NUCLEAR ENERGY

LESS ‘RENAISSANCE’ AND MORE RUIN

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Nuclear energy has historically been viewed as costly, difficult to construct, and risky to local communities, the environment, and public health.

Yet, over the past few years, there has been an uptick in interest in nuclear energy as a climate solution. Much of this recent interest comes from a mixture of ideological changes and attacks on other clean energy technologies (such as solar and wind) and the need for a lot of power. Energy demand is increasing: tech companies are pushing a massive buildout of energy-intensive AI data centers; extreme temperatures caused by climate change require more heating and cooling to keep people safe; and a shift to electrification of buildings and transportation puts more strain on the grid.

While nuclear is a near zero-carbon energy generation option, there are reasons why so many communities have been fighting the technology for so long, including:

+ **Potential for Catastrophic Disaster:** A nuclear disaster could result in death and public health harms for entire communities, like the Chornobyl disaster;
+ **Public Health Harms From Radioactive Waste:** Decades of radiation and contamination from nuclear waste can result in communities experiencing high amounts of thyroid cancer and congenital disabilities as seen in communities like the Yakama Nation near the Hanford Nuclear Site in southeastern Washington.[1]
+ **Environmental Risk From Radioactive Waste:** Nuclear waste is stored at nuclear plants near communities without any long-term storage options. Waste from nuclear energy remains radioactive for hundreds of years, risking water supplies and the environment.
+ **High Costs and Long Construction Timelines:** Nuclear energy is expensive and takes a long time to be developed; for example, the Vogtle Plant in Georgia was finished seven years behind schedule and $17 billion over projected costs.[2]

While nuclear may seem like a good option in the face of burning dirty fossil fuels, these equity, affordability, public health, and safety concerns must be taken into account when considering this energy source.

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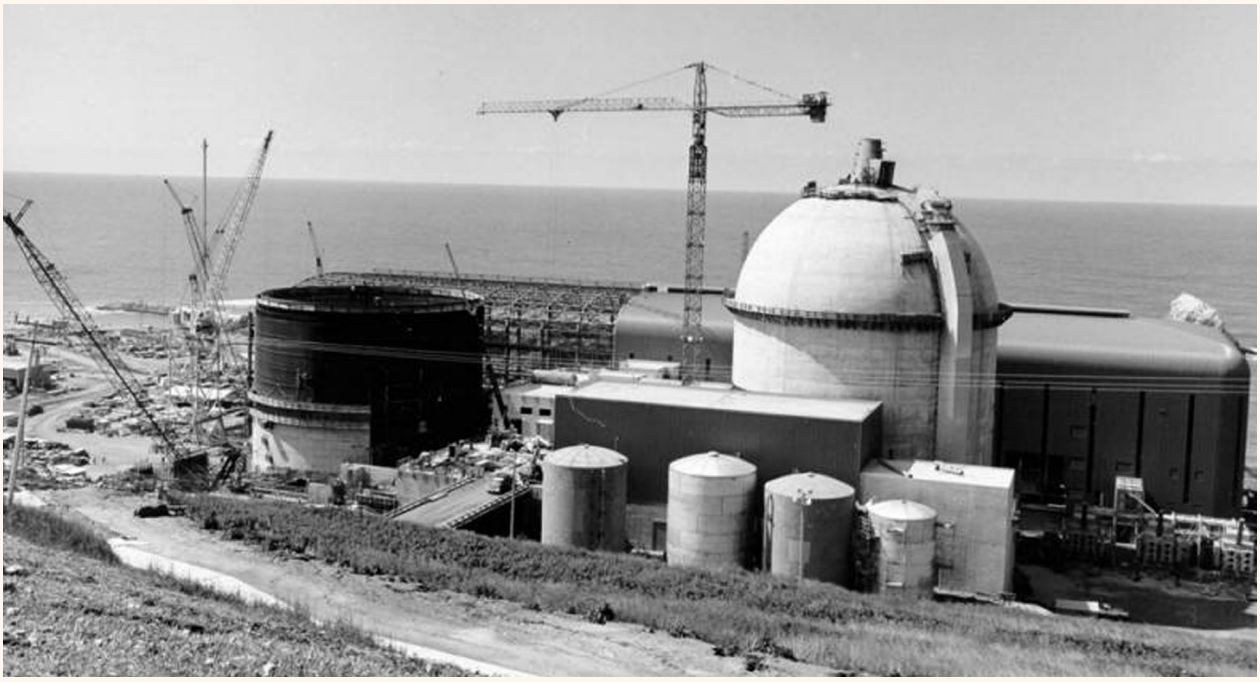
HOW NUCLEAR ENERGY STARTED

