

EXPLAINED| How Nuclear Energy Can Provide Solution To India's Power Demand

Nuclear power is the only type of energy that is reliable, and can act as the base load, unlike solar and wind that is not available round the clock. Here's is how India can achieve self reliance on energy front by opting for nuclear energy.

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Representative Image

Global warming and climate change are the most pertinent threats, looming large over our present as well as future generations and may push human civilization to the brink of an impending environmental apocalypse.

The industrial revolution of the 1800s and the boom in fossil fuel consumption during the 1950s were two milestones in the global temperature rise trends. In 2014 India's Green House Gasses (GHG) footprint was 3,202 million metric tonnes CO₂ equivalent, of which the energy sector contributes 68.7 per cent. India contributes to 6.55 per cent of the global GHG emission.

Need for nuclear energy solutions

The best alternative to the non-green fossil fuel-driven energy industry is nuclear power. It is the only type of energy that is reliable and can act as the baseload, unlike solar and wind that is not available round the clock. Nuclear power is also free from GHG emissions. Indirectly, over the course of a nuclear power station's life cycle, it produces the same amount of CO₂ equivalent to wind and one-third of solar stations. The economic viability of energy production is estimated through the levelized cost of electricity (LCOE). It is the total cost of electricity produced by the station after including the incurred cost of operations, building, maintenance and waste disposal investments for the lifetime of the unit. LCOE of a nuclear plant in the US was between \$97 per MWh and \$136 per MWh in 2016. This cost is almost the same to coal-fired electricity excluding its carbon emission control mechanism costs. Evidently, the nuclear power plant is cost-effective in comparison to its non-renewable, non-green, fossil fuel-intensive alternatives.

Deterrents to nuclear power

Only 10 per cent of the world's energy demand is catered by nuclear power. Only 3.2 per cent of India's national energy demand comes from nuclear power. The question arises, that if nuclear power is cheap in the long run and possesses a negligible carbon footprint, why it is not gaining popularity? The growth of nuclear energy also equips the nation with nuclear enrichment technologies that can be used for military aspirations. The other reason, is the fear of nuclear disasters with the incident of Three Mile Island (28th March 1979), Chernobyl (26 April 1986) and Fukushima Daiichi (11th March 2011) still fresh in mind. And finally, there is the problem of disposing of nuclear waste and spent reactor fuel.

What's the way forward?

Recent technologies and international treaties are solutions to all these problems. Treaties and conventions such as, 'Non-Proliferation of Nuclear Weapons, 'Convention on Nuclear Safety (CNS)', are an international safeguard against improper, unsafe use of nuclear capabilities. Natural Uranium contains only 0.7 per cent of the U- 235 isotopes required for power generation. Isotope separation technology is employed to enrich this to 3-5 per cent for its subsequent use in reactors.

A global perspective

As per the World Nuclear Association, 90 per cent of the world's Uranium enrichment capacity is restricted to the five nuclear states. Recent proposals from International Atomic Energy Agency (IAEA) and Russia along with the US-led Global Nuclear Energy Partnership (GNEP) are taking strides to establish international enrichment centres to maintain a supply of fuel in the international market. Uranium Enrichment Centre (IUEC) at Angarsk in Siberia is the first of such ventures.

World Nuclear Association's Cooperation in Reactor Design Evaluation and Licensing (CORDEL) Working Group and the OECD Nuclear Energy Agency's (NEA's) Multinational Design Evaluation Programme (MDEP) looks after the safety of the reactors. The OECD, NEA 2010 report, focused on the reduction of the release of radiation from early Generation I to today's Generation III+ reactors by a factor of 1600. This makes nuclear energy safe. The recent P&T technology to transmute the transuranic elements in a specialized nuclear reactor, reduce the volume and radioactivity hazard of the spent fuel. The technology of the 'fast neutron' system inactivates the long-lived actinide radioactive elements making the waste disposal system easy and affordable.

Nuclear energy Corporations across the globe are now adhering to safe and clean energy principles. Russia's State Atomic Energy Corporation, ROSATOM, is one of leading the nuclear power technology for over 75 years. The modern Russian designs such as the current VVER 1200 generation 3+ is among the safest in the world and chosen by many countries such as Egypt, Turkey, Bangladesh, Finland, etc. Rosatom has also implemented environmental policies to minimize production and consumption waste of hazard classes I and II. In October 2020 the cooperation joined the UN Global Compact and taking strides in the field of human rights, labour relations and the environment. In 2019, it committed about 320 million US \$ on its environmental protection plans.

In October 2018, Russia and India agreed to cooperating in building six new nuclear units. The nation has limited hydrocarbon reserves (oil, natural gas), and coal-fired thermal power is adding up to the environmental burden. Climate change impacts such as droughts, floods, extreme weather events, natural disasters, untimely forest fires are destabilizing the lives and livelihood, across the globe and in India. Thus, nuclear energy is the only alternative to save the ailing environment of the nation and to fulfil the GHG emission reduction targets as per the Paris Agreement. Clean and safe nuclear power can cater to the growing energy demand of the nation while minimizing GHG emissions, the first step towards the ultimate goal of combating climate change.

*This article has been co-authored by **Abhiroop Chowdhury & Aliya Naz**, Associate professor, Assistant Dean (Student Affairs) of the Jindal School of Environment and Sustainability, O.P. Jindal Global University and Independent Researcher respectively.*

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