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# TODAY'S ANALYSIS

## (22 March 2025)

### TOPICS TO BE COVERED

- INDIA'S NUCLEAR SECTOR
- ECONOMIC SURVEY: (CHAPTER 6) INDIA'S INFRASTRUCTURE DEVELOPMENT & CAPITAL EXPENDITURE
- MCQs



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## INDIA'S NUCLEAR SECTOR

- **Context:** In March 2025, IAEA Director General Rafael Mariano Grossi praised India's nuclear sector for being one of the most dynamic globally.
- India is increasing its cooperation with the IAEA on nuclear technology, safety, and security.

### KEY HIGHLIGHTS

- **Global Recognition:** Grossi highlighted India's growing role in nuclear energy, especially in Asia. India is collaborating closely with the IAEA on safety, technology, and regulations.
- **Diplomatic Engagements:** External Affairs Minister S. Jaishankar met Grossi during the Raisina Dialogue 2025, discussing nuclear safety and non-proliferation, highlighting India's role in nuclear diplomacy.
- **Workforce Development:** India's efforts in training nuclear experts were praised, with the IAEA collaborating with India's Department of Atomic Energy (DAE) and the Global

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Centre for Nuclear Energy Partnership (GCNEP) to build a skilled workforce, including the launch of a new Nuclear Engineering Course.

- **Raisina Dialogue 2025:** The dialogue showcased India's growing importance in global nuclear discussions.

## BUDGETARY FOCUS

### Union Budget 2025-26: Nuclear Energy in India's Future

- **Objective:** Strengthening nuclear capabilities as part of the long-term energy strategy for a sustainable and developed India (Viksit Bharat). The government aims to increase nuclear power capacity to **100 GW** by 2047.

### Key Budget Highlights:

- **Nuclear Energy Mission:** ₹20,000 crore allocated for Small Modular Reactors (SMRs) R&D with the goal of building **five indigenous SMRs by 2033**.
- **Policy Reforms:** Amendments to the **Atomic Energy Act** and **Civil Liability for Nuclear Damage Act** to encourage private sector involvement.

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- **Private Sector Partnerships:** Collaborations on Bharat Small Reactors (BSRs) and SMRs, focusing on cost-effective energy solutions for industries like steel and aluminum.

## INDIA'S NUCLEAR CAPACITY EXPANSION

- **Objective:** Increase nuclear power from **8,180 MW** to **22,480 MW** by 2031-32.
- **New Projects:** 10 new reactors in Gujarat, Rajasthan, Tamil Nadu, Haryana, Karnataka, and Madhya Pradesh. Notable project: **Kovvada Plant (6 x 1208 MW)** in Andhra Pradesh in partnership with the USA.
- **Recent Developments:**
  - Rajasthan Atomic Power Project Unit-7 (RAPP-7) achieved criticality in September 2024.
  - **Prototype Fast Breeder Reactor (PFBR)** made significant progress, achieving milestones in March 2024.

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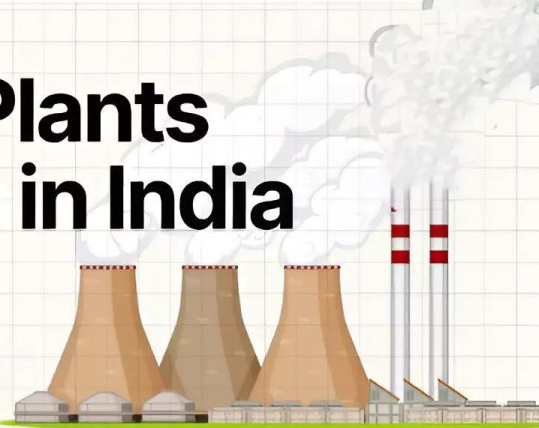
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## NUCLEAR POWER PLANTS IN INDIA

# Nuclear Power Plants under operation in India



● **RAJASTHAN ATOMIC POWER PLANT-1 (RAPS-1), (RAPS-2), (RAPS-3), (RAPS-4), (RAPS-5), (RAPS-6)**

KOTA, RAJASTHAN

● **NARORA ATOMIC POWER PLANT-1 (NAPS-1), (NAPS-2)**

NARORA, UTTAR PRADESH

● **KAKRAPAR ATOMIC POWER PLANT-1 (KAPS-1), (KAPS-2)**

TAPI, GUJARAT

● **TARAPUR ATOMIC POWER PLANT-1 (TAPS-1), (TAPS-2), (TAPS-3), (TAPS-4)**

BOISAR, MAHARASTRA

● **MADRAS ATOMIC POWER PLANT-1 (MAPS-1), (MAPS-2)**

KALPAKKAM, TAMIL NADU

● **KAIGA GENERATING STATION-1 (KGS-1), (KGS-2), (KGS-3), (KGS-4)**

KAIGA, KARNATAKA

● **KUDANKULAM NUCLEAR POWER STATION-1 (KKNPS-1), (KKNPS-2)**

KUDANKULAM, TAMIL NADU

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## STRATEGIC FOCUS AREAS

- **Energy Security:** Nuclear power as a long-term energy solution.
- **Environmental Sustainability:** Integrating nuclear energy with renewables to reduce carbon emissions.
- **Private Sector Role:** Expanding private sector participation through public-private partnerships.
- **Technological Innovation:** Developing advanced reactors like SMRs and PFBR to enhance India's position in global nuclear energy.

