PLUTUS IAS

CURRENT AFFAIRS

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NUCLEAR ENERGY MISSION FOR VIKSHIT BHARAT

WHY IN THE NEWS?

The Union Budget 2025-26 outlines a significant push towards nuclear energy as part of India's long-term energy transition strategy. The government has set an ambitious target of 100 GW nuclear power capacity by 2047, positioning nuclear energy as a major pillar in India's energy mix. This development aligns with the broader objectives of Viksit Bharat, ensuring energy reliability and reducing dependency on fossil fuels. To achieve this goal, strategic policy interventions and infrastructure investments are being undertaken, with an emphasis on indigenous nuclear technology and public-private collaborations.

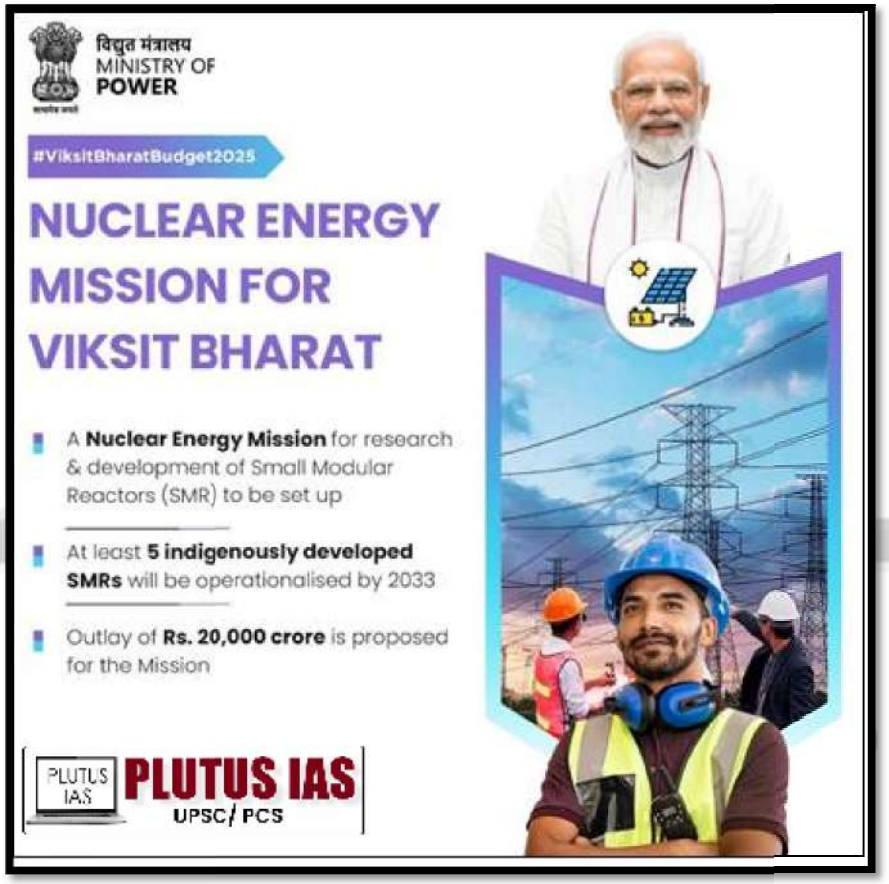
NUCLEAR ENERGY MISSION COMPONENT:

1. Research and Development of SMRs: Focus on developing Small Modular Reactors (SMRs) to offer scalable, cost-effective energy solutions. SMRs are essential for addressing land constraints, stabilizing the grid, and complementing renewable energy sources.

2. Indigenous Technology: The mission emphasizes the development of domestic technologies like Bharat Small Reactors (BSRs) and SMRs, leveraging India's expertise in Pressurized Heavy Water Reactors (PHWRs) for energy independence.

3. Private Sector Participation: Encouraging private sector involvement in land acquisition, capital, and funding for nuclear plants, with NPCIL managing reactor operations. This speeds up nuclear energy deployment.

4. Legal Amendments: Changes to the Atomic Energy Act and the Civil Liability for Nuclear Damage Act will attract private investments and promote innovation in the sector.



BHARAT SMALL REACTORS (BSRS) AND THEIR PARTNERSHIP:

Bharat Small Reactors (BSRs) are 220 MW Pressurized Heavy Water Reactors (PHWRs) designed for energy demands in industrial zones.

