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A guide: The end of Germany's nuclear power

14 April 2023

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This weekend sees the end of an era as Germany's long journey away from generating power from nuclear takes place with the closure of its last three operating reactors.

Isar 2 was commissioned in 1988 (Image: Preussen Elektra)

What is happening?

The last three operating nuclear power reactors in Germany are being permanently shut down on 15 April. Isar 2, Emsland and Neckarwestheim 2, all pressurised water reactors, had been due to end their lives by the end of last year, but were allowed an extension for the winter following energy capacity concerns as a result of the Russia-Ukraine war.

How we got here - a timeline

This weekend's final closures have been more than 20 years in the making and are the results of decisions taken by various coalition governments in the country.

1960s/70s: Germany was for many years a world leader in nuclear energy, with the Kahl experimental nuclear power plant the first to generate electricity when it went into operation in 1960 with more than 30 power and experimental reactors up and running in the following three decades. As World Nuclear Association's Information Paper on Germany says: "German support for nuclear energy was very strong in the 1970s following the oil price shock of 1974, and as in France, there was a perception of vulnerability regarding energy supplies."

1980s/90s: The Chernobyl accident led to a change in public and political attitudes to nuclear energy and the last new nuclear power plant was commissioned in 1989. When the country was unified in 1990, all the Soviet-designed reactors in the former East Germany were decommissioned - five VVER-440 units at Greifswald, plus unit 6, which was completed but not operated, and construction of a four-unit VVER-1000/V-320 power station at Stendal was halted.

1998: A coalition government was formed between the Social Democratic Party and the Green Party, which had partly grown out of the anti-nuclear movement. At the time, there were 19 operating nuclear reactors in Germany. The political parties' agreement included a commitment to change the law to phase out nuclear power.

2001: After more than two years of talks and negotiations, the German government and the main energy companies signed a compromise deal putting a cap of 2623 billion kWh on lifetime production by all 19 operating reactors, limiting the operating lives of reactors to an average of 32 years. It also prohibited the construction of new nuclear power plants and introduced the principle of on-site storage for used fuel.

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2009: The new Christian Democrat (CDU) and Liberal Democrat (FDP) coalition government was committed to rescind the phase-out policy. The following year an agreement was reached to give eight-year extensions from the 2001-agreed dates for reactors built before 1980 and 14-year extensions to the later ones. The agreement included new tax measures and subsidies for renewables in return.

2011: Events at Fukushima led to the German government announcing an immediate three-month moratorium on nuclear power plans and then Chancellor Angela Merkel decided all pre-1980 nuclear power plants should be shut immediately - together with one unit already in long-term shutdown this amounted to 8336 MWe, about 6.4% of the country's capacity. Although there was a safety assurance from the Reaktor-Sicherheitskommission review of the 17 reactors, the government decided to revive the previous government's phase-out policy and close all reactors by the end of 2022. The Bunderstag passed the measures by 513 votes to 79 in June 2011 and approved construction of new coal and gas-fired plants as well as a rapid expansion of renewables - a policy package known as Energiewende.

2022: Russia's war with Ukraine led to pressure to rethink, or at least delay, the phasing out of nuclear power with soaring energy prices and the end of gas supplies from Russia prompting fears of blackouts and energy security questions. Following a 'stress test ' of the grid in September 2022, the coalition government - which includes the Green Party - agreed to keep Emsland, Isar 2 and Neckarwestheim 2 on standby until mid-April 2023.

What has the German government said?

Steffi Lemke, Federal Minister for the Environment and Nuclear Safety said the phase-out made the country "safer" saying "with the shutdown of the last three nuclear power plants, we are entering a new era of energy production. So let's continue to work on solutions for a nuclear repository and put all our energy into expanding renewable energies".

Robert Habeck, Federal Minister of Economics and Climate Protection, said that the phase-out was implementing the 2011 government's decision and said "security of energy supply in Germany is and will remain guaranteed ... the massive expansion of renewable energies in particular provides additional security. In 2030 we want to generate 80% of the electricity here in Germany from renewable energies".

The priority now was to "complete the phase-out safely, including dismantling, and to advance the search for a repository for high-level radioactive waste and permanent solutions for low- and intermediate-level radioactive waste".

What do opinion polls suggest the German public think?

According to an opinion poll for broadcaster *ARD,* six out of ten people in the DeutschlandTrend survey oppose the nuclear phase-out with 34% in favour of it. That compares with the figures from June 2011 when 54% thought the policy was correct and 43% opposed it, *ARD* said.

How much electricity could the nuclear plants produce?

To take just one example, Isar 2, its operator Preussen Elektra said that each year it generates roughly 11 billion kWh of electricity, enough to supply 3.5 million households for a year, and in doing saving almost 10 million tonnes of CO2. Between the three of the reactors being shut this weekend, over their less-than 35-year lifetimes, according to World Nuclear Association, they have had load factors above 90% and generated 32.6 TWh of electricity.

In quotes: Reaction to the phase-out

The Swiss Nuclear Forum's President, Hans-Ulrich Bigler: "It is unfortunate that Germany, one of the world's leading nuclear energy nations, is abandoning this technology due to a government decision in the midst of an international energy and climate crisis. The workforce of the German nuclear power plants can be proud. With their work, they have reliably supplied Germany and its neighbouring countries with electricity over the past few decades, while preventing several billion tons of CO2 emissions."

He added: "Last year we were already able to see that the gradual phase-out of nuclear energy and the loss of gas capacities were also compensated for by more climate-damaging electricity production from coal. This is not a good sign for climate protection in Europe."

Open letter to German Chancellor Olaf Scholz signed by two dozen scientists and Nobel Prize winners, via Replanet: "In view of the threat that climate change poses to life on our planet and the obvious energy crisis in which Germany and Europe find themselves due to the unavailability of Russian natural gas, we call on you to continue operating the last remaining German nuclear power plants.

"We welcome the efforts of the German government to reduce greenhouse gas emissions in Germany, a country of particular economic and political importance in Europe, in accordance with international agreements. However, in 2022, CO2 emission goals were exceeded by 40 million metric tons due to the increased use of coal-fired power plants resulting from the necessary cuts in natural gas consumption...

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"The Emsland, Isar II and Neckarwestheim II nuclear power plants supplied a total of 32.7 billion kilowatt hours of low-emission electricity in 2022. German private households most recently consumed an average of 3190 kWh of electrical energy per year. This means that these three power plants can supply more than 10 million, or a quarter, of German households with electricity. The resulting reduction in the amount of electricity required from coal-fired power plants could save up to 30 million tons of CO2 per year.

"In the past, other European countries also pursued plans to reduce their nuclear power generation capacities. In recent years, however, many of these countries have taken a different stance on nuclear power due to rising energy costs, which has been exacerbated by the most recent loss of Russian natural gas deliveries. France, the UK, Poland, the Czech Republic and the Netherlands, among others, are planning to build new nuclear power plants or are already doing so, while Belgium and Switzerland are seeking to extend the operating licenses of their plants."

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