## REGULATORY LANDSCAPE

- **Atomic Energy Act, 1962:** Grants exclusive government authority over nuclear energy.
- **Atomic Energy Regulatory Board (AERB):** Regulates safety and compliance in nuclear facilities.
- **Civil Liability for Nuclear Damage Act, 2010:** Caps liability at ₹1,500 crore, with government backing.

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## SIGNIFICANCE OF NUCLEAR ENERGY

- **Current Contribution:** Nuclear energy accounts for **1.6%** of India's energy generation.
- **Energy Diversification:** Reduces reliance on coal (55% of India's energy mix).
- **Climate Change Mitigation:** Nuclear energy is a low-carbon source, supporting India's net-zero emissions target by 2070.
- **Reducing Import Dependence:** Helps reduce reliance on imported fossil fuels (e.g., 85% crude oil, 50% natural gas).

## KEY ISSUES IN INDIA'S NUCLEAR SECTOR

- **Limited Share in Energy Mix:** Nuclear still contributes only **1.6%** of India's total energy.
- **Investment Challenges:** High capital cost and long timelines for nuclear projects.
- **Dependence on Imported Nuclear Fuel:** Limited domestic uranium reserves lead to reliance on imports.
- **Safety Concerns:** Public opposition due to safety fears (e.g., Fukushima incident).
- **Technological Delays:** Delays in projects like the **Prototype Fast Breeder Reactor (PFBR)**.

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- **High Cost:** Nuclear energy has higher capital costs compared to renewable energy sources.
- **Waste Management:** India lacks a permanent radioactive waste disposal system.

## MEASURES TO REVAMP INDIA'S NUCLEAR SECTOR

- **Enhancing Private Sector Participation:** Amend the Atomic Energy Act, 1962 to allow private sector involvement in reactor operations.
- **Expanding Indigenous Technology:** Focus on developing technologies like **Fast Breeder Reactors** and **Small Modular Reactors (SMRs)**.
- **Streamlining Land Acquisition:** Integrate the Right to Fair Compensation and Transparency in Land Acquisition Act, 2013 for easier land acquisition.
- **Strategic Nuclear Fuel Reserves:** Secure long-term uranium supplies through agreements with countries like **Russia, Kazakhstan, and Canada**.
- **Fast-Tracking Regulatory Approvals:** Reform the Atomic Energy Regulatory Board (AERB) and establish the **National Nuclear Energy Authority (NNEA)** for quicker regulatory approvals.

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- **Sovereign Green Bonds:** Issue green bonds to attract international investment in nuclear energy projects.
- **Skill Development:** Expand training programs at **BARC** and other institutions for reactor operations, R&D, and waste management.
- **Local Manufacturing:** Integrate nuclear energy into **Make in India** and **Production Linked Incentive (PLI)** schemes.
- **Promoting SMRs:** Develop Small Modular Reactors to meet decentralized energy needs, especially in remote areas.
- **International Technology Transfer:** Pursue agreements with countries like **USA, Japan, and South Korea** for advanced reactor designs.

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# CHAPTER 6: INDIA'S INFRASTRUCTURE DEVELOPMENT & CAPITAL EXPENDITURE

## Key Developments in India's Digital Connectivity:

- **Telecommunications Growth:**

- **5G Rollout:**

- **Coverage:** Launched in all states and union territories, available in 779 out of 783 districts as of October 31, 2024.
- **Infrastructure:** Over 4.6 lakh 5G Base Transceiver Stations (BTSs) installed across the country.

- **Expanding Mobile Coverage:**

- **Approved Project:** Provide 4G services to 24,680 uncovered villages in remote areas and upgrade 6,279 villages from 2G/3G networks to 4G.
- **Progress:** By December 2024, 7,815 sites covering 10,706 villages were commissioned.

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## EFFORTS FOR CONNECTIVITY IN REMOTE AREAS

- **Bharat Net Project:**

- **Aim:** Provide broadband connectivity to all Gram Panchayats and villages.
- **Progress:** 6.92 lakh km of Optical Fibre Cable (OFC) laid, and 2.14 lakh Gram Panchayats service-ready as of December 2024.

