

COP 28, CLIMATE CHANGE AND NUCLEAR ENERGY

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(Views expressed in the brief are those of the author, and do not represent those of ISSI)



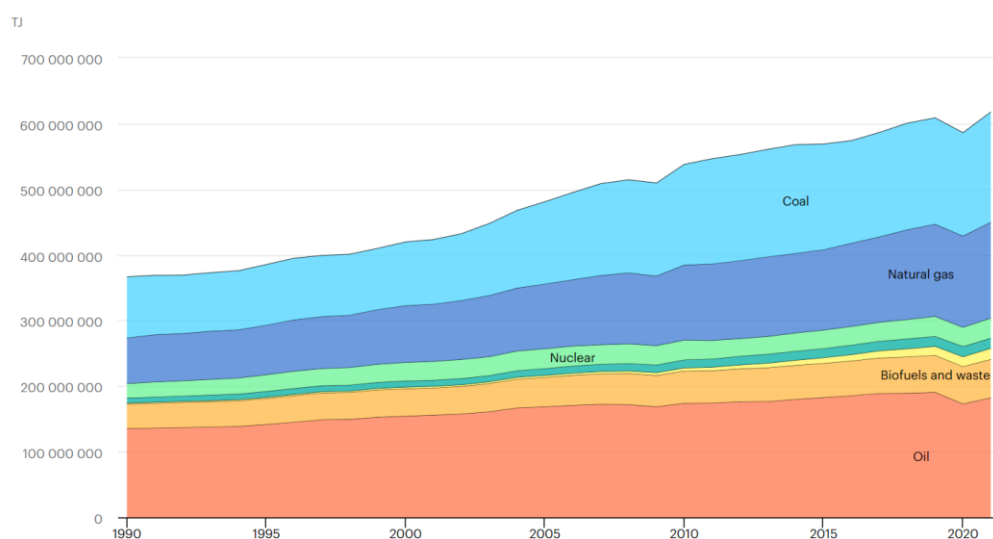
Nuclear energy came into focus at the United Nations Climate Change Conference (COP28), held in UAE in December 2023, when 20 countries pledged to triple nuclear power capacity by 2050. The International Atomic Energy Agency (IAEA) in its statement said that “the goal of global net zero carbon emissions can only be reached by 2050 with swift, sustained and significant investment in nuclear energy.... [it is] important part of the solution to climate change and energy insecurity.”¹ Nuclear energy has zero carbon emissions and is seen as part of the solution to transition away from fossil fuels and triple renewable energy capacity. Belgium, France and IAEA also announced that the world’s first Nuclear Energy Summit will be held in Brussels in March 2024 in order to build on the global momentum on nuclear power. The Summit is expected to host representatives and experts from 30 countries. The Summit will showcase the IAEA’s Atom4NetZero initiative, which supports efforts by Member States to harness the power of nuclear energy in the transition to net zero by providing technical expertise and

¹ “IAEA Statement on Nuclear Power at COP28,” IAEA, December 1, 2023, <https://www.iaea.org/newscenter/statements/iaea-statement-on-nuclear-power-at-cop28#:~:text=Resilient%20and%20robust%20nuclear%20power,industry%20processes%20and%20hydrogen%20production.>

scientific evidence on the potential of nuclear energy to decarbonize electricity production.²

According to UN figures, 32 countries worldwide are operating 443 nuclear reactors for electricity generation, while 55 new nuclear plants are under construction.³ Nuclear energy provides about 10 percent of the world's electricity and about 26 percent of the world's low-carbon electricity.⁴ The IAEA's annual nuclear power outlook projection sees installed nuclear capacity of 369 gigawatts today, doubling to 890 gigawatts by 2050.⁵

Total energy supply (TES) by source, World 1990-2022



Source: International Energy Agency, <https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=WORLD&fuel=Energy%20supply&indicator=TESbySource>

The proponents of tripling nuclear energy by 2050 included countries like the U.S., France, The Netherlands, Japan, Canada, Czech Republic, Hungary, Bulgaria, Republic of Korea, Poland, Romania, Slovakia, Slovenia, Sweden, Ukraine, and the UK. Among developing countries are Mongolia, Morocco, Ghana and the UAE.⁶ The initiative was led by the U.S. that also proposed 10 percent share of NPPs in world energy supplies.

