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NUCLEAR POWER CORPORATION OF INDIA LIMITED (NPCIL)

DEPARTMENT OF ATOMIC ENERGY

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

TWENTIETH REPORT

(EIGHTEENTH LOK SABHA)

LOK SABHA SECRETARIAT

NEW DELHI

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COMMITTEE ON PUBLIC UNDERTAKINGS

(2025-26)

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NUCLEAR POWER CORPORATION OF INDIA LIMITED (NPCIL)

DEPARTMENT OF ATOMIC ENERGY

Presented to Lok Sabha on 11 December, 2025

Laid in Rajya Sabha on 11 December, 2025

LOK SABHA SECRETARIAT

NEW DELHI

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CONTENTS

COMPOSITION OF THE COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

Shri Baijayant Panda - Chairperson

Members

LOK SABHA

2. Shri Tariq Anwar
3. Shri Sudip Bandyopadhyay
4. Shri Chandra Prakash Joshi
5. Smt. Kanimozhi Karunanidhi
6. Shri Kaushalendra Kumar
7. Shri Shankar Lalwani
8. Smt. Poonamben Hematbhai Maadam
9. Shri B.Y. Raghavendra
10. Shri Mukesh Rajput
11. Shri Sukhjinder Singh Randhawa
12. Shri Pratap Chandra Sarangi
13. Shri Kodikunnil Suresh
14. Shri Prabhakar Reddy Vemireddy
15. Shri Lalji Verma

RAJYA SABHA

16. Dr. John Brittas
17. Shri Neeraj Dangi
18. Shri Milind Murli Deora
19. Dr. Bhagwat Karad
20. Shri Surendra Singh Nagar
21. Shri Debashish Samantaray
22. Shri Arun Singh

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2.	Smt. Mriganka Achal	-	Director
3.	Shri Tenzin Gyaltsen	-	Deputy Secretary
4.	Shri L. Shantikumar Singh	-	Executive Officer

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17. Shri Milind Murli Deora
18. Shri Narain Dass Gupta
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22. Shri Arun Singh

INTRODUCTION

I, the Chairperson, Committee on Public Undertakings (2025-26) having been authorized by the Committee to submit the Report on their behalf, present this Twentieth Report on 'Nuclear Power Corporation of India Limited (NPCIL)'.

2. The Committee on Public Undertakings (2024-25) had selected the said subject for detailed examination and report. The subject was then carried forward by the Committee on Public Undertakings (2025-26).

3. The Committee was initially briefed about the subject by the representatives of the NPCIL on 26 June, 2025 and then by the representatives of Uranium Corporation of India Limited (UCIL) on 21 July, 2025. Thereafter, the Committee took evidence of both NPCIL and UCIL on 31 July, 2025. The Committee also took oral evidence of the representatives of the Department of Atomic Energy (DAE) on 01 August, 2025.

4. The Committee (2025-26) considered and adopted the draft Report at their sitting held on 05 December, 2025.

5. The Committee wish to express their thanks to the representatives of NPCIL, UCIL and DAE for tendering evidence before the Committee and furnishing the requisite information to them in connection with examination of the subject.

6. For facility of reference and convenience, the Observations and Recommendations of the Committee have been printed in bold letters in Part-II of the Report.

New Delhi:
08 December, 2025
17 Agrahana, 1947(S)

BAIJAYANT PANDA
Chairperson,
Committee on Public Undertakings

ABBREVIATIONS

1	AEC	Atomic Energy Commission
2	AERB	Atomic Energy Regulatory Board
3	AMCR-2016	Atomic Minerals Concession Rules, 2016
4	AMD	Atomic Minerals Directorate for Exploration and Research
5	ASE	Atomstroyexport, Russian Federation
6	ASHVINI	Anushakti Vidhyut Nigam Limited
7	BARC	Bhabha Atomic Research Centre
8	BHAVINI	Bharatiya Nabhikiya Vidyut Nigam Limited
9	BSMR	Bharat Small Modular Reactor
10	BSR	Bharat Small Reactor
11	CAPEX	Capital Expenditure
12	CEA	Central Electricity Authority
13	CCS	Cabinet Committee on Security
14	CIFE	Central Institute for Fisheries Education, Mumbai
15	COG	CANDU (Canadian deuterium uranium) Owners Group
16	CPSE	Central Public Sector Enterprise
17	CPSU	Central Public Sector Undertaking
18	DAE	Department of Atomic Energy
19	DAE-BRNS	DAE – Board of Research in Nuclear Sciences
20	DGMS	Directorate General of Mines Safety
21	ENEC	Emirates Nuclear Energy Company
22	EPC	Engineering Procurement and Construction
23	ERP	Enterprise Resource Planning
24	ESL	Environmental Survey Laboratory
25	FPC	First Pour of structural Concrete
26	GHAVP	Gorakhpur Haryana Anu Vidyut Pariyojana
27	GHGs	Green House Gases
28	GoI	Government of India
29	IAEA	International Atomic Energy Agency
30	ITR	Institute of Plasma Research
31	ITAT	Income Tax Appellate Tribunal
32	ITER	International Thermonuclear Experimental Reactor
33	JNPP	Jaitapur Nuclear Power Project
34	KGS	Kaiga Generating Station
35	KAPP	Kakrapar Atomic Power Project
36	KAPS	Kakrapar Atomic Power Station