Nuclear technology has been around since the creation of the first atomic bombs in the 1940s, which were used to killed hundreds of thousands of people in World War II. That unnatural disaster was followed by an effort to turn nuclear energy into a power source, with the first civilian nuclear power plant in the United States beginning operation in 1957.[3] From the late 1950s into the 1970s, nuclear energy was a way to create a massive amount of energy and support lower energy prices. A frenzy in building new nuclear reactors followed, though this interest quickly cooled once utilities realized the high cost associated with these projects, with many plans facing cancellations.[4] By the late 1990s, many reactors were closing before the expiration of their 40-year operation license due to cost escalation, slower growth in electricity demand, and a changing regulatory environment.[5] In the 2000s and 2010s, nuclear power plants struggled: eight power companies retired thirteen reactors, primarily due economic reasons.[6]

As of 2025, the United States has 94 nuclear reactors in 28 states, which supply nearly 20% of the nation's electricity,[7] and more than 50 proposed "advanced" reactors.

Today, increased tax incentives from the Inflation Reduction Act, loans from the federal government, and growing energy demand are leading some energy experts to declare a "nuclear renaissance." Tech companies are increasingly focusing on nuclear power as a way to meet energy demand for powering AI data centers without creating additional carbon emissions, yet whether new nuclear plants can be built fast enough to meet this rapid demand is uncertain. Large technology companies like Microsoft, Google, Amazon, and Meta are investing in nuclear energy, specifically small modular reactors[8] to help power their AI data centers.

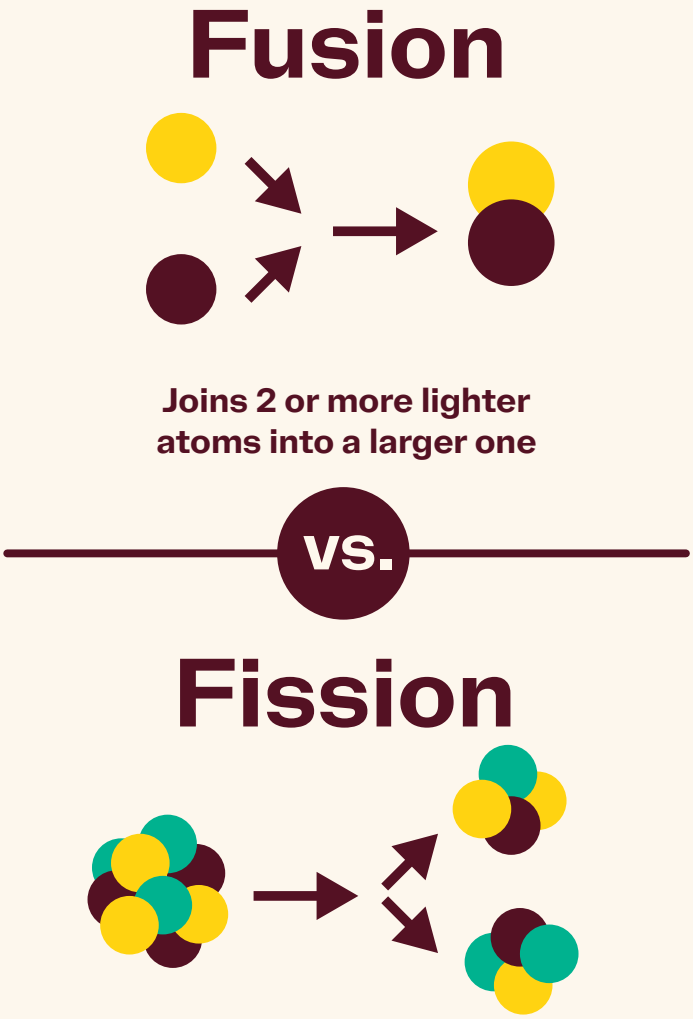


Construction of Diablo Canyon Nuclear plant, Security Pacific National Bank Photo Collection / Los Angeles Public Library

WHAT IS NUCLEAR ENERGY?