² "Atoms4NetZero," IAEA, <https://www.iaea.org/atoms4netzero>.

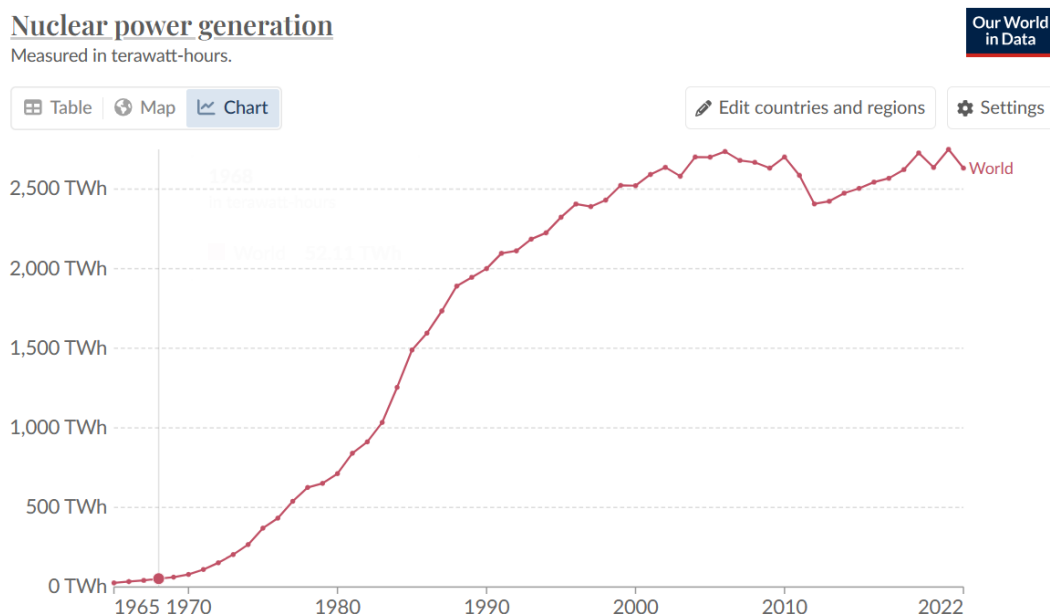
³ "Atomic Energy," UN, <https://www.un.org/en/global-issues/atomic-energy>.

⁴ "Nuclear Power in the World Today," World Nuclear Association, updated November 2023, <https://world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>.

⁵ Jeffrey Donovan, "Nuclear Energy Makes History as Final COP28 Agreement Calls for Faster Deployment," December 13, 2023, <https://www.iaea.org/newscenter/news/nuclear-energy-makes-history-as-final-cop28-agreement-calls-for-faster-deployment>.

⁶ Syed Akhtar Ali, "COP28: Emerging Role of Nuclear Power," *Business Recorder*, December 14, 2023, <https://www.brecorder.com/news/40278491>.

In the past decade or so, there has been an overall decline in the trend towards nuclear energy. As Director General IAEA, Mariano Grossi, underscored: “Nuclear power’s share of global electricity production decreased by about half in the past two decades.” This was due to environmental and safety concerns in the wake of 2011 Fukushima accident. The 1986 Chernobyl and 1979 Three Mile Island catastrophes also loom large in the public consciousness. Much of Europe scaled down on nuclear energy with the exception of France with 69 percent nuclear in its energy mix. Germany completely phased out its nuclear power program in the wake of Fukushima, and turned off its last 3 (out of 17) reactors in April 2023. Belgium and Switzerland decided not to build new plants and to phase out the existing ones.⁷ Trend towards nuclear energy picked up following the energy crisis created in Europe and the rest of the world as a result of the Ukraine conflict.



