

# FORTUNE

## Can nuclear renaissance be the answer to the climate change crisis?

By Marcus Baram

The Biden administration is making a big push for nuclear power once again to be a key part of America's sustainable energy future, which could lead to the first expansion of reactor construction in more than three decades.

The White House [requested \\$1.8 billion for nuclear energy](#) in its fiscal 2022 budget, a 50% increase from last year's levels, with Energy Secretary Jennifer Granholm telling reporters at the recent UN Climate Conference that ["we are very bullish on these advanced nuclear reactors"](#) and pointing to the emerging technology of small, modular reactors. The House-passed version of the Build Back Better bill also includes [between \\$20 billion and \\$25 billion in subsidies](#) to keep older reactors running. And the Biden administration says that the country's 94 nuclear reactors will be ["absolutely essential"](#) for the U.S. to achieve its goal of a net-zero carbon economy by 2050. Even the environmental group Greenpeace is [no longer actively campaigning](#) against nuclear power over its safety issues.

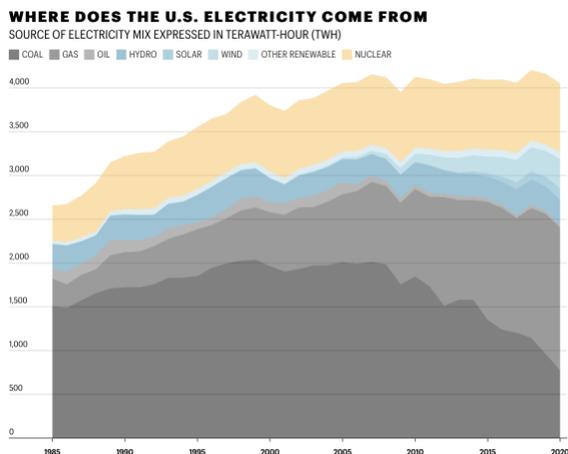
While there have been previous nuclear revivals, this time is different. The looming threat of climate change is more pressing than ever; there is bipartisan support for expanding our use of nuclear energy; advances in technology have made nuclear more efficient and safer than ever; and the government has committed billions in funding to nuclear power.

We've been here before. At the start of the Obama administration, there was a nuclear renaissance, with applications for [30 new reactors in the U.S.](#) The challenge of climate change was causing policymakers to take a fresh look at nuclear's potential as a zero-emission clean-energy source. It had been several decades since the Chernobyl and Three Mile Island disasters, and many energy experts were convinced that the future looked bright. But in the end, [only two new reactors were built](#), according to *Time* magazine, and the momentum withered because of competition from the cheap natural gas of the fracking boom and well-subsidized renewables like solar and wind. And the meltdown of three reactors at Fukushima in Japan, [leading to the evacuation of 154,000 people](#), scuttled plans around the globe, with Germany [phasing out](#) its last six reactors, and utilities in the U.S. abruptly [dropping their ambitious plans](#) for new ones.

### A NEW GENERATION OF NUCLEAR TECH

Currently, nuclear supplies [20% of electricity in the U.S.](#) and 50% of its carbon-free electricity. And those numbers are expected to grow at home and around the world. Global nuclear generating capacity [is expected to almost double by 2050](#), according to the International Atomic Energy Agency (IAEA). Nuclear's potential has been eagerly embraced by the U.S.

Department of Energy, which touts the fact that it would take 3 million solar panels or more than 400 wind turbines to [provide the same power as a one-gigawatt reactor](#).



Source: [OUR WORLD IN DATA](#); [BP STATISTICAL REVIEW OF WORLD ENERGY & EMBER](#). Note the graphic is interactive on the live copy of this article.

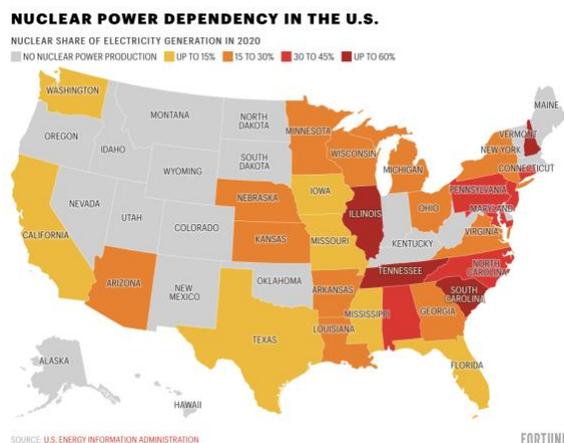
A new generation of nuclear technology that is safer and more responsive to the cycles of supply and demand is being spearheaded by ambitious startups. X-energy, with funding from the Defense Department, is [planning 80-megawatt modular reactors](#) that can be assembled into larger operations, and Oklo is developing [a micro-reactor the size of a hot tub](#) that could power remote villages and communities around the world.

"A lot of stars are aligned right now," says MIT nuclear engineering professor Jacopo Buongiorno, pointing to increased concerns about climate change and the advancements in nuclear technology that have made it safer and more efficient.

