



## Securing India's Nuclear Future

This editorial is based on [“Election rhetoric, nuclear weapons and Pakistan- the need to expand debate”](#) which was published in The Indian Express on 28/05/2024. The article brings into picture the shifting global nuclear dynamics. It argues that India should modernize its nuclear capabilities and energy program to address these evolving threats.

**For Prelims:** [Comprehensive Nuclear Test Ban Treaty](#), [NATO](#), [Ballistic Missiles](#), [Nuclear Suppliers Group](#), [2011 Fukushima Nuclear Disaster](#)

**For Mains:** Current Nuclear Threats that India Faces, Evolving Nuclear Landscape Globally.

The world is witnessing a resurgence of **nuclear anxieties**. The [Russia-Ukraine war](#) and China's assertiveness are prompting a rethink on nuclear deterrence strategies. In Europe, talk of strengthening [NATO's nuclear forces](#) and collaboration between France and Britain is gaining ground. Similarly, anxieties about [Iran's nuclear program](#) are pushing Arab nations towards acquiring atomic capabilities. Meanwhile, the rise of [Artificial intelligence](#) and robotic weapons raises concerns about the **automation of nuclear decision-making**.

For India, while Pakistan's nuclear arsenal remains a concern, a bigger threat is emerging from China's rapidly expanding nuclear program. India needs to prioritize modernizing its nuclear arsenal and civilian nuclear energy program to counter these challenges.

### How is the Nuclear Landscape Evolving Globally?

- **Russia-Ukraine War:** Russia's veiled threats of using nuclear weapons during the Ukraine conflict have shattered Europe's sense of security.
  - This has led to discussions within **NATO** about strengthening its nuclear forces and potential collaboration between France and Britain on their nuclear arsenals.
  - Russia has also withdrawn from ratification of the [Comprehensive Nuclear Test Ban Treaty](#).
- **China's Nuclear Expansion:** China is rapidly expanding its nuclear arsenal, with estimates suggesting a potential tenfold increase by 2035.
  - This significant build-up, coupled with [China's assertive territorial claims in Asia](#), is prompting anxieties amongst its neighbors.
  - Countries like Japan and South Korea are re-evaluating their reliance on the US "**nuclear umbrella**" and considering potential nuclear programs of their own.
- **Iran's Nuclear Program:** Iran's ongoing nuclear program, despite international efforts to curb it, continues to be a source of concern for the **Middle East**.
  - This has intensified fears of a regional nuclear arms race as Arab nations like **Saudi Arabia** reportedly are exploring options for acquiring nuclear capabilities to counterbalance Iran's potential.

- **North Korea's Nuclear Activity:** North Korea's continued development and testing of [ballistic missiles](#) and nuclear weapons remains a major security threat in East Asia.
  - This has led to increased tensions with [South Korea](#) and heightened anxieties in the region.
- **Modernization of Nuclear Arsenals:** Even established nuclear powers like the **US and Russia** are modernizing their nuclear arsenals, raising concerns about a potential arms race and lowering the threshold for nuclear use.
- **Erosion of Arms Control Treaties:** The breakdown of key arms control treaties, like the [Intermediate-Range Nuclear Forces Treaty between US and Russia \(erstwhile Soviet Union\)](#), has weakened international frameworks for managing nuclear stockpiles and fostering nuclear disarmament efforts.

## What is India's Historic Stance on Nuclear Energy and Usage of Nuclear Weapons?

- **1948:** The Atomic Energy Commission is established, with **Homi J. Bhabha** as its chairman, to spearhead India's nuclear program.
- **1956:** India's first nuclear reactor, Apsara, becomes operational, marking the beginning of its nuclear research program.
  - This was not only first in India but was also the first reactor in whole of Asia
- **1968:** India refused to sign the **Nuclear Non-Proliferation Treaty**.
- **1969:** India's first commercial nuclear power plant, **Tarapur Atomic Power Station**, under the agreement between **India, the United States**, and the International Atomic Energy Agency (IAEA)
- **1974:** India conducts its first underground nuclear test, codenamed "**Smiling Buddha**," at **Pokhran**, officially labeling it a peaceful nuclear explosion.
- **1995-1996:** India opposed the indefinite extension of the NPT and also refused to sign the [Comprehensive Test Ban Treaty \(CTBT\)](#).
- **1998:** India carries out a series of nuclear tests at Pokhran codenamed **Operation Shakti**, declaring itself a nuclear-armed state.
  - India adhered to a self-imposed commitment to 'No First Use' (NFU) of nuclear weapons on another country.
- **2003:** **India and Pakistan** agree to a ceasefire along the [Line of Control](#) in Kashmir, reducing the risk of nuclear escalation.
- **2005:** The United States and India reach a landmark civil nuclear agreement, paving the way for nuclear cooperation and fuel supplies.
- **2008:** The [Nuclear Suppliers Group \(NSG\)](#) grants India a waiver, allowing it to engage in nuclear trade despite its **non-NPT status**.
- **2016:** India gains entry into the **Missile Technology Control Regime (MTCR)**.
- **2019:** India successfully tests its anti-satellite missile capability, demonstrating its ability to shoot down low-orbit satellites.
- **2024:** India initiated the core loading of **India's Prototype Fast Breeder Reactor (PFBR)** at **Kalpakkam, Tamil Nadu** marking a significant milestone in India's nuclear program.
  - The PFBR is part of **India's three-stage plan** to harness its thorium reserves for sustainable nuclear energy.