Nuclear energy can come from fission or fusion processes, both which involve changing the physics of the atom.[9] Fission involves splitting the center of an atom (the nucleus) into smaller fragments, which releases a large amount of energy or heat.[10] This process, which also releases significant amounts of radiation, is what's predominantly used to power nuclear reactors.

Fusion involves **combining** the nuclei of lighter atoms to form a heavier nucleus, which releases an even larger amount of energy. Fusion is what powers the sun.[11] Although there have been successful experiments, fusion is not currently used to generate electricity. The diagram below illustrates the different processes.



[12]

Nuclear reactors use the reaction of uranium atoms splitting to cause other uranium atoms to split, which generates heat. The heat is then used to create steam that will then spin a turbine, which powers a generator and creates electricity.[13]

TYPES OF REACTORS

Most of the current traditional nuclear reactors are light-water reactors (LWRs), which use regular water to cool the reactor.[14] There is a growing interest in looking outside of traditional reactors to different types of "advanced" reactors. Interest in small modular reactors is gaining momentum in the U.S. and throughout the world.[15] Yet, small modular reactors face the same core issues that more traditional nuclear power faces, including **high construction costs, limited fuel, and radioactive waste concerns**.[16] Additionally, most small modular reactor designs have yet to be built, and it remains unclear whether they can be built cost effectively at scale.[17] Small modular reactors are likely to be less efficient than larger reactors. Only two small modular reactors are currently operating, both outside the U.S.,[18] so assessing the viability of small modular reactors at scale is likely years away.

The nuclear industry has also proposed other types of advanced reactors with non-LWR designs[19] that use different mediums for cooling, such as sodium-cooled fast reactors, high-temperature gas-cooled reactors, and molten salt-fueled reactors. These types of reactors, however, are largely untested, introduce a host of novel safety concerns, and would require significant time and resources to be safely deployed.[20]

DANGERS TO AND CONCERNS FOR COMMUNITIES AND THE ENVIRONMENT

All phases of nuclear energy development and use pose major public health and environmental concerns, from mining the uranium needed to power the nuclear reactors, to sourcing and handling the water to cool the reactors, to the creation and eventual storage of nuclear waste.

Likewise, nuclear energy has historically created and is likely to continue to create environmental injustice. The forms this injustice takes range from uranium mining's disproportionate impact on Tribal communities[21] to the historical absence of community voices in regulatory proceedings.[22] All nuclear sites are currently also waste storage sites, which means that any community living near a nuclear facility will most probably be living near a nuclear waste storage site, as well.[23] While estimates vary, nuclear frontline communities likely face harmful levels of radiation and toxins that adversely impact their health and environment.[24]

Pollution Impacts of Mining Uranium

In order to get uranium to power a nuclear reactor, it needs to be mined. All forms of uranium mining[25] can have detrimental impacts on the surrounding communities. Uranium mining can—and has—contaminated groundwater, surface water, and soil with radioactive waste.[26] Efforts have been made to remediate these impacts, but many areas continue to be riddled with pollution. Mining has posed—and continues to pose—high risks to the environment and nearby communities. Some impacts of older uranium mining techniques include:

Pollution of groundwater and surface water with radioactive waste

Processing with chemicals that can leach into the ecosystem and drinking water sources

Production of radioactive dust that can impact air quality in nearby communities

While mining companies have tried new techniques, problems persist with groundwater and radiation exposure.[27] Uranium mining remains active in states like New Mexico and Colorado, while previously closed mines in Arizona are reactivating. Former mines are disproportionately on Native land. For example, there are more than 500 abandoned uranium mines on or near the Navajo Nation.[28]

Water Usage

Nuclear plants require a large amount of water to help cool the plant. This water usage could be detrimental to drought-prone areas.[29] Nuclear plants use around 300 billion gallons of water a year in the U.S., which makes it one of the most water-intensive methods for electricity generation. On average, nuclear generation uses more water than other zero-carbon resources such as solar, wind, and geothermal.[30]

