the containers from the elements. These vaults protect the surrounding area if there were to be a leak. One method to handle nuclear waste is vitrification which is when waste is mixed with glass. This makes the waste easier to manage because it is transformed into a immobile solid.The benefits of vitrification is it is durable and helps protect against leakage which can harm the environment.



Another improvement is in the reactors themselves. There has been great improvement in their efficiency and safety compared to the fifties. One change has been to the implementation of other coolants such as gas, molten salt, and liquid metals(sodium and lead). This has allowed the reactors to operate at higher temperatures. The higher temperature the more efficient the power cycle. Another change has been more attention to safety.

Another drastic change that occurred after the 1950s is that three different reactors have meltdown. In March of 1979, there was a partial meltdown of the Three Mile Island Nuclear Generating Station in Pennsylvania. This meltdown was caused by mechanical failure and the fact that plant staff failed to realize what was happening. The meltdown Cherynobyl in 1986 was caused by a faulty design and human error. As a result 350,000 people were forced to relocate.These earlier incidents helped to increase public fear about the safety of nuclear energy. With public support waning, less money

has been invested into nuclear energy research. The most recent nuclear meltdown happened in 2011 at the Fukushima Daiichi reactor. This event happened after an earthquake. The reactor withstood the earthquake but it was the subsequent tsunami that shut the power down. Without power or the use of the back generators that prevented the water circulation and cooling circulation for operating.

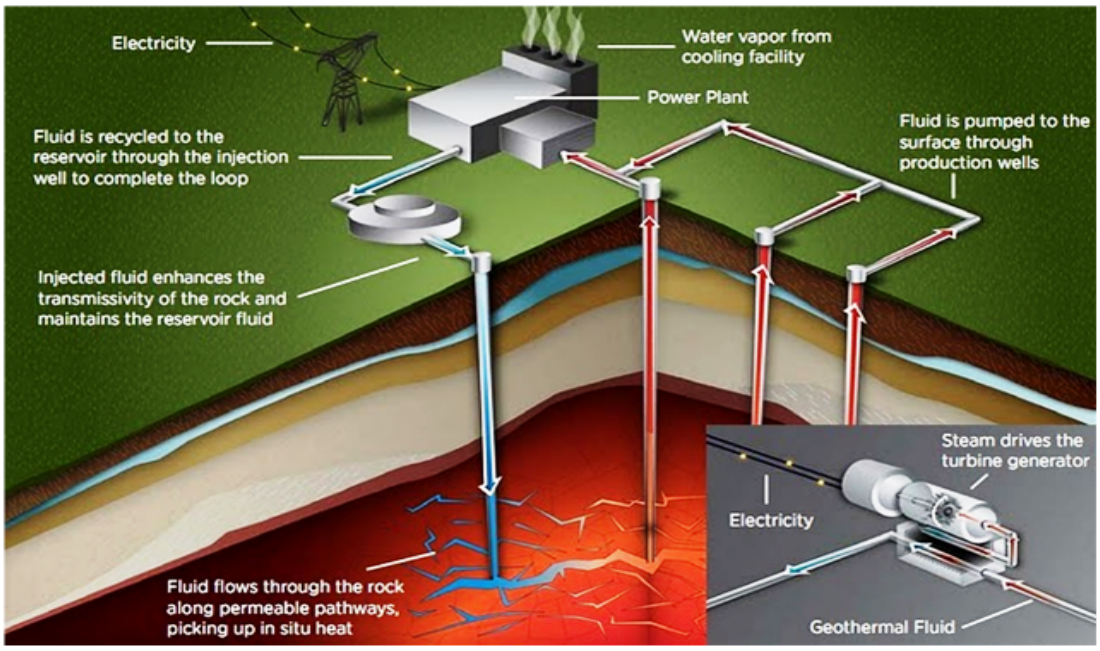
The Effects on the Environment

Worldwide there is over a quarter million metric tons of radioactive waste sitting near reactors waiting for proper disposal.The effect on the environment of the disposal and storage of radioactive waste today is fairly straightforward: the used rods will be stored in water for six to ten years. Then the rods are removed and placed in a sealed container and placed in a dry storage. Deep geological disposal is when radioactive materials is buried below 250m and 1000m for mined repositories 2000m to 5000 for boreholes near surface disposal is when the radioactive material is dumped at ground level or in caverns this is only viable for low level waste and intermediate waste disposal

Sustainable Alternatives

These are other sustainable alternatives to nuclear power that we should be working towards:geothermal, solar power, wind power and hydroelectric power. I will look at some of the advantages and disadvantages of these forms of power.

Geothermal energy is sustainable, reliable and available all year long. Also this system is relatively low maintenance. Disadvantage is that could lead to depletions in the cooling of certain areas, with increased use. These systems require land and are expensive to install.