1. Private Sector Partnership: The private sector will provide land, cooling water, and capital, while NPCIL handles design, quality assurance, and operations. This accelerates project timelines and attracts investment.

2. Decarbonization: BSRs play a vital role in reducing emissions, supporting India's goal of generating 500 GW from non-fossil fuels by 2030.

3. Safety and Flexibility: BSRs are designed for safety and can be deployed in industrial areas, acting as captive power plants and aiding in industrial decarbonization.

SIGNIFICANCE OF THE NUCLEAR ENERGY MISSION:

1. Energy Security: Diversifies India's energy mix, reducing reliance on fossil fuels and enhancing long-term energy stability.

2. Sustainability: Supports climate goals by reducing carbon emissions, aiding in achieving India's Paris Agreement commitments.

3. Technological Leadership: Positions India as a global leader in nuclear energy through indigenous advancements like Small Modular Reactors (SMRs).

4. Economic Growth: Drives job creation, innovation, and investment in energy infrastructure, boosting related industries.

5. Remote Area Power: SMRs provide reliable energy to off-grid regions, ensuring energy access in underserved areas.

6. Public-Private Collaboration: Encourages private sector partnerships, speeding up nuclear energy deployment and innovation.

7. Energy Independence: Reduces dependence on imported energy, strengthening national security and protecting against global price fluctuations.

GOVERNMENT INITIATIVES FOR NUCLEAR ENERGY MISSION:

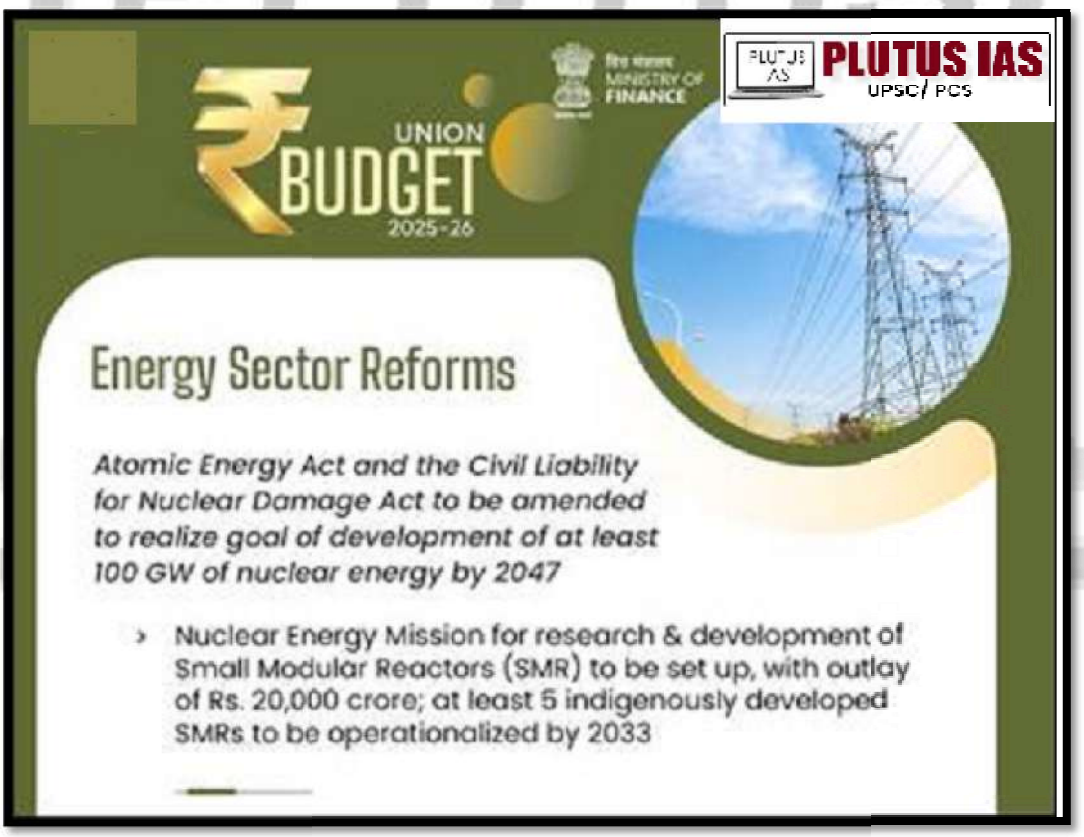
1. Nuclear Capacity Expansion: The government aims to increase nuclear power capacity from 8,180 MW to 22,480 MW by 2031-32, with the construction of ten reactors totalling 8,000 MW across multiple states (Gujarat, Rajasthan, Tamil Nadu, Haryana, Karnataka, Madhya Pradesh).