Terrorism

To protect the public, nuclear reactors and nuclear material must be safeguarded from a foreign or domestic terrorist attack. There are three types of security risks related to nuclear facilities:

+ Attacks on nuclear energy facilities;
+ Explosives that could disperse radioactive materials;
+ Acquisition of raw nuclear materials to create weapons.[31]

Recently, the Nuclear Regulatory Commission has relaxed security requirements for the industry,[32] which could put the public more at risk. An attack on a nuclear reactor or the spent fuel storage would release radiological particles into the atmosphere, which could spread further than just the area hit, contaminating food, soil, or drinking water.[33]

Nuclear Waste

The nuclear fission process produces radiation and radioactive waste that are harmful to human health and the environment if released.[34] High-level waste can remain radioactive and dangerous to human health for thousands of years,[35] and even low-level waste can still pose a threat for many years. Unfortunately, the nuclear industry still has not developed a long-term solution for storing the waste, and it is generally kept right at the nuclear power facility.

One in three people in the U.S. live within 50 miles of a nuclear waste storage site.[36] Although nuclear power facilities are required to ensure that the public is not exposed to this waste, living near nuclear power facilities is likely to increase health risks. Research has shown that communities living near nuclear facilities have higher rates of cancer mortality.[37]

Nuclear Disasters

While nuclear disasters are not likely, those that do occur can be catastrophic. As one article describes, "Although modern reactors use different designs, they are not immune to severe accidents. The complexity of the technology, with many components interacting rapidly, means failures can still occur, even if they follow different chains of events."[38] Three of the most well-known nuclear accidents were those that occurred at Three Mile Island, Chornobyl, and Fukushima.[39] These accidents all released radioactive material and exposed the public to radiation.[40] The worst nuclear accident in the U.S. occurred at Three Mile Island near Middletown, Pennsylvania.[41] A portion of the Three Mile Island plant, the sole reactor not involved in the accident, is now restarting to help power Microsoft's AI.[42]

WHAT'S HAPPENING NOW AND WHAT'S TO COME

Shift in Opinion: Resurgence

For years, many environmentalists opposed nuclear energy, given the concerns about radioactive waste, safety, and high costs. More recently, some environmentalists have shifted their opinions, based primarily on climate change concerns.[43] Political targeting of solar and wind, along with a continued increase in energy demand, has also led to a more comfortable stance on nuclear energy, particularly as this source is viewed as one of the only zero-carbon baseload energy options able to meet demand. As the impacts of climate change accelerate, environmentalists see value in nuclear power's ability to produce electricity without emitting greenhouse gases, as well as its smaller footprint and use of less material to produce energy than other types of zero-emission sources, like solar energy. Some of this shift is also due to the rising demand from data centers and the hope of relying on zero-carbon resources to meet that demand.[44] While many environmentalists who now support nuclear energy still acknowledge the issues of safety and radioactive waste, they see the climate benefits as outweighing these risks.

Presidential Actions to Accelerate Nuclear

In 2025, President Donald Trump signed a series of executive orders to accelerate the nuclear energy industry by easing regulations and expanding production. In these executive orders, President Trump attempted to eliminate environmental review and regulatory requirements in order to expedite the development of nuclear energy. Trump also ordered the Department of Energy to reform nuclear reactor testing and required the Nuclear Regulatory Commission (NRC) to cut regulations. Finally, the President signed an order aimed to rapidly deploy advanced nuclear technologies. In all, Trump's executive orders seek to increase U.S. nuclear energy generating capacity by more than 100GW by 2050.[45]

Reduction of Safety Requirements

The Trump administration's actions to accelerate nuclear power are likely to undermine safety requirements. For example, one of the executive orders calls for reconsideration of the linear no-threshold model for examining risk from nuclear radiation.[46] This regulatory framework holds that any radiation exposure could be harmful and should be avoided. Reconsidering this model could lead to higher allowable exposures and weaker standards.[47]