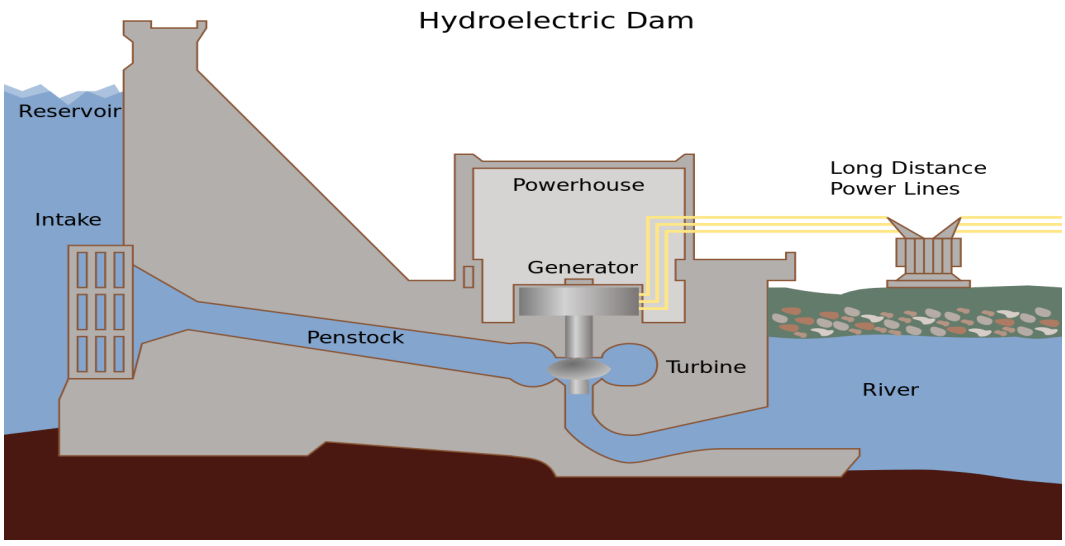


Solar energy is renewable and there has been great improvements in this technology over the last few years. It seems to be a great alternative but not all places

have constant and consistent sun exposure. Also, this method requires batteries which can be expensive and damaging to the environment.

Wind power is renewable, clean and environmentally friendly. This form of power is cost efficient because it uses a free resource.Disadvantages of wind power are that it requires the construction of wind turbines, requires large amounts of land and is expensive to install. Wind turbines can be dangerous for flying animals. These turbines are quite noisy and not visually pleasing.

Hydroelectric dams use a renewable resource and they do not emit any greenhouse gases. The construction of a hydro dam can cause the loss or damage to the fish habitat. Dams can destroy many hectares of useable land.



These other power sources offer great alternative sources of energy. No energy sources seem to be without flaws.

How Individuals Reduce Your Impact

If you are seeking to reduce your impact when it comes to this industry all you need to do is make sure not to waste energy. Turn off lights when not in use, use a programmable thermostat, buy energy efficient appliances, and seal all leaks or drafts in your home. If you wanted to completely eliminate yourself from using any nuclear power you could look at other sustainable alternatives.

Conclusion

As our population continues to grow so does our need for energy. Many believe that nuclear energy is the solution to our energy needs. With the rapidly depleting fossil fuels, many countries might once again have an increased interest in nuclear energy. I think the nuclear meltdowns such as Three Mile Island, Cherynobll and Fukushima drive home the fact that nuclear meltdowns may be rare but can have catastrophic impacts on the environment. Also, there seems to be much debate about whether nuclear waste can actually be safely stored.The potential to contaminate large areas of land and groundwater leads me to believe that nuclear energy is not as safe as other sustainable alternatives such as geothermal, solar, wind, and hydroelectric.

Web site links below

https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/uranium-and-nuclear-power-facts/20070

https://www.ucsusa.org/resources/how-nuclear-power-works

https://www.eia.gov/energyexplained/nuclear/nuclear-power-and-the-environment.php

https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/nuclear-power-reactors.aspx

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https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-waste/storage-and-disposal-of-radioactive-waste.aspx

https://www.energy.gov/eere/wind/environmental-impacts-and-siting-wind-projects

https://www.greenmatch.co.uk/blog/2014/08/5-advantages-and-5-disadvantages-of-solar-energy

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https://cen.acs.org/environment/pollution/nuclear-waste-pilesscientists-seek-best/98/i12

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https://www.energy.gov/ne/articles/nuclear-101-how-does-nuclear-reactor-work

https://www.greenmatch.co.uk/blog/2014/04/advantages-and-disadvantages-of-geothermal-energy

https://en.m.wikipedia.org/wiki/Three_Mile_Island_accident

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