- **Mobile Coverage in North-East and Border Areas:**

- **Coverage:** 1,358 mobile service sites covering uncovered villages and highways.
- **Arunachal Pradesh and Assam:** 671 towers covering 1,178 villages.
- **Meghalaya:** 433 towers covering 622 villages and 3 highways.

- **Telecom Development in Islands:**

- **Andaman & Nicobar Islands:** Completed submarine OFC connectivity with 205 Gbps bandwidth and increased satellite bandwidth.
- **Lakshadweep Islands:** Submarine OFC project (1,869 km) commissioned in January 2024, enabling 5G and FTTH services.

- **Mobile Services in Remote Villages:**

- **Border Villages Scheme:** 319 villages covered with 4G.

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- **LWE-Phase I & II:** Upgraded 297 towers to 4G, and 1,106 towers commissioned under Phase II, covering 1,162 locations.
- **Aspirational Districts Scheme:**
  - **Efforts:** Cover villages in underserved areas.
  - **502-Village Scheme:** 215 towers covering 251 villages across 112 districts.
  - **7,287-Village Scheme:** 2,497 sites covering 3,804 villages in 5 states.
- **Information Technology (IT) Initiatives:**
  - **GI Cloud (MeghRaj):**
    - **Aim:** Deliver ICT services through cloud computing.
    - **Support:** As of November 30, 2024, the National Informatics Centre supports 1,917 applications on its cloud.
- **Digital Bharat Nidhi (DBN):**
  - **Renamed:** Universal Service Obligation Fund renamed Digital Bharat Nidhi (DBN) in August 2024.
  - **Support:** Continues to support telecom services, mobile services, broadband connectivity, and infrastructure in rural and remote areas.

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## KEY DEVELOPMENTS IN RURAL INFRASTRUCTURE

- **Rural Drinking Water and Sanitation:**

- **Jal Jeevan Mission (JJM):**

- **Objective:** Provide reliable access to safe piped drinking water to rural households, ensuring long-term water security.

- **Progress:**

- **Launch:** August 2019 with 3.23 crore (17%) rural households having tap water connections.
- **Current:** Over 15.30 crore (79.1%) out of approximately 19.34 crore rural households by November 26, 2024.

- **Achievements:**

- **States and UTs with 100% Coverage:** Arunachal Pradesh, Goa, Haryana, Himachal Pradesh, Gujarat, Punjab, Telangana, Mizoram, Andaman & Nicobar Islands, Dadra Nagar Haveli & Daman Diu, Puducherry.

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- **Water Quality Laboratories:** 2,160 laboratories, with 1,570 accredited by the National Accreditation Board for Testing and Calibration Laboratories.

## IMPACT OF JAL JEEVAN MISSION

- **Safe Drinking Water:** Provided to 69.23 lakh households in quality-affected areas, including 23 lakh in arsenic-affected areas and 11.43 lakh in fluoride-affected areas.
- **Community Water Purification Plants (CWPPs):** 618 installed, with 573 in arsenic and fluoride-affected areas.

## SWACHH BHARAT MISSION (GRAMEEN)

- **Phase I:** Achieved open defecation-free (ODF) status in rural areas.
- **Phase II (2020-2025):** Aims to convert ODF villages into ODF Plus villages.
- **ODF Plus Progress:**
  - **Categorization:** Aspiring, Rising, and Model.
  - **Goal:** Ensure all villages become ODF Plus Model, sustaining ODF status, proper waste management, and visual cleanliness.

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- **Recent Progress:** By November 2024, 1.92 lakh villages incrementally declared ODF

Plus under the Model category, bringing the total to 3.64 lakh villages.

## KEY DEVELOPMENTS IN URBAN INFRASTRUCTURE

- **Swachh Bharat Mission-Urban (SBM-U):**

- **SBM-U 2.0:**

- **Launch:** 2021.
- **Focus:** Create garbage-free cities by integrating waste management and sanitation practices, aligning with sustainability and circular economy principles.

- **Progress:**

- **Individual Household Latrines:** 63.7 lakh units constructed.
- **Community and Public Toilets:** 6.4 lakh seats constructed.
- **Door-to-Door Solid Waste Collection:** Achieved in 93,756 wards.
- **Waste Processing:** Significant progress in processing waste generated across cities.

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## IMPACT

- **Toilet Access:** As per the 78th NSS Report, 97% of households in urban areas have access to toilets.
- **ODF Certification:**
  - **ODF:** 4,576 ULBs certified (complete access to toilets).
  - **ODF+:** 3,913 ULBs certified (clean, hygienic, and functional toilets).
  - **ODF++:** 1,429 ULBs certified (safe faecal sludge management).
  - **Water+:** 64 ULBs achieved status, ensuring proper treatment and reuse of wastewater.
- **ICT-enabled Governance:**
  - **Swachhata App:** 2.08 crore users, resolving 2.39 crore complaints out of 2.55 crore reported.
  - **Google Toilet Locator:** Mapped 67,407 toilets across 3,326 cities, enhancing accessibility.

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## URBAN HOUSING

- **Pradhan Mantri Awas Yojana – Urban (PMAY-U):**
  - **Launch:** 2015.
  - **Aim:** Provide permanent housing in urban areas.
  - **Achievements** (as of November 25, 2024):
    - **Sanctioned:** 1.18 crore houses.
    - **Grounded:** 1.14 crore houses.
    - **Completed:** 89 lakh houses.
  - **PMAY-U 2.0:**
    - **Launch:** September 2024.
    - **Aim:** Assist an additional 1 crore households.
    - **Progress:** 6 lakh houses approved in FY25.

## URBAN TRANSPORT

- **Metro and Rapid Rail Systems:**
  - **Operational or Under Construction:** In 29 cities, with 1,010 km operational in 23 cities.

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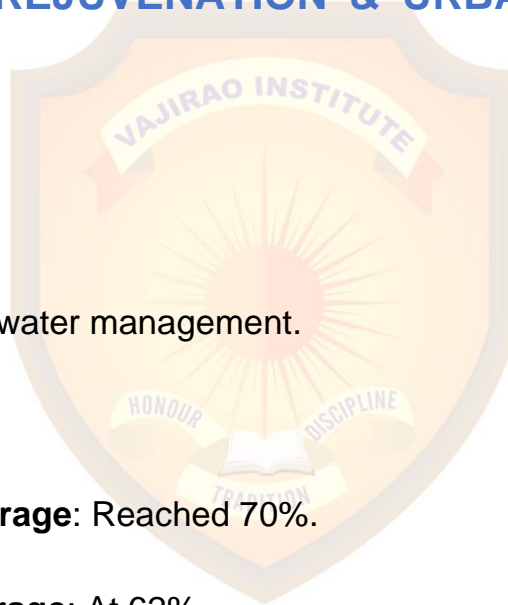
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- **Underway:** An additional 980 km of metro systems.
- **Daily Ridership:** Reached 10.2 million in FY25.
- **Benefits:** Contributed to reducing emissions, saving time, and cutting vehicle operating costs.

## ATAL MISSION FOR REJUVENATION & URBAN TRANSFORMATION

### (AMRUT)



- **Launch:** 2015.
- **Focus:** Improve urban water management.
- **Progress:**
  - **Tap Water Coverage:** Reached 70%.
  - **Sewerage Coverage:** At 62%.
  - **Water Treatment Capacity:** Created or augmented 4,649 million litres per day.
  - **Parks:** Developed 2,439 parks, adding 5,070 acres of green space.
- **AMRUT 2.0:**
  - **Launch:** 2021.
  - **Aim:** Expand coverage to all statutory towns and cities.
  - **Initiated:** 8,923 projects worth ₹1.89 lakh crore.

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## SMART CITIES MISSION

- **Launch:** 2015.
- **Aim:** Develop smart cities with essential infrastructure and a sustainable environment.
- **Progress** (as of January 13, 2025):
  - **Proposed:** 8,058 projects worth ₹1.64 lakh crore.
  - **Completed:** 7,479 projects worth ₹1.50 lakh crore.
- **Key Achievements:**
  - **Integrated Command and Control Centres (ICCCs):** Operational in 100 cities, managing urban services like crime tracking, transport, and disaster management.
  - **CCTV and Public Safety:** Over 83,000 CCTV cameras installed across 1,200+ projects.
  - **Smart Mobility:** 16 lakh solar/LED streetlights and 1,700 km of smart roads built, alongside shared bicycles and electric buses.
  - **Affordable Housing:** Over 35,000 units built in 23 cities.

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## MCQs

1. Consider the following statements wrt the nuclear sector in India and mark the correct one:

1. As of 2024, nuclear power contributes less than 2% in the total energy mix of India.

2. India aims to increase the contribution to more than 10% by 2030.

(A) Only 1

(B) Only 2

(C) Both 1 & 2

(D) Neither 1 nor 2

**Ans. (C)**

2. Which of these nuclear power plant is located north of Tropic of Cancer?

(A) Kudankulam NPP

(B) Tarapur NPP

(C) Kaiga NPP

(D) Narora NPP

**Ans. (D)**

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3. Which of these has replaced the Universal Service Obligation Fund?

- (A) Digital India Initiative
- (B) Digital Bharat Nidhi
- (C) Bharat Broadband Network Ltd.
- (D) None of the above

**Ans. (B)**

4. Which of these is/are the features of Jal Jeevan Mission?

1. It aims to provide piped water in all the rural households of the country.
2. Jal Jeevan mission has achieved saturation as of 2024.

- (A) Only 1
- (B) Only 2
- (C) Both 1 & 2
- (D) Neither 1 nor 2

**Ans. (A)**

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