The Trump administration has also been quietly removing safety requirements. In particular, the NRC has taken steps to end the standard of more than 50 years that requires radiation levels to be "as low as reasonably achievable."[48] Rather, the NRC proposes that operators would only need to keep radiation under the maximum dose limits.[49] **This proposal conflicts with science that shows there is no safe level of harmful radiation.**[50] In a mostly secretive process, the U.S. Department of Energy also rewrote several rules to reduce safety requirements by weakening groundwater protection and reducing worker protection requirements.[51]

Companies are also reducing their compliance with safety recommendations. Until recently, all nuclear operators belonged to the Institute of Nuclear Power Operations (INPO), a voluntary watchdog created after the Three Mile Island catastrophe.[52] More recently, however, a growing number of companies are declining to join.[53] This change, by itself, is worrisome, as it represents a fundamental shift in the industry away from prioritizing safety. In the current environment, the declining membership is even more worrisome because the Trump administration has offloaded some safety requirements to INPO.[54]

First "Advanced" Reactor Approval

The Nuclear Regulatory Commission has issued its first construction permit for an advanced reactor in Wyoming. This is the first construction permit issued for a non-LWP reactor,[55] yet the design raises a number of safety concerns. The Union of Concerned Scientists says it "lacks a containment structure, is vulnerable to rapid autocatalytic power increases, and uses a coolant (liquid sodium) that can catch fire."[56]

Federal Government Investments and Loans

In the Inflation Reduction Act, Congress passed new tax incentives to accelerate nuclear power development and left these tax incentives largely intact when it passed H.R.1, officially known as the One Big Beautiful Bill Act.[57] The latter legislation also included a provision for increased tax incentives for nuclear communities, like the nuclear energy community adder.[58]

The Trump administration is also creating new programs to develop and incentivize nuclear energy. For example, the administration announced a Utility Power Reactor Incremental Scaling Effort (UPRISE) in March 2026.[59] UPRISE's goal is to surpass Trump's goal of 5GW of new nuclear capacity by 2029.[60]

The Reality of Nuclear as a Climate "Solution"

While nuclear energy does have a smaller footprint than other energy resources and is generally zero-carbon, it also has a number of disadvantages, including:

Long Construction and Development Timelines – The impacts of climate change are accelerating rapidly. Therefore, zero-emission resources are needed as soon as possible. Nuclear energy facilities have historically taken more than a decade to plan, develop, and construct, which is longer than other clean energy resources.

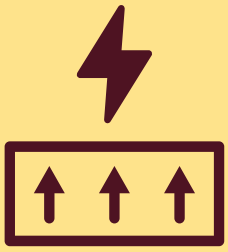
High Costs – At a time when energy is unaffordable for many households, nuclear energy is especially costly. Nuclear energy is more expensive than other clean energy resources like solar, wind, and geothermal.

Risk of Nuclear Meltdown or Release of Radioactive Waste – While accidents are rare, nuclear meltdowns or the release of radioactive waste can have catastrophic impacts on local communities and the environment.

There are other disadvantages to nuclear energy, as well, including risks from mining and from the release of greenhouse gases during the mining, development, and construction associated with nuclear power facilities.

Better Alternatives to Nuclear Energy

Other clean energy resources are more likely to come online faster and without nuclear energy's significant disadvantages, such as geothermal, offshore wind, and long duration energy storage. Each of these can help provide the same type of grid energy that nuclear energy provides.



Geothermal energy uses heat from the earth to generate electricity. It has a high availability, meaning that it can produce electricity all hours of the day.

Offshore wind energy is produced from wind turbines located in a body of water. Wind speeds offshore are often faster and more consistent than those onshore, leading to a more available source of energy production.

Long duration energy storage (LDES) technologies can store energy for days, weeks, or even entire seasons. They can help bridge the gap in times when solar and wind generation are not available.

While these resources also have potential drawbacks, they do not have the radioactive waste and safety concerns of nuclear energy, they can often be built faster, and they are often more economical than nuclear power.

WHAT'S NEXT FOR NUCLEAR

There has already been a big push for nuclear in the past few years, and with the expansion of AI and grid reliability concerns, interest in nuclear energy will likely continue to grow.