2. Approval for New Plants: In-principle approval has been granted for a 6 x 1208 MW nuclear power plant at Kovvada, Srikakulam district, Andhra Pradesh, in collaboration with the USA.

3. Rajasthan Atomic Power Project Milestone: The Unit-7 of the Rajasthan Atomic Power Project (RAPP-7) reached criticality on September 19, 2024, marking a significant milestone in building and operating indigenous reactors.

4. Commitment to Clean Energy: These initiatives align with India's strategy to provide clean, reliable energy, contributing to energy security and environmental sustainability.

5. Focus on Safety: India's nuclear power plants adhere to strict safety protocols, with radiation levels consistently below global standards, ensuring secure and sustainable operations.



WHAT ARE THE ISSUES IN NUCLEAR ENERGY DEVELOPMENT?

1. Safety Concerns: Accidents like Chornobyl and Fukushima highlight the risks of nuclear plants, making robust safety measures and public trust crucial.

2. High Initial Costs: Building nuclear plants requires substantial investment in infrastructure, research, and development, which can be a barrier, especially for developing countries.

3. Long Development Timelines: Nuclear projects take years to complete due to complex regulations and technical challenges, making it difficult to quickly meet energy demands.
4. Nuclear Waste Management: Safe, long-term storage of radioactive waste remains a challenge with environmental risks.
5. Public Opposition: Concerns about safety, waste, and environmental impact often lead to protests and project delays.
6. Geopolitical Risks: Nuclear technology can be misused for weapons, raising international security concerns.
7. Regulatory Hurdles: Complex regulations can delay projects and increase costs.
8. High Operational Costs: Skilled labour, maintenance, and plant decommissioning contribute to high operational costs.
9. Environmental Impact: While low-carbon, uranium mining, plant construction, and reactor emissions can harm ecosystems.

WAY FORWARD

1. Enhance Safety Protocols: Adopt advanced safety technologies and international best practices to build public trust and ensure safe operations.
2. Reduce Costs: Streamline regulatory processes, innovate with reactor designs like SMRs, and leverage public-private partnerships to lower investment costs.
3. Accelerate Timelines: Fast-track approvals and reduce delays through improved project management and international collaboration.
4. Improve Waste Management: Invest in advanced solutions for reprocessing, recycling, and safe long-term storage of radioactive waste.
5. Engage the Public: Raise awareness and involve local communities to address concerns and reduce opposition to nuclear projects.
6. Ensure Geopolitical Stability: Strengthen global agreements and frameworks for responsible nuclear technology use and non-proliferation.
7. Streamline Regulations: Simplify regulatory frameworks to speed up plant construction while maintaining safety and environmental standards.
8. Explore Sustainable Fuels: Invest in alternative nuclear fuels like thorium to reduce dependence on uranium and enhance long-term sustainability.
9. Minimize Environmental Impact: Focus on eco-friendly mining practices and designs with minimal environmental impact.

CONCLUSION:

The provisions for nuclear power in the Union Budget 2025-26 mark a transformative shift in India's energy landscape. By promoting nuclear energy as a sustainable, scalable, and secure power source, the government aims to bolster energy security and meet the nation's long-term economic and environmental goals. The Nuclear Energy Mission for Viksit Bharat is poised to accelerate nuclear power development, positioning India as a global leader in advanced nuclear technology by 2047.

PRELIMS QUESTIONS:

Q. Consider the following statements:
1. The Union Budget 2025-26 aims to increase India's nuclear power capacity to 100 GW by 2047.
2. Bharat Small Reactors (BSRs) are designed for urban areas to support energy demands.

3. The government has approved the construction of a 6 x 1208 MW nuclear plant in Gujarat as part of the nuclear energy mission.

How many of the statements given above are correct?

A. Only one
B. Only two
C. All three
D. None

Answer: A

MAINS QUESTIONS:

Q. What are the challenges associated with the development of nuclear energy in India, and what measures can be taken to address them? Discuss in the context of the Union Budget 2025-26.
(250 words, 15 marks)

Ritik singh