Nuclear Energy: Then & Now

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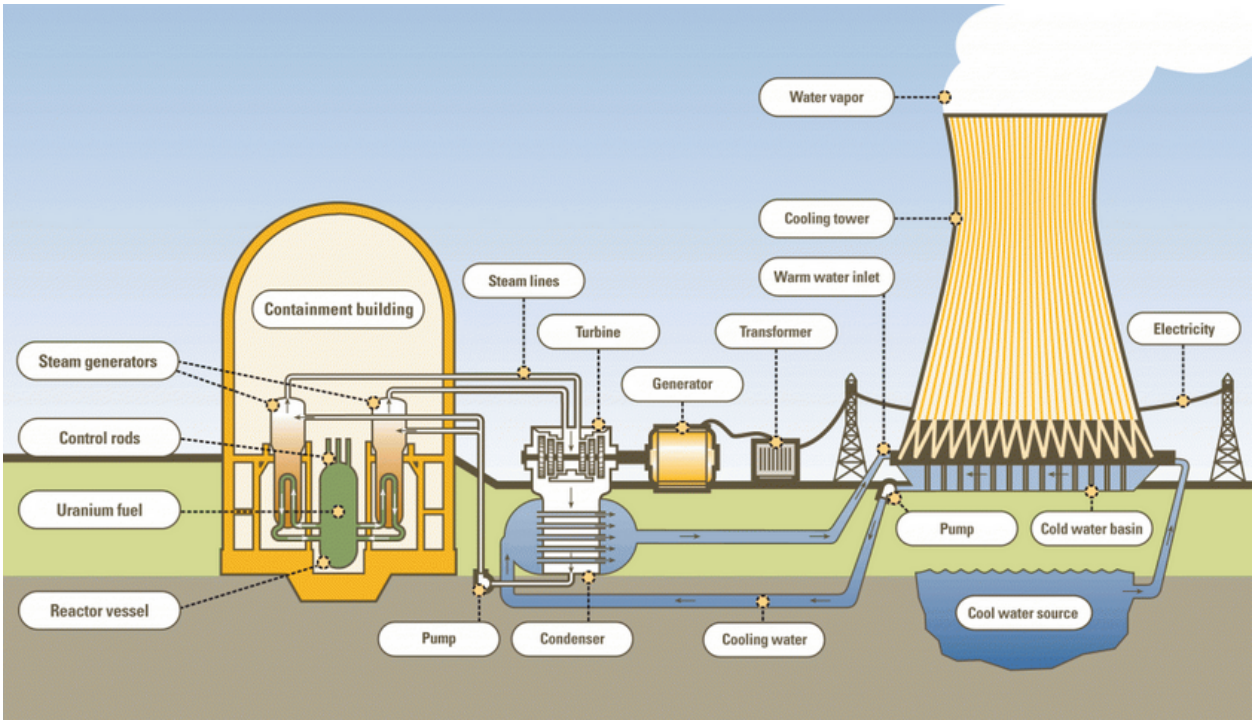

Nuclear Energy, Explained

WHAT IS NUCLEAR ENERGY & HOW DOES IT WORK?

Nuclear energy refers to energy in the core of an atom. It is created by a process called "fission," whereby uranium (a chemical element) has its atoms split in a reactor. This process heats water, producing steam, which then enables a turbine generator to generate electricity.

WHAT ARE THE BENEFITS OF WIDE SCALE NUCLEAR ENERGY?

Nuclear energy's biggest claim to fame is its environmental friendliness and reliability. With under one-hundred nuclear reactors in the United States, nuclear still generates roughly twenty percent of the nation's electricity; some states generate more than half of their electricity from nuclear alone. Furthermore, nuclear energy helps fight climate change as it provides carbon-free electricity. In fact, nuclear accounts for fifty-six percent of our country's carbon-free electricity.

As opposed to other electricity sources, it also doesn't release byproducts such as nitrogen oxide, sulfur dioxide or other harmful air pollutants.

In terms of emission-free electricity, nuclear energy's reliability is unmatched. Electricity sources such as solar and wind, while eco-friendly, are reliant on factors such as weather and time of day, while nuclear energy plants operate nonstop.

WHY ARE THERE STIGMAS ASSOCIATED WITH NUCLEAR ENERGY?

Disasters such as Chernobyl, Fukushima, and Three Mile Island have all left an indelible imprint on American's memories, which greatly affects the perception of nuclear to this very day. Chernobyl occurred in Ukraine during the year 1986. The nuclear meltdown was the result of a flawed reactor design and improperly trained personnel. In total, thirty deaths resulted from this incident which included factory workers and civilians; their deaths were a result of acute radiation poisoning. Fukushima's 2011 nuclear reactor accident in Japan was the result of severe weather including a large scale earthquake and ensuing tsunami. Ultimately, it resulted in zero fatalities, despite high radioactive release. Similarly, the 1979 Three Mile Island incident in Pennsylvania resulted in zero deaths; however, it was the result of mechanical and human error. In sum, the loss of life combined with the inherent fear and uncertainty associated with nuclear has caused the American public to take pause.

WHY SHOULD WE TRUST IT NOW?

These examples, though often grouped together under the overarching topic of nuclear, have their fair share of noteworthy differences. Geographic differences cannot be overly emphasized as different countries are subject to varied regulations. Specifically for the case of Fukushima, while natural disasters at unprecedented magnitudes are reasonable grounds for extensive

damage, pertaining to nuclear energy or otherwise, safeguards have recently been implemented as to better assure future safety. These include, but are not limited to: adding more extensive technology to maintain plant safety function, evolving evaluations and modifications to the structure to account for natural disaster, as well as new equipment to better withstand seismic activity. In terms of Chernobyl, Russia stopped building RBMK reactors (graphite moderated nuclear power reactor), and switched to pressurized water reactors. This is significant because RBMK reactors are much more difficult to control, specifically due to the ratio of water to steam, otherwise known as the "void coefficient." Theoretically, water is supposed to cool nuclear meltdowns and is often the saving grace of near-disaster situations; however, in the case of RBMK reactors, more water produces more steam, spurring more reactivity. Furthermore, countries like the United States, Russia and Japan have created "Generation III" reactor designs that rely on passive safety measures (constant forces such as convection and gravity, as opposed to manual core cooling) in order to better achieve heightened safety standards.

The fact of the matter is, nuclear energy is constantly improving in a plethora of ways. It is not the shortcomings of the technology that impede our progress moving forward, it is public sentiment stagnating based off of outdated information.