Source: “Nuclear Energy,” Our World in Data, <https://ourworldindata.org/nuclear-energy>

The tripling of nuclear energy will require immense effort and workable solutions. As the IAEA Director General emphasized: “We must tackle several challenges if we are to succeed... and lofty pledges made at COP28 can become reality.”⁸ There would be a need to build momentum and take practical steps. Countries would need to build new nuclear power plants - both new large-scale reactors and advanced small modular reactors (SMR). However, countries would need to adopt several measures such as extending the life of existing nuclear reactors up to 80 years. This will

⁷ Suriya Jayanti, “Nuclear Power is the only Solution,” *Time*, December 4, 2023, <https://time.com/6342343/nuclear-energy-climate-change/>.

⁸ Jeffrey Donovan, “Nuclear Energy Makes History as Final COP28 Agreement Calls for Faster Deployment,” IAEA, December 13, 2023, <https://www.iaea.org/newscenter/news/nuclear-energy-makes-history-as-final-cop28-agreement-calls-for-faster-deployment>.

require huge financial commitment and need for governments to speed up approvals for new nuclear plants.

The COP28 pledge to triple nuclear energy will boost the nuclear energy market. Some countries are already working on building nuclear power plants. The UAE is building four 1400 MW NPPs, with three already operational; while Saudi Arabia is building its first NPP. Countries like the U.S., UK and France are already taking practical steps for increasing the share of nuclear energy. The UK Department for Energy Security and Net Zero (DESNZ) said that it will invest GB£300 million (US\$381 million) to launch a high-assay low-enriched uranium (HALEU) program. Also, GB£10 million will be provided for develop the skills and sites. This is aimed at boosting domestic production of HALEU and is part of plans to help deliver up to 24 GW of nuclear power by 2050, which will cater to about 25 percent of the UK's electricity needs.⁹ France has proposed a new energy bill that favours the further development of nuclear power as a carbon-free source of electricity. It also sets a target of constructing a minimum of 6 but as many as 14 new reactors to realize the transition to clean energy and meet climate change goals.¹⁰ While the U.S., already a nuclear energy production leader, is seeking to increase HALEU production, it is seeking bids from contractors to help establish a domestic supply of a uranium fuel enriched to higher levels for use in a next generation of reactors.¹¹ HALEU is a fuel currently only available in commercial levels from Russia. Given the tense relations with Russia in the wake of Ukraine crisis, this is a bid to create alternate source of uranium fuel.

There is a lot of skepticism among experts on how practical the goal to triple nuclear energy is by 2050. The envisaged nuclear renaissance is also marred by troubled relations among major powers. The return of the prominence of nuclear energy was catalyzed by the Ukraine conflict and the resulting energy crunch in Europe where Russia was a major energy supplier. The U.S. and the Western countries are trying to diversify their energy sources by pursuing nuclear energy. Russia and China are large suppliers of nuclear power plants around the world and are among leaders in nuclear energy technology innovations. Thus, nuclear energy market and innovations would also reflect the major power rivalries and competitions.

Nuclear Energy and Pakistan

⁹ "UK to launch HALEU Production Program," World Nuclear News, January 8, 2024, <https://www.world-nuclear-news.org/Articles/UK-to-launch-HALEU-production-programme>.

¹⁰ "France drops Renewables Targets, Prioritises Nuclear in New Energy Bill," *France 24*, January 9, 2024, <https://www.france24.com/en/france/20240109-france-drops-renewables-targets-prioritises-nuclear-in-new-energy-bill>.

¹¹ "US seeks to Jump-start Production of Higher-energy Uranium now made in Russia," *Reuters*, January 10, 2024, <https://www.reuters.com/world/us/us-seeks-jump-start-production-higher-energy-uranium-now-made-russia-2024-01-09/>.

