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# War in Ukraine generates interest in nuclear energy, despite danger

European nations are weighing climate benefits against the perils of putting nuclear power plants in harm's way

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The war in Ukraine has intensified interest across Europe in building new nuclear energy plants or extending the lives of old ones to liberate the continent from its heavy reliance on Russian oil and natural gas.

Belgium made an about-face, deciding to keep open a pair of reactors slated for closure. The Czech Republic invited Western companies to deliver nuclear fuel to replace Russian supplies. Poland is negotiating to build new reactors in a quiet seaside town. The war has reversed the tenor of the nuclear debate, just when its prospects had seemed to dim.

“They’re all doing it for the same reasons: decarbonization, energy security and national security,” said David Durham, president of Westinghouse’s energy systems business, which as of early April had signed memorandums of understanding with 19 different companies or government agencies in a dozen countries, including Poland, Romania and the Czech Republic.

The heightened interest comes as [the war in Ukraine](#) shows the dangers of building nuclear reactors on NATO’s front line. Fighting around Ukraine’s nuclear sites raised alarms about damage that enemy troops, drones and missiles might inflict on installations — damage that could lead to radiation releases, which have been linked to a range of cancers years later.

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When Russian troops occupied two nuclear sites — including the Chernobyl complex, which famously blew up in 1986 — international nuclear safety bodies called emergency meetings, while the European Union shipped iodide tablets to Ukraine to protect people from the harmful effects of any radiation release.

American and European officials who support nuclear energy frequently call the reactors in Ukraine “robust” for holding up during the recent fighting at the sites — but nuclear experts say that spent-fuel pools, transmission lines and backup diesel power are weak points that haven’t yet been directly targeted in battle.

“Nuclear power plants are extremely robust, but we have limited options to mitigate consequences if military forces, particularly sophisticated military forces, purposely strike at those plants,” said a senior Biden administration official.

Some nuclear experts question whether a building designed to contain radiation inside can withstand a missile from the outside.

“The simple fact is the Russian attack on Ukraine and their substantial nuclear infrastructure shows the vulnerabilities of these facilities in a conflict,” said Daryl G. Kimball, executive director of the Arms Control Association.

Another reason to pause before ordering nuclear power plants? Reactors are wildly expensive and notoriously late in construction, which makes nuclear energy largely irrelevant for the current crisis, and possibly the next. A pair of nuclear reactors under construction in the state of Georgia — the same model proposed for Poland — is running about six years late and \$16 billion over budget.

Even if nuclear contractors stay on schedule, a new reactor in Europe will not be switched on at least until the end of the decade — long after renewables are supposed to have replaced Russian oil and gas imports, according to Westinghouse, the reactor company NuScale and Energy Department experts.

“It is likely that most of these ‘projects’ will never lead to any electricity generation,” Mycle Schneider, a nuclear power consultant based in Paris, said in an email. “The key parameter will be the combination of cost and time. The planning, licensing and construction will likely take at least 15 years for any of these projects.” That timeline would be not only too long for the Ukraine crisis but also “much too long to cope with the climate change emergency,” he added.

Additionally, nuclear — like other energy sources — must now compete with renewables on the basis of price, and renewables are a lot cheaper. Caroline Kuzemko, an energy policy expert at the University of Warwick, said that these days “you have renewables on the table, and you also have energy efficiency on the table, because the lowest-cost energy is the energy that you don’t demand.”

“The E.U. is trying to wean itself off imports of Russian gas,” she added. “Maybe nuclear can do that in the 20-year timeline, but it doesn’t get you off the big problem, which is the near-term problem of getting off gas.”

The European Nuclear Society and the American Nuclear Society argue that the dangers posed by fighting around Ukraine's nuclear sites have been inflated, and they warn against actions that "manipulate public fear of radiation."

"Nuclear power plants are not ominous facilities to be feared," the associations wrote in a joint statement. "Rather, they have already played an invaluable role in reducing air pollution, cutting greenhouse gas emissions, and reducing dependence on fossil fuels. And their future potential is enormous."

But Edwin Lyman, director of nuclear power safety at the Union of Concerned Scientists, says the associations aren't paying attention to the "close calls" in Ukraine.

"Do they really want to be building nuclear plants close to the border of a country under threat?" he said. "You would think this display of vulnerability to war would give people pause about that kind of deployment."

Countries on NATO's eastern flank — those most at risk of direct conflict or radioactive spillover from a nuclear disaster caused by Russia's war in Ukraine — appear to be leaning toward the associations' view. But each country has a different set of considerations.

Slovenia, which generates one-third of its electricity with nuclear power, aims to phase out its own coal resources by 2033. Before the war in Ukraine, two options were under consideration, Tomaz Zagar, president of the Nuclear Society of Slovenia, said in an email. One combined renewable energy sources such as solar and wind with gas power plants, while the second proposal suggested combining renewables with a new nuclear plant.

Previously, the gas option was seen as less risky, Zagar said, but the war "gave important acceleration to [the] nuclear option." For countries in Eastern Europe, "NPPs [nuclear power plants] and even attacks on NPPs are now seen as much less dangerous than the war itself."