Nevertheless, there is still a lot of uncertainty around the ability to build new types of advanced nuclear reactors, given the supply chain concerns, high costs, and time requirements. A limited number of existing nuclear reactors could be brought back online, although this would be costly. Unfortunately, data centers may turn to even more damaging resources than nuclear energy. The expense and long construction time of nuclear alternatives don't appeal to tech companies and developers who want their AI data centers up and running in a year or two.[61] These developers often look to dirty energy like diesel to back up the grid and power these data centers, creating toxic pollution and deepening our reliance on fossil fuels.

But despite the potential high costs and various concerns associated with building new nuclear power, there has been an increase in support for nuclear energy across party lines.[62] Sixteen states have placed a ban (moratorium) or restrictions on nuclear power.[63] Since 2016, five of these states fully lifted their moratoria (Wisconsin, Kentucky, Montana, West Virginia, Illinois), and another five states (California, Massachusetts, Minnesota, New Jersey, Vermont) are now considering lifting theirs.[64] More than ten states have also committed to advance nuclear energy as part of a "First Mover" initiative.[65] With attitudes shifting and many lawmakers looking for ways to meet clean energy goals and increasing energy demands, we will likely see more rollbacks to nuclear bans and regulations.

Community Voice in Nuclear Siting

Despite increasing support for nuclear energy, most Americans oppose a nuclear facility being sited within their community.[66] Communities should be involved in the initial design stages of any new nuclear facility and given a voice to develop necessary protections. Communities living near potential nuclear sites should be involved in the planning and discussions related to at least the following potential concerns and issues:

+ **FACILITY DESIGN** – Communities should be informed about the design of the facility as well as the types of waste and fuel involved. In particular, communities should be informed about the sort of containment to be used, whether the fuels are flammable, and the potential risks for an accident.
+ **WASTE STORAGE** – Nuclear energy generators all currently also store nuclear waste. Information should be provided about how waste will be handled and stored and the steps to be taken to ensure that the local community is not exposed.

+ **ENVIRONMENTAL IMPACTS** – Nuclear energy generators often use water to cool their facilities and may have other immediate environmental impacts. Information should be provided about the potential facilities' water usage, emissions, and other environmental impacts. Communities should be involved in designing how the facility monitors, reports, and mitigates potential impacts to the environment.

+ **SAFETY AND EMERGENCY PLANNING** – Nuclear facilities need to have a plan in place in the event of an emergency. Communities should be involved in developing emergency and evacuation plans and be informed about the measures in place to prevent accidents and emergencies.

Community Benefits

Any potential benefits should likewise be discussed with the local community. A wide-range of potential community benefits—such as employment and other economic benefits—should be included in an document like a community benefits agreement (CBA). However, community benefits should never be used as a tool for reducing necessary safety, environmental, or emergency protections.

Communities Organizing Against Nuclear

Communities throughout the U.S. are already organizing to protect their state nuclear moratoria:

+ In 2025, **OREGON** communities came together to fight a bill that would allow a county in Oregon to be exempt from the state nuclear moratorium. The bill remained dormant the remainder of the session.[67]

+ At the time of this writing, a community in **MICHIGAN** is currently opposing the restart of a nuclear facility, primarily due to safety reasons.[68]

+ In May 2026, the **NEW YORK** senate passed legislation that would place a moratorium on nuclear power for two years.[69]

ADDITIONAL RESOURCES

State Specific Nuclear Information

1. Nuclear Energy Institute (NEI): U.S. Nuclear Plants

Federal Policy Interventions

2. AI Now Institute, North Start Policy Toolkit (federal interventions on nuclear and data centers)

AI and Nuclear Regulation

3. Dr. Sofia Guerra, FREng, and Dr. Heidy Khlaaf, AI Now Institute, Fission for Algorithms: The Undermining of Nuclear Regulation in Service of AI

Up-To-Date Resources on the Dangers of Nuclear Power

4. Beyond Nuclear
5. Map of Planned Advanced Nuclear Reactors (last updated in 2024): Nuclear Innovation Alliance
6. [Video]: Why Small Nuclear Doesn't Work, Dr. Ben Miles
7. [Book] No To Nuclear: Why Nuclear Power Destroys Lives, Derails Climate Progress and Provokes War by Linda Pentz Gunter

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