Already with low carbon emissions, Pakistan also has the goal of achieving zero carbon emissions for the energy sector by 2050. It has a vision to supply one-fourth of its energy needs through nuclear power by 2050. Pakistan operates six NPP, which produced about 12.5 percent of the total energy production in the country from July 2021 to June 2022. The gross power generation capacity of NPPs stood at 3530 MW, which supplied 12,885 million of electricity to the national grid from July 2021 to March 2022.¹² Pakistan is working on a seventh power plant and aims to increase its share of power generation to 8800 MW by 2030 and to 40,000 MW by 2050. Nuclear power has the potential to contribute more to the national grid if it is invested in. However, financial constraints and reluctance of countries to engage in civil nuclear cooperation have been stumbling blocks in realization of full nuclear energy potential.

Pakistan's Nuclear Power Plants

Reactor Unit	Type	Net Capacity [MW(e)]	Status	Operator	Reactor Supplier	Construction Date	First Criticality Date	First Grid Date	Commercial Date	Shutdown Date	UCF for 2021
CHASNUPP-1	PWR	300	Operational	PAEC	CNNC	8/1/1993	5/3/2000	6/13/2000	9/15/2000		85.9
CHASNUPP-2	PWR	300	Operational	PAEC	CNNC	12/28/2005	2/22/2011	3/14/2011	5/18/2011		98.4
CHASNUPP-3	PWR	315	Operational	PAEC	CNNC	5/28/2011	8/1/2016	10/15/2016	12/6/2016		99.2
CHASNUPP-4	PWR	313	Operational	PAEC	CNNC	12/18/2011	3/15/2017	6/25/2017	9/19/2017		84.4
KANUPP-2	PWR	1014	Operational	PAEC	CZEC	8/20/2015	2/28/2021	3/18/2021	5/21/2021		98.6
KANUPP-3	PWR	1014	Operational	PAEC	CZEC	5/31/2016	2/21/2022	3/4/2022	4/18/2022		0.0
KANUPP-1	PHWR	90	Permanent Shutdown	PAEC	CGE	8/1/1966	8/1/1971	10/18/1971	12/7/1972	8/1/2021	30.7

Source: "Pakistan: Country Nuclear Power Profiles," International Atomic Energy Commission (Updated 2022), <https://cnpp.iaea.org/countryprofiles/Pakistan/Pakistan.htm>

Conclusion

Given the challenges of climate change and the disastrous consequences that the world is facing, it is imperative to move towards cleaner and greener energy generation. In 2022, Pakistan faced the consequences of climate change in the form of devastating floods with 33 million people affected, more than 1730 lives lost, and over 15 billion of dollars in damages to property and infrastructure.¹³ This is a climate induced disaster personified. If steps are not taken to reduce carbon footprint and reverse the rise in global temperatures, then there would be many more disasters like the 2022 massive floods of Pakistan in the years to come.

¹² "Energy" in Pakistan Economic Survey 2021-22, Government of Pakistan, Finance Ministry, p. 266

¹³ "Pakistan: Flood Damages and Economic Losses Over USD 30 billion and Reconstruction Needs Over USD 16 billion - New Assessment," The World Bank, October 28, 2022, <https://www.worldbank.org/en/news/press-release/2022/10/28/pakistan-flood-damages-and-economic-losses-over-usd-30-billion-and-reconstruction-needs-over-usd-16-billion-new-assessme>

Climate change has become an existential threat to the planet and humanity. The world must come together to find ways to mitigate global warming. The move towards nuclear energy is a solution to the mitigating climate change. The COP28 nuclear energy pledge is a step in the right direction. However, it will take enormous investment, innovative technologies, making appropriate regulations and immense commitment from governments for the tripling of nuclear energy pledge to come to fruition. The 'nuclear renaissance' is not just more nuclear power, it is also better, cleaner, safer, and more efficient energy. Countries must put aside their differences and work together to mitigate the climate crisis and build a safer and climate resilient world for the future generations.