37	KKNPS	Kudankulam Nuclear Power Project
38	LWR	Light Water Reactors
39	MAPS	Madras Atomic Power Station
40	MDO	Mine Developer cum Operator
41	MMDR Act 1957	The Mines and Minerals (Development and Regulation) Act, 1957
42	MoEF&CC	Ministry of Environment, Forest & Climate Change
43	NAPS	Narora Atomic Power Station
44	NEERI	National Environmental Engineering Research Institute, Nagpur
45	NFC	Nuclear Fuel Complex, Hyderabad
46	PAPs	Project Affected Persons
47	PHWR	Pressurised Heavy Water Reactor
48	PLF	Plant Load Factor
	PWR	Pressurised Water Reactor
49	RFCTLARR Act	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013
50	RAPP	Rajasthan Atomic Power Project
51	RAPS	Rajasthan Atomic Power Station
52	R&R	rehabilitation and resettlement
53	SEBI	Securities Exchange Board of India
54	SEBI LODR	SEBI Listings Obligations and Disclosure Requirements
55	TAPS	Tarapur Atomic Power Station
56	U_3O_8	Uranium oxides
57	UCIL	Uranium Corporation of India Limited
58	WANO	World Association of Nuclear Operators

PART – I

CHAPTER-I

INTRODUCTION

Background, Mandate and Vision

Nuclear Power Corporation of India Limited (NPCIL) was incorporated in September 1987 under the Companies Act, 1956. It is a wholly owned Central Public Sector Undertaking (CPSU) under the administrative control of the Department of Atomic Energy (DAE), Government of India. NPCIL is responsible for the design, construction, commissioning, operation and maintenance of nuclear power reactors for electricity generation. Its mission is to harness nuclear energy for peaceful purposes to meet the Country's growing energy needs in a safe, reliable and environmentally sustainable manner.

1.2 As submitted by NPCIL, DAE started the design, construction and operation of nuclear power plants in the Country as a departmental activity in the early 1960s. In the year 1967, Power Projects Engineering Division (PPED), a division of the DAE, was formed and entrusted with this responsibility. PPED was converted to Nuclear Power Board (NPB) in the year 1984, with increased delegation of powers. The NPB was registered as Nuclear Power Corporation of India Limited (NPCIL) under Companies Act 1956 on 17th September 1987 and the assets of the Nuclear Power Board excluding Unit-1 of Rajasthan Atomic Power Station (RAPS-1) were transferred to NPCIL on its formation.

1.3 At the time of its establishment, NPCIL had six operating reactors (including RAPS-1) and four reactors under construction. The total assets of the company were ₹1,313 crore. NPCIL has since grown manifold and today operates 25 reactors with a capacity of 8780 MW. In addition, 17 more nuclear power reactors totaling to 13100 MW capacities are at various stages of implementation in the Country. The total assets of the company as on March 2025 were ₹1,91,607 crore with a net worth of ₹65,475 crore. It has been a profit making, dividend paying company, consistently making profits since 1995-96 and its instruments have the highest credit rating of AAA.

1.4 NPCIL's mandate is to develop nuclear power technology and produce nuclear power as a safe, reliable and economically viable source of energy. It also provides technical support for nuclear power plant projects in India and abroad. The company's vision is 'to be globally proficient in nuclear power technology, contributing towards long-term energy security of the Country'.

NPCIL's Objectives and Core Values

1.5 NPCIL's objectives are listed as under:

- *To maximise the power generation and profitability from nuclear power stations with the motto 'safety first and production next'.*
- *To increase nuclear power generation capacity in the Country, consistent with available resources in a safe, economical and rapid manner, in keeping with the growth of energy demand in the Country.*
- *To continue and strengthen QA activities relating to nuclear power programme within the organisation and those associated with it.*
- *To develop personnel at all levels through an appropriate Human Resources Development (HRD) programme in the organisation with a view to further improve their skills and performance consistent with the high technology.*
- *To continue and strengthen the environmental protection measures relating to nuclear power generation.*
- *To continue and strengthen the neighbourhood welfare programme/CSR activities for achieving inclusive growth of surrounding population.*
- *To share appropriate technological skills and expertise at national and international levels.*
- *To bring about modernisation and technological innovation in activities.*
- *To coordinate and endeavour to keep the sustained association with the other units of DAE.*

1.6 As furnished by NPCIL, the followings are listed are core values of the Company:

- ***Safety** – Safety is an overriding priority in our all activities.*
- ***Ethics** – Upholding highest ethical standards, with honour, through integrity and mutual trust.*

- ***Excellence***– *Continual improvement through learning, self-assessment and setting higher benchmarks.*
- ***Care*** *– Care and compassion for people and protection of environment.*

NPCIL's Functions and Organisational Structure

1.7 As furnished by NPCIL, its main function is to implement the atomic power projects for generation of electricity in pursuance of the schemes and programmes of the Government of India under the Atomic Energy Act 1962. It functions as per the guidelines formulated by the Atomic Energy Commission, (and not DPE guidelines). Its activities include all aspects of nuclear power reactors, encompassing Siting, Design, Construction, Commissioning, Operation & Maintenance, Renovation & Modernization, Upgrades, Quality Assurance, Life Management, Waste Management and Decommissioning.