Advanced nuclear is one of the breakthrough technologies that could have a significant impact on decarbonization, says Joseph Hezir, principal at the Energy Futures Initiative and former adviser to Obama-era Energy Secretary Ernest Moniz. Hezir points to several major developments in the past decade and a half: nuclear plant

technology that doesn't rely on light water but molten salt and high-temperature gas for coolant; enriched uranium that is longer-lasting and more efficient; and the increased ability to design and build small modular reactors than can be constructed more inexpensively in factories rather than at a huge construction site. He notes that micro-reactors, if they can be economical and successfully deployed, could open up a lot of markets around the world, including developing countries. One of these newer reactors [will be built and tested in Alaska](#) by the Pentagon by the end of 2027.

"Even with deployment of renewable technologies like solar and wind, there is still the issue of intermittency and the need for storage capacity," says Hezir. "There is still a need for clean, firm power like nuclear."



Source: [U.S. ENERGY INFORMATION ADMINISTRATION](#). Note the graphic is interactive on the live copy of this article.

While the existing reactors are aging and require government subsidies to keep them running safely, micro-reactors can be built very quickly, with a commercial unit up and running by 2027, says Buongiorno. But the key question is how much of an impact they can have on replacing fossil fuels, and it's unlikely they will play a significant role before the middle of the century.

Nuclear power's safety reputation and costly operation remain ongoing concerns that threaten its viability as a climate change solution.

While the new generation of technology promises to make nuclear power more reliable and will help reduce America's reliance on fossil fuels, experts are doubtful that it will be able to significantly contribute to a zero-carbon energy future in the near future, in time to avoid the worst impacts of climate change.

"If you think climate change needs to be addressed in the next 15, 20 years, nuclear is not going to do that," says former Nuclear Regulatory Commission Chair Allison M. Macfarlane, who considers a lot of the renewed interest in the technology "hype" that is promoted by the industry "spending money on PR and lobbying."

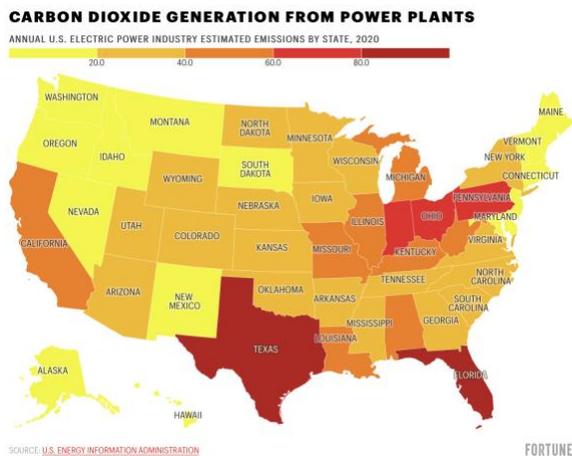


Figure 1 Source: [U.S. ENERGY INFORMATION ADMINISTRATION](#). Note the graphic is interactive on the live copy of this article.

She doubts that nuclear power will make a significant contribution to helping achieve a zero-carbon energy future because it takes an extremely long time to build plants and "most of these new designs you're hearing about are basically pieces of paper," noting the complexity of the operations. She also says that it won't be easy for nuclear to compete with natural gas and wind, due

to the deregulation of the electricity market decades ago. "Nobody has been able to get it to work economically and reliably for a reasonable price," Macfarlane says, pointing to the billions of dollars that have been spent to get nuclear technology off the ground in the U.S. and around the world, from the U.K. to Japan and Russia. Also, as the IAEA noted in its most recent report, nuclear's contribution to electrical capacity around the globe is likely to [decline from 5% in 2020 to somewhere between 2.4% and 4.8% by 2050](#), meaning that it has less potential to replace fossil fuels than other renewable energies.

The last challenge to a nuclear renaissance is public sentiment. While an Associated Press survey shows that two-thirds of Americans [believe nuclear will help take the place of fossil fuels in the future](#), a majority of them also [oppose expanding the construction of nuclear power plants in the country](#).

The government is certainly helping to get the word out, trying to reassure the public about the safety and reliability of nuclear power. On its site, the Energy Department lists "3 Reasons Why Nuclear Is Clean and Sustainable." Among them are two issues close to the heart of environmentalists: The agency claims that nuclear power's land footprint is small, producing more electricity on less land than any other clean-energy source, and addresses long-standing concerns about nuclear waste by stating that "all the used nuclear fuel produced by the U.S. nuclear energy industry over the last 60 years could fit on a football field at a depth of less than 10 yards!" There is no mention of nuclear waste's extremely long half-life, with the most potent waste needing to be safely stored for up to a million years.

The Energy Department says it strongly supports the development of advanced reactors, in particular small modular

reactors and micro-reactors, "to ensure the next generation of nuclear technology is able to meet our energy needs and emissions goals."

Education and public messaging about the evolving nature of nuclear energy will be an important part of any nuclear renaissance, if it is going to last.

Some public opposition may be impossible to eradicate, says Buongiorno, who notes that some of the safety concerns are outdated. "It's like saying, 'I don't want to fly a Dreamliner because I remember there was an accident with the Hindenburg.' The technology has evolved so much, it's like comparing apples to oranges."

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<https://fortune.com/2022/02/28/can-nuclear-power-solve-climate-change/>