## Why did India not Sign NPT and CTBT?

- **Nuclear Non-Proliferation Treaty (NPT):** India views the NPT as discriminatory as it categorizes states as "**nuclear weapon states**" (**NWS**) and "**non-nuclear weapon states**" (**NNWS**).
  - NWS like the **US, Russia, UK, France, and China** can retain their nuclear arsenals, while NNWS are obligated to give up pursuit of nuclear weapons.
    - India perceives this as **unfair** and hindering its right to self-defense.
  - India remains committed to the goal of universal, non-discriminatory and verifiable nuclear disarmament, **which the NPT does not explicitly call for**.
- **Comprehensive Test Ban Treaty (CTBT):** India emphasizes the importance of maintaining a credible minimum nuclear deterrent against potential threats, particularly from neighboring **Pakistan and China**.

- Signing the CTBT, which bans all nuclear explosions for military or civilian purposes, could limit **India's ability to further develop and refine its nuclear arsenal.**

## What are the Current Nuclear Threats that India Faces?

- **India's Neighbourhood Nuclear Threats:** Pakistan possesses a substantial nuclear arsenal, estimated to be around **170 warheads**. The long-standing tensions between India and Pakistan over issues such as **Kashmir** and **cross-border terrorism** raise the risk of nuclear escalation in the event of a conflict.
  - China's construction of numerous **missile silos** and the deployment of **road-mobile intercontinental ballistic missiles (ICBMs)** have raised concerns in India about the shifting nuclear balance in the region.
- **Command and Control Vulnerabilities:** The safety and security of nuclear command and control systems are critical, and any vulnerabilities or potential for unauthorized access or cyberattacks could have severe consequences.
  - Example: The 2019 **alleged cyberattack on one of India's Kudankulam Nuclear power plant**, although denied by officials, highlighted the need for robust cybersecurity measures in the nuclear realm.
- **Environmental and Health Risks:** The risks associated with nuclear accidents, radioactive contamination, and long-term environmental and health impacts pose challenges for India's expanding nuclear energy program.
  - **Example:** The **2011 Fukushima nuclear disaster in Japan** underscored the need for stringent safety protocols and emergency preparedness measures for nuclear facilities.
- **Emerging Technologies and Regional Arm Race:** The rapid development of **hypersonic missiles**, autonomous weapons systems, and **artificial intelligence (AI)** raises new challenges for nuclear deterrence strategies.
  - India's development of its own hypersonic missile capabilities, while aimed at deterrence, **could contribute to a regional arms race.**

## What Measures Should India Adopt to Strengthen its Nuclear Program?

- **Pursue Responsible Nuclear Modernization:** While maintaining a credible minimum deterrence, India should focus on **responsible nuclear modernization**.
    - This involves developing advanced delivery systems, improving the survivability and reliability of its nuclear forces, and exploring emerging technologies such as **directed energy systems**.
  - **Enhance Nuclear Risk Reduction Measures:** India should actively engage in nuclear risk reduction measures with neighboring nuclear-armed states, **particularly Pakistan and China**.
    - This can involve **confidence-building measures**, crisis communication mechanisms, and agreements to prevent inadvertent escalation or misunderstandings during crises.
  - **Invest in Advanced Nuclear Technologies:** India should continue to invest in advanced nuclear technologies, such as **thorium-based reactors, small modular reactors, and next-generation nuclear power plant designs**.
    - This can help address India's long-term energy needs while minimizing environmental and safety risks.
  - **Enhance Civilian Nuclear Cooperation:** India should seek to **expand civilian nuclear cooperation** with like-minded countries and organizations.
    - This can involve joint research and development projects, technology sharing, and collaboration in areas such as nuclear waste management, nuclear medicine, and peaceful applications of nuclear technology.
  - **Participate in Global Nuclear Governance Initiatives:** India should actively participate in global nuclear governance initiatives, such as the **Nuclear Security Summits and Global Initiative to Combat Nuclear Terrorism (GICNT)**.
    - This would demonstrate India's commitment to nuclear non-proliferation and the peaceful use of nuclear technology.
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**Drishti Mains Question:**

Discuss the evolving global nuclear dynamics in the context of recent geopolitical developments. How should India respond to the nuclear challenges especially posed by neighboring countries?

**UPSC Civil Services Examination, Previous Year Questions (PYQs)**

**Prelims**

**Q. In India, why are some nuclear reactors kept under “IAEA safeguards” while others are not? (2020)**

- (a) Some use uranium and others use thorium
- (b) Some use imported uranium and others use domestic supplies
- (c) Some are operated by foreign enterprises and others are operated by domestic enterprises
- (d) Some are State-owned and others are privately owned

**Ans: (b)**

**Mains**

**Q. With growing energy needs should India keep on expanding its nuclear energy programme? Discuss the facts and fears associated with nuclear energy. (2018)**

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