In Poland, which has no nuclear reactors, President Andrzej Duda said nuclear power had become key for both climate protection and energy security in Europe. During President Biden's visit last month, Duda said that a reactor "will be able to get off the ground soon." In addition, NuScale and KGHM Polska Miedz S.A., a Polish copper and silver producer, have recently tentatively agreed to deploy a small modular reactor that could start as early as 2029.

Latvia's defense minister suggested last month that Latvia should build a power plant with Estonia as part of Europe's drive to seek energy sources that do not rely on Russia — even after the head of an Estonian power company said power consumption in the Baltic countries was not high enough to justify a nuclear reactor.

Nuclear energy is not exempt from the problem of reliance upon Russia, either. Russia possesses about 40 percent of the world's capacity for uranium enrichment. World spot prices have roughly doubled, but European and American leaders left uranium fuel off the sanctions list, despite the fighting in Ukraine.

Since the invasion, both Slovakia and Hungary, which rely heavily on nuclear power, have continued to accept shipments of uranium fuel from Russia for their Soviet-era nuclear plants. Hungarian Foreign Minister Peter Szijjarto said that sanctions on activities related to nuclear energy would be a "red line" for Hungary.

Others are seeking to reduce their uranium dependence on Russia. The Czech Republic selected Westinghouse and France's Framatome to replace Russia's TVEL and deliver fuel supplies to the country's Temelin nuclear plant. But even that won't begin until 2024.

In Western Europe, the war has largely hardened existing positions on both sides of a fierce debate over the role of nuclear energy in the transition away from fossil fuels.

No place is that debate more crucial than in France. The nation is the third-largest importer of Russian gas in the E.U., according to the U.S. Energy Information Administration. And inside France — the largest and most experienced nuclear power producer in Europe — nuclear energy accounts for about 70 percent of electricity. Recently, however, nuclear energy production has fallen, with a number of reactors shut down for maintenance or because of suspicions of corrosion.

But facing an energy crisis and election challenges from pronuclear opponents, President Emmanuel Macron in early February declared a “nuclear renaissance” in France, including the construction of at least six new reactors as well as possibly extending the lifetime of existing ones.

“This is quite a paradigm shift in France because in the past, French regulation kind of obliged nuclear power to decommission,” said Alexandre Danthine, senior associate at Aurora Energy Research.

The United Kingdom does not depend on Russian gas, though soaring gas prices around the world have driven energy costs up in Britain. Prime Minister Boris Johnson, looking to the Ukraine conflict for cover for his own intentions for “greater energy independence,” unveiled plans for a major ramp-up in nuclear power, increasing its share of electricity generation from about 16 percent to 25 percent by 2050.

Some nations have to decide whether to close plants, not build them. Various international experts and politicians have called on Germany and Belgium to delay the decommissioning of reactors slated for the coming years. In its 10-point plan to reduce the European Union's reliance on Russian gas, the International Energy Agency suggested last month that forestalling the closures of the German and Belgian reactors, combined with the completion of a new reactor in Finland and running bioenergy plants at full capacity, could slash future gas demand by about 13 billion cubic meters without increasing emissions.

Germany, a staunch opponent of nuclear power that recommitted after the Fukushima accident to close its nuclear plants, has ruled out such a move so far. “No one in government thinks we should do that, and therefore that will remain the case in Germany,” said Sascha Muller-Kraenner, co-founder of the Berlin-based Ecologic Institute.

The country “is not yet in full energy crisis mode,” said Georg Zachmann, a senior fellow at the European think tank Bruegel. But he predicted that could change under pressure from the European Union if the supply of Russian gas to Europe stops.

Belgium is an example of a country that has changed its position. It decided to extend the life of two nuclear reactors by a decade beyond their planned closures in 2025, possibly the clearest policy shift in response to the war.

“This extension will strengthen our country’s independence from fossil fuels in a turbulent geopolitical environment,” Belgian Prime Minister Alexander De Croo said in a statement.

As nuclear power producers contend with the threat of conflict surfaced by the war in Ukraine, some are considering new safety and security measures.

Taiwan recently conducted drills to prepare for a simulated Chinese attack on a nuclear power plant on the southern end of the island. About 500 police officers, firefighters, utility workers and volunteers participated. Japan is weighing whether to deploy Self-Defense Forces with interceptor missiles to protect its civilian nuclear reactors and create a special security force.

Chernobyl is back under Ukrainian control, and nuclear officials said the month-long Russian occupation there did not cause any major radiation leak. But the Zaporizhzhia plant, the largest in Europe, remains under Russian control.

“The war in Ukraine has certainly started conversations about whether a change to the security posture of nuclear plants is needed, but I think what you’re seeing from regulators is a cautious, deliberate approach,” C.J. Fong, a deputy head for regulation at the OECD Nuclear Energy Agency, wrote in an email.

“It should be noted that — like most civilian infrastructure — nuclear power plants were not intended to be operated in the middle of a military conflict,” Fong said. “Therefore, the situation in Ukraine is unprecedented and goes well beyond what the operators or regulator could reasonably be expected to have been prepared for.”