

NUCLEAR ENERGY IN NEW JERSEY

1942

The world's first self-sustaining, controlled nuclear chain reaction was achieved

10%

Of the world's power comes from nuclear energy

Nuclear power has come a long way since the world's first self-sustaining, controlled nuclear chain reaction was achieved in 1942. Today, nuclear power plants generate about ten percent of the world's power. This power is clean, carbon-free, and reliable.

When it comes to building new nuclear power plants, concern often stems from the accidents at Chernobyl, Fukushima, and Three Mile Island. While these three accidents did have negative consequences, the lessons learned from them have helped to shape the current nuclear fleet and new advanced reactor designs into safer, more reliable sources of clean, carbon-free energy.

Chernobyl, Fukushima and Three Mile Island



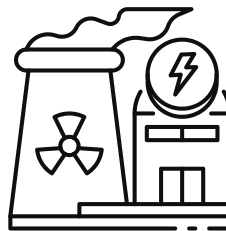
Chernobyl's reactor had a **positive feedback loop**: hotter coolant → increased power → hotter coolant (escalating cycle)



Coolant design was a major issue in the Chernobyl accident



Human error and component **failure** were the common factors in all three incidents



Clean



Carbon-free



Reliable

In Chernobyl, one of the major design flaws was that as the reactor's coolant temperature rose, the reactor's power output also increased. This created a dangerous cycle where hotter coolant led to even higher power levels. The type of coolant used was a significant factor in the accident. In contrast, current reactors and advanced reactor designs utilize coolant that behaves in the opposite manner: as the coolant gets hotter, it produces less power. This design change makes a Chernobyl-style accident nearly impossible.

Advanced Reactors Today



Negative feedback coolants (Hotter coolant = less power, making a Chernobyl style accident nearly impossible)



Advanced designs incorporate lessons from prior accidents



Significantly improved safety equipment in current reactor designs



Passive safety features enable automatic shutdown/cooling without human action or electricity



Reduced reliance on operators and failure-prone equipment

All three accidents also have two common factors that contributed to them: human error and component failure. By studying these accidents, the current nuclear fleet and advanced nuclear reactors have significantly improved their safety-related equipment designs. Advanced reactors are the direct response to the lessons learned from these accidents. Their designs incorporate passive safety features that leverage physical laws, including natural circulation, gravity, and thermal expansion, to shut down and cool the reactor without requiring active human intervention or electricity during emergencies. These designs minimize the need for operator action and reduce the reliance on equipment, such as pumps and valves, that could potentially fail in certain situations.

American energy demands have significantly increased over the past several years. Advanced Nuclear Power Reactors are an effective way to address both consumer and commercial energy needs, while ensuring safety and reliability.