1.8 It has also been submitted that NPCIL is also mandated with implementation of the first stage of the Country's indigenous three-stage nuclear power programme of Pressurised Heavy Water Reactors, as well as Light Water Reactors which were set up with international cooperation, in addition to the indigenous programme.

1.9 It has further been submitted that NPCIL presently has a fleet of 25 nuclear power reactors with a total installed capacity of 8780 MW. In addition, 7 nuclear power reactors totaling to 6100 MW capacity are at various stages of construction/commissioning and 10 reactors are under pre-project activities. On their progressive completion, NPCIL's operating capacity is expected to reach 21980 MW by 2031-32 (including RAPS-1).

1.10 At present, NPCIL is the only company generating electricity from nuclear energy in the Country. NPCIL also has planned project at Mahi Banswara 1 to 4 (4X700 MW) which would be built, owned and operated by Anushakti Vidhyut Nigam Limited (ASHVINI), a Joint Venture (subsidiary) Company of NPCIL and NTPC Limited, following its approval from Government on 11.09.2024. Additionally, Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) is mandated to implement Fast Breeder technology.

1.11 NPCIL is headed by a Chairman and Managing Director (CMD) and has full-time Functional Directors representing major operational and administrative domains, such as

Projects, Operations, Technical, Finance, and Human Resources. The CMD is assisted by the Board of Directors comprising Government Nominee Directors, Functional Directors, and Independent Directors.

1.12 As has been submitted, as on March 2025, the sanctioned strength of the Board was 18, with 17 Directors in position. The Corporate Office of NPCIL is located in Mumbai, with regional and project offices spread across the Country.

Share Capital and Shareholding Pattern

1.13 NPCIL is 100% owned by the Government of India under the administrative control of DAE. The authorized share capital of the company is ₹25,000 crore and the paid-up share capital as of 31 March, 2025 is ₹19,752.77 crore. The Company is not listed on any stock exchange.

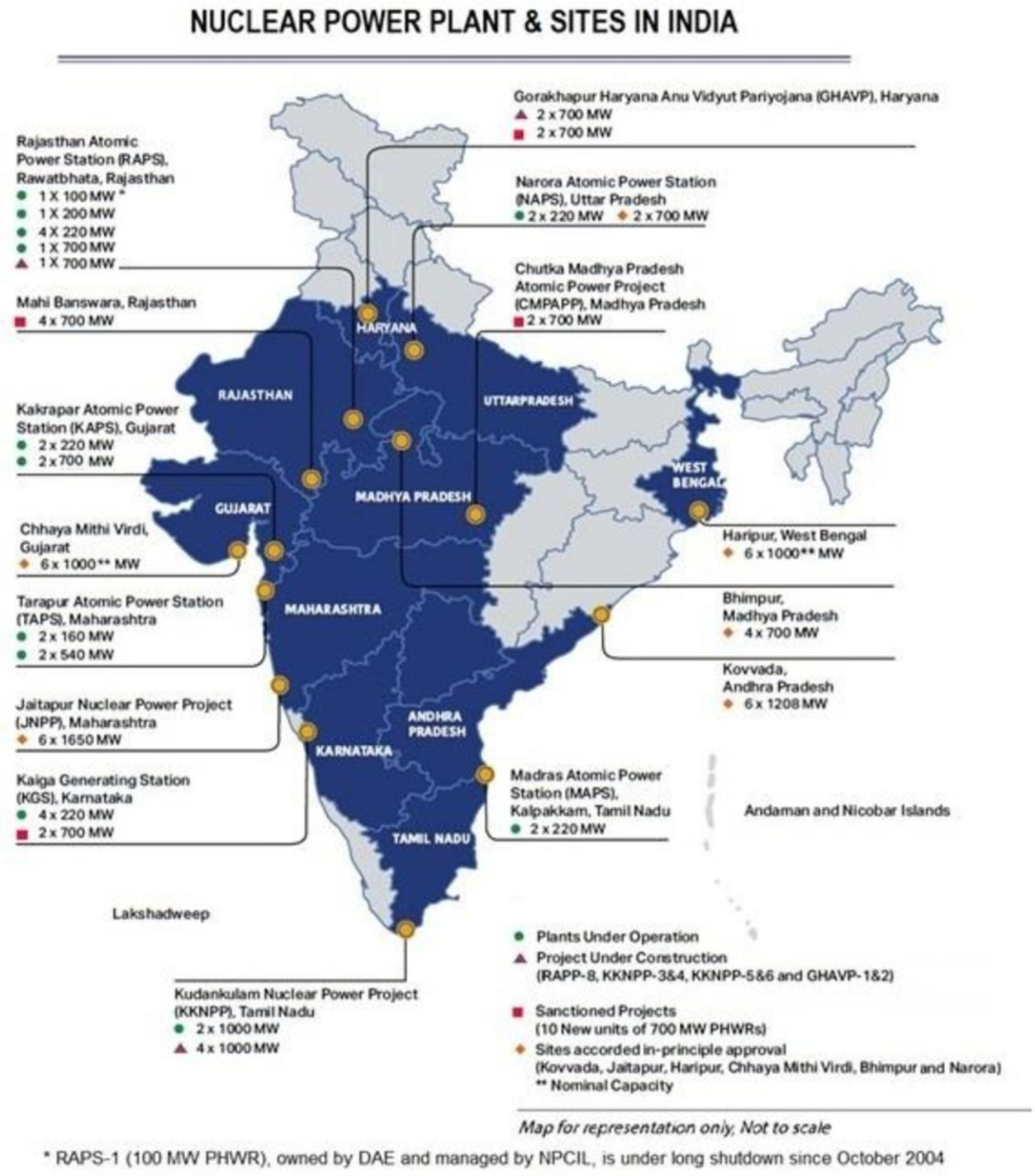
Installed Capacity, Power Generation and Locations

1.14 NPCIL currently operates 25 nuclear reactors at seven locations across India with a total installed capacity of 8780 MW. It has been stated that the average Plant Load Factor (PLF) during the year 2024-25 was 86.60%, which is comparable to global standards and NPCIL generated 56,681 million units (MUs) of electricity during 2024-25, contributing about 3% of the total electricity generation in the Country.

1.15 The operational nuclear power plants of NPCIL are located at the following sites:

- Tarapur Atomic Power Station (TAPS), Maharashtra
- Rajasthan Atomic Power Station (RAPS), Rajasthan
- Madras Atomic Power Station (MAPS), Tamil Nadu
- Narora Atomic Power Station (NAPS), Uttar Pradesh
- Kakrapar Atomic Power Station (KAPS), Gujarat
- Kaiga Generating Station (KGS), Karnataka
- Kudankulam Nuclear Power Project (KKNPP), Tamil Nadu

1.16 Details of the locations and capacity of the nuclear power plants on the map of India are shown in the picture below:



Challenges and Risks

1.17 Some of the major challenges and risks faced by NPCIL in the business of running nuclear power plants and electricity generation are enumerated below:

• Long gestation period for project execution due to regulatory and environmental clearances.
• Public perception and opposition due to nuclear apprehensions.
• Huge dependency on imported uranium
• Global volatility in nuclear fuel supply and technology sanctions.
• High capital cost of projects compared to conventional energy.
• Requirement of skilled manpower and stringent safety standards.

1.18 NPCIL has been continuously playing a pivotal role in India's nuclear power programme by maintaining high safety standards, operational efficiency, and technological self-reliance. With the commissioning of new reactors and expansion of its capacity, NPCIL is poised to contribute significantly to India's clean energy transition and energy security by 2047. In this backdrop and given the pivotal role played by NPCIL in India's nuclear power programme and the importance of nuclear power as a clean, environment friendly and reliable source of electricity for India's increasing current and future energy requirement and the unique challenges faced by the nuclear energy sector as mentioned above, the Committee selected NPCIL for comprehensive examination.

1.19 During the course of examination of the subject, the Committee came to learn that Uranium Corporation of India Limited (UCIL), another CPSU of DAE is the only PSU mandated for Uranium mining and processing in India and NPCIL's domestic uranium requirement is fulfilled by UCIL and hence the ambitious capacity expansion plan of NPCIL is dependent on UCIL's capacity to provide commensurate amount of uranium required by NPCIL in its nuclear reactors which are in different stages of completion. The Committee have also heard the views of UCIL regarding its relationship with NPCIL.

1.20 In the succeeding Chapters of the Report, the Committee have discussed the main issues pertaining to the Company and in Part-II of this Report, the Committee have given their Observations/ Recommendations.

CHAPTER II

PERFORMANCE OF THE COMPANY

Physical and Financial Performance

2.1 The operational (physical) performance of NPCIL during the last five years is summarized below:

Year	Commercial Generation (Million Units)	Plant Load Factor (%)
2020-21	43029	80.79
2021-22	47112	87.59
2022-23	45855	86.57
2023-24	47971	84.68
2024-25	56681	86.60

2.2 As per NPCIL, the key operational performance metrics are Plant Load Factor (PLF) and Availability Factor. The PLF, a measure of capacity utilisation is the ratio of the actual electricity generated to the maximum possible for a given capacity and period. Availability Factor is the ratio of the number of hours a plant is available to the total number of hours in a period. NPCIL's PLF & Availability Factor in the year 2023-24 and 2024-25 were 84.7% & 85.4% and 86.6% & 88.4% respectively.

2.3 It has also been submitted that the performance of NPCIL's fleet in terms of capacity utilization has been comparable to the global average of nuclear power plants. PLF of NPCIL fleet and global average during the last five calendar years is as follows:

Calendar	Global Average Plant Load Factor	NPCIL Plant Load Factor
2020	79.0	81.96
2021	81.7	82.16
2022	80.0	86.44
2023	81.9	87.76
2024	*82.19*	85.97

Source: PRIS, IAEA and NPCIL

2.4 Regarding the types of nuclear reactors NPCIL has developed and operated, it has been stated that NPCIL has developed the Pressurised Heavy Water Reactor

(PHWR) technology with the support of R&D institutions of the Department of Atomic Energy. The unit size of the reactors has been evolved from 220 MW to 540 MW and 700 MW, with enhanced safety features based on evolving standards and operational feedback. However, NPCIL also has operated Light Water Reactors- Boiling Water Reactors at Tarapur (TAPS 1&2 – 2X160 MW) set up on turnkey basis by USA and Kudankulam (KKNPP 1&2 – 2X1000 MW) set up in technical cooperation with Russian Federation. It has gained sufficient experience and expertise in these reactors. In respect of TAPS-1 and 2, which are the oldest reactors in the world in operation today, NPCIL has made many indigenous innovations to refurbish and operate these reactors. Thus, NPCIL has expertise across reactor technologies, though PHWR remains its core strength.

2.5 When asked why size of India's reactors are of small capacity (not more than 700 MW) and what is India's position in terms of the number of reactors and capacity, the representative of NPCIL, during the deliberation held on 26.06.2025, stated as under:

> "…Today, we have 25 reactors in operation with a total capacity of 8,880 megawatt. Initially, we started off with small size reactors up to 220 megawatt average size. It was because that was what the grid at that time was accommodating. But after 1974 because of the technology denial and this embargo regime, what we did was we focused on developing the technologies rather than trying to increase the unit size. This continued till 80s. So, we have a large number of small reactors which we have set up and we are operating, and then we increased our indigenous reactor size to 540 megawatt. Now, we are operating 700 megawatt reactors. We are almost sixth or seventh in the world in terms of number of reactors in operation, but our capacity is rather low because of the individual unit size being low…
>
> … पावर जेनरेशन लगभग 3 प्रतिशत के आस-पास है।… वर्ष 1974 में जो एक्सप्लोजन हुआ था, उसके बाद हमारे पास टोटल न्यूक्लियर टेक्नोलोजी डिनाइल रिज़ीम था। बाहर से कोई सपोर्ट नहीं था, इसलिए हमने अपने रिएक्टर्स डेवलप किए हैं। हम लोग बड़े नहीं, बल्कि छोटे रिएक्टर्स डेवलेप कर पाए हैं। इसलिए रिएक्टर्स में हमारा छठा नंबर है, लेकिन कैपिसिटी नहीं है। चूंकि हमने 220 मेगावाट को 540 मेगावाट किया, 540 मेगावाट से 700 मेगावाट किया था। हमारा 700 मेगावाट पूरी तरह से इंडीजीनस रिएक्टर है। अभी हम 700 मेगावाट का उत्पादन कर रहे हैं। अभी हमारी कैपिसिटी एडिशन तेज हो रही है। जहां तक उत्पादन की लागत है, हाल ही में हमने 1,400 मेगावाट के दो यूनिट्स कमीशन्ड किए हैं, जिनका नाम काकरापार थ्री एंड फोर है।…"

2.6 When asked about the factors that contributed to one of the reactors operated continuously for 962 days, achieving a global record, NPCIL has submitted as under:

> "Pressurised Heavy Water Reactors are fuelled online and can in theory be operated for continuously. However, they have to be shutdown for maintenance and surveillance, as mandated by the regulatory authority. The PHWRs are normally shutdown every alternate year (Biennial Shutdown). However, the regulator may permit operation for longer period. In case of KGS-1 also, although the unit was operating normally, for meeting the requirements of various inspections and maintenance activities to be carried out in line with the regulatory clearances, the unit was shutdown after 962 days. Indian nuclear power reactors have operated continuously for more than a year 53 times of which more than two years has been four times. This bears testimony to the excellence in design, construction, safety, quality and operation & maintenance practices of NPCIL."

2.7 Regarding benchmarking of NPCIL's technology and reactor performance globally, it has been submitted that NPCIL is a member of World Association of Nuclear Operators (WANO) which carries out peer reviews and publishes trends of safety and operational performance indicators. Performance of NPCIL reactors is benchmarked against all other reactors in terms of various WANO Performance Indicators. These trends are also discussed internally for further performance enhancement. It has further been submitted that NPCIL is also a member of CANDU (Canadian deuterium uranium) Owners Group [COG] and India is a member state of the International Atomic Energy Agency (IAEA)'s Convention on Nuclear Safety and these platforms are utilized to benchmark NPCIL's performance.

2.8 Regarding the current cost of production per MW and its comparison with thermal and solar, NPCIL has furnished the following information:

> "The capital cost of setting up an indigenous nuclear power plant (completion cost) is about ₹16 crore per MW. It varies widely in case of reactors to be set up with foreign cooperation, depending on extent of localisation, foreign exchange component and rate variation, interest rates on debt etc. As regards thermal power, as per the National Electricity Plan, it was ₹8.34 crore per MW at 2021-22 prices and various reports suggest it could be ₹10-12 crore per MW at present. However, in terms of electricity tariffs per unit, nuclear power tariffs are comparable to those of contemporary thermal power plants due to lower fuel cost in nuclear power. Capital cost of solar power plants also varies widely, and is reported to be about ₹4-5 crore per MW. However, as solar is an intermittent source, these figures are not strictly comparable."

2.9 Regarding the per MW capital cost and operation and maintenance (O&M) cost in new generation reactors like Kakrapar-3 and Rajasthan-7, it has been stated that the

capital cost of 700 MW PHWRs like KAPP-3 and 4 and RAPP-7 and 8 is around ₹16 crore/MW. The notified normative O&M cost is ₹27.89 lakh/MW per year in 2022-23 escalatable at 6% per annum.

2.10 When asked how NPCIL is addressing the size limitations of PHWRs and its plans for larger or modular reactors, it has been furnished that the optimum size of PHWRs is around 700 MW, while Light Water Reactors (LWR) can be set up over a large range of unit sizes upto 1730 MW. NPCIL is presently working with Bhabha Atomic Research Centre (BARC) on developing a LWR technology based Bharat Small Modular Reactor (BSMR) of about 220 MW, from which further higher capacity Indian LWR design of 900 of 1000 MW would be evolved. In the meanwhile, large LWRs of 1000, 1200 and 1730 MW are also planned to be pursued with foreign cooperation.

2.11 Moreover, regarding NPCIL's R&D and plan to increase the size of the nuclear reactors beyond 700, the representatives of NPCIL, during the deliberation on the subject, stated as under:

> "…. Come(ing) to bigger reactors. Historically, we started the Pressurized Heavy Water Reactor (PHWR). The reason behind the same was that we had a very modest uranium within our country. So, we had a three-stage programme. We will use whatever uranium is available with us. As far as the second stage is concerned, we will go for plutonium which is generated out of this uranium in the first stage, that is, the stage at which we are working. That plutonium and thorium will be used in the second stage at Kalpakkam reactor, which is under commissioning right now. So, thorium - which is available in plenty in the country - will be converted into Uranium-233. This will be a fuel for the future and we do not have to depend on any other country. That is why, we have got the PHWR technology. But in the world, people went for PWR technology because they had vast reserves of uranium and they enriched uranium. That is why, they went for PWR technology. As regards PHWR, the limit as of now is 700 and beyond this, elsewhere also, 800 or 900 is the maximum limit. But whereas in PWR, they can go up to a much bigger capacity like 1200, 1400, 1600, 1700, etc. So, that is why, their size is bigger. But now, we are working on a reactor which is called the Bharat Small Modular Reactor (BSMR). It is based on the PWR technology. So, this will not only develop one small modular reactor, but this will be a proto-type reactor for scaling up of our reactor capacity. We will gradually go to 300, 500, 1000, 1200. This is our planning. We are working on this. So, R&D generally is done by our laboratories."

2.12 Regarding DAE's role in monitoring of physical and financial performance of NPCIL, DAE, in a written submission, has furnished as under:

> "DAE approves NPCIL's MOU targets and closely monitors the MOU targets encompassing key parameters which are entered with NPCIL based on DPE guidelines. DAE regularly monitors performance of NPCIL through a system of reports. Every month NPCIL submits a comprehensive report on generation, profit, progress of key projects and major achievements. A CAPEX progress report is submitted to DAE every month. NPCIL also submits a comprehensive quarterly report on its projects. Every year, NPCIL submits its inputs for Annual report of DAE. Apart from the regular reports, Secretary DAE also carries out review of NPCIL's performance from time to time. Also, DAE being the Administrative Ministry for NPCIL, is also responsible for scrutinizing all major project proposals of NPCIL, before final approval by Atomic Energy Commission (AEC) and Cabinet Committee on Security (CCS)."

2.13 NPCIL's financial performance during the last five years has been as follows:

(₹ crore)

Particulars	2024-25	2023-24	2022-23	2021-22	2020-21
Revenue from Operations	**19880**	**18484**	**14,619**	**15,036**	**13,335**
Other Income	1296	712	1,626	1,382	683
Total Income	**21176**	**19196**	**16,245**	**16,418**	**14,018**
Total Expenses	**13200**	**10768**	**10,889**	**8,618**	**8,288**
Profit before Rate Regulatory Income/(Expenses)	**5159**	**8428**	**5,356**	**7,800**	**5,730**
Profit Before Tax (PBT)	**5522**	**10322**	**6,195**	**8,174**	**5,598**
Profit After Tax (PAT)	**4343**	**6486**	**5,202**	**6,454**	**4,374**
Dividend	**1931**	**1520**	**1817**	**1292**	**1318**
Total Assets	**191607**	**168234**	**144393**	**127795**	**114152**
Networth	**65475**	**60821**	**52243**	**48873**	**42931**

2.14 Regarding NPCIL's trends in capital expenditure (CAPEX) and profitability in the last 5 years, it has been submitted that NPCIL has achieved highest ever CAPEX of ₹17,984 Crore during the FY 2024-25. NPCIL's CAPEX performance during the last five years are tabulated below:

(₹ crore)

Year	CAPEX
2020-21	10052
2021-22	14235
2022-23	16277
2023-24	17759
2024-25	17984

2.15 Regarding the funding model used for reactors using imported uranium versus indigenous fuel, it has been submitted that nuclear power projects are funded by a mix of debt and equity, generally with a Debt to Equity ratio of 70:30. The source of fuel to be used has no bearing on the funding pattern of the projects.

2.16 When asked whether there are any financial or governance issues, including pending liabilities, that the Committee should be made aware of, NPCIL, in a written submission, has stated as under:

"a) Decommissioning Fund: As per Govt. of India notification, Decommissioning levy shall not form part of NPCIL sales income (revenue) and it shall be kept separately. In view of the above, NPCIL has adopted an accounting policy that Decommissioning of nuclear power plants / facilities is the liability of DAE, Govt. of India, and accordingly, NPCIL accounts the decommissioning fund as "Fund held for others".

The issue was raised by CAG auditors and asked to confirm that DAE, GoI holds the responsibility of decommissioning of the nuclear power plants. NPCIL has requested to DAE, for confirming the same.

b) Taxation: Income Tax Department is taking a stand that Decommissioning levy, interest on decommission fund and R&D and R&M Funds are income in the hands of NPCIL and hence tax is levied on the same. NPCIL's contention is that these funds are held by NPCIL on behalf of DAE, GoI, and hence not to be added as income in the hands of NPCIL. NPCIL has filed the appeals at various tax authorities (CIT, ITAT, High Court, etc.). The issues are pending with AYs 1997-98 to AY 2023-24.

c) NPCIL on behalf of Atomstroy Export (ASE), as constituent attorney, is filing income tax returns and appeals as per power of attorney. ASE (NPCIL) received favourable order from ITAT (from AY 2007-08 to AY 2021-22) and refund of around ₹350 Crore is due from IT department. However, refund amount is not received from IT Department due to technical reasons."

2.17 Regarding the capital outlay for the planned 17 reactors, the representatives of NPCIL, during the sitting held on 31.07.2025, stated as under:

> "… the cost of completing a 700 MW reactor is about ₹16 crore per megawatt. So, for 17 reactors in the pipeline, the total capital outlay is approximately ₹2.6 lakh crore. We are confident in meeting this requirement, as we are successfully raising funds from the market. There are no issues on that front for the 2031-32 timeline."

Landmark Achievements of NPCIL

2.18. Some of the landmark achievements as furnished by NPCIL are listed below:

- RAPP-7 (700 MW) commenced commercial operation on April 15, 2025; Unit-8 expected in FY 2025-26.
- NPCIL recorded its highest-ever electricity generation of 56,681 MUs in FY 2024-25, avoiding 49 million tonnes of CO_2 emissions.
- Achieved high performance indicators with around 87% PLF and 88% Availability Factor in FY 2024-25.
- Highest-ever CAPEX of ₹17,984 crore in FY 2024-25.
- Nine reactors recorded >90% PLF, and one achieved 100% availability.
- NPCIL reactors reached 639 reactor-years of safe operation (cumulative) as of May 31, 2025.
- Five units operated continuously for over a year; TAPS-3 (478 days) and RAPS-6 (444 days) continued beyond a year as of June 18, 2025. Continuous year-long operation achieved 52 times (including 4 instances beyond two years).
- RAPS-3 resumed after successful Renovation & Modernisation in a record 491 days, extending life by 25–30 years, within budget.
- Nuclear Island Mega EPC Package for Kaiga-5&6 (2×700 MW) awarded to MEIL for ₹12,786 crore (QCBS method).
- Renovated "Hall of Nuclear Power" galleries inaugurated at Mumbai (24.03.2025) and New Delhi (05.06.2025).

Capacity Expansion and Project Implementation

2.19 As informed by NPCIL, it is presently implementing a large nuclear power expansion programme of adding 13100 MW by 2031-32. The present installed capacity

of NPCIL is 8780 MW (Excluding RAPS-1 (100 MW) which is under long term shutdown). A total of 13100 MW capacity comprising of 17 reactors is at various stages of implementation comprising of 7 reactors at various stages of construction/commissioning and 10 at various stages of pre-project activities, which is scheduled to be completed by 2031-32. In India, nuclear power projects are implemented on a twin unit basis. The gestation period of a nuclear power project is about 63 months from First Pour of Concrete to Commercial Operation with the second unit following by a year. The details of the projects presently 'under construction' and under pre-project activities and expected timelines and milestones set are as follows:

State	Location	Project	Capacity (MW)	Physical Progress (as of June 2025)/ Status	Expected Completion
Projects Under Construction					
Rajasthan	Rawatbhata	RAPP-7[$] &8	2 X 700	98.11%	2025-26
Tamilnadu	Kudankulam	KKNPP-3&4	2 X 1000	78.57%	2026-27 / 2027-28
		KKNPP-5&6	2 X 1000	37.55%	2028-29 / 2029-30
Haryana	Gorakhpur	GHAVP-1&2	2 X 700	*Construction in progress*	2031-32
Projects Under Pre-Project Activities					
Karnataka	Kaiga	Kaiga-5&6	2 X 700	*Pre-project activities and procurement in progress*	*Progressively by 2031-32 **
Haryana	Gorakhpur	GHAVP– 3&4	2 X 700		
Madhya	Chutka	Chutka-1&2	2 X 700		
Rajasthan	Mahi Banswara	Mahi Banswara-1&2	2 X 700		
		Mahi Banswara-3&4	2 X 700		

NPCIL is yet to obtain physical possession of the land for Chutka-1&2 project.

[$]RAPS-7 is already in operation

2.20 Moreover, in addition, initial pre-project activities are in progress at Kovvada Andhra Pradesh, Jaitapur Maharashtra, Narora Uttar Pradesh, Bhimpur, Madhya

Pradesh and expansions RAPP 9 &10 at Rawatbhata, Rajasthan and KAPP 5&6 at Kakrapar, Gujarat.

2.21 It has been submitted that under Nuclear Energy Mission, India's nuclear power capacity is targeted to reach 100GW and NPCIL plans to contribute half of the capacity of 100 GW by 2047. The table below shows NPCIL's vision of capacity addition by 2047:

Technology	Particulars	Capacity (MW)	
		Individual	Total
PHWRs, LWRs, BWRs	Present Capacity (19 PHWRs, 2 LWRs, 2BWRs)		8880
Indigenous Pressurized Heavy Water Reactor- 700 MW	Capacity under implementation (14 PHWRs) - target 2031-32	9100	23100
	Possible Capacity Addition		
	• Additional PHWRs (2X700 MW each) at existing sites	4200	
	• PHWRs at Bhimpur, M.P approved in principle (4X700)	2800	
	• Fleet of PHWRs at New Site to be identified	7000	
Light Water Reactors with International Collaboration	Capacity under implementation (4 LWRs) - target 2031-32	4000	21628
	Possible Capacity Addition		
	• LWRs at Jaitapur (6X1730MW)	10380	
	• LWRs at Kovvada (6X1208 MW)	7248	
Total NPCIL Capacity expected by 2047			~54000

2.22 Explaining what is the "fleet mode" approach and how it is being implemented, NPCIL has stated that fleet mode is bulk sanction of a number of nuclear power projects of the same design, to be implemented simultaneously or with staggered schedule. Fleet mode offers continuity of business for manufacturing and construction industries, while at the same time bringing about substantial economies of scale and maximise cost and time efficiencies. The Government had sanctioned 10 indigenous 700 MW PHWRs to be implemented in fleet mode. For the fleet mode reactors, bulk orders have been placed for long manufacturing cycle equipment with staggered delivery schedules. Bulk Orders for EPC packages like Turbine Island packages for more than one project have also placed with staggered schedules.

2.23 On being asked how s NPCIL defines "pre-project stage" and "under construction" in its project classification, NPCIL has submitted as under:

> “Normally a reactor of project is termed “under construction” after placement of the First Pour of structural Concrete (FPC).
>
> All activities to be carried out prior to FPC are broadly termed pre-project activities. The major pre-project activities include: Land Acquisition and associated R&R (in case of green field sites), obtaining statutory environmental clearance from MoEF&CC and siting consent from AERB, detailed site investigations to obtain design inputs, preparation of DPR and obtaining financial sanction for the project from Government. Following the accord of financial sanction, excavation, consolidation grouting, levelling course and preparation for FPC area also included in pre-project activities.”

2.24 Regarding the biggest challenges in executing nuclear projects in India, it has been stated that the biggest challenges to executing nuclear power projects relate to land acquisition and related rehabilitation and resettlement (R&R), obtaining statutory clearances, limited number of suppliers & EPC contractors for the supply chain, financial issues and problems of contractors, public acceptance in the initial stages and large aspirations of the local people seeking jobs.

Joint Ventures and Collaborations

2.25 NPCIL (Nuclear Power Corporation of India Limited) had formed joint ventures with other public sector companies to expand nuclear power generation in India. These JVs include Anushakti Vidhyut Nigam Limited (with NTPC), NPCIL-Indian Oil Nuclear Energy Corporation Limited, and NPCIL-NALCO Power Company Limited. The purpose of these JVs was to facilitate the construction of new nuclear power plants. However, the JV with NALCO was subsequently closed with approval of both the partners.

2.26 The Government on September 11, 2024 accorded approval to the Anushakti Vidhyut Nigam Limited (ASHVINI), a Joint Venture (JV) of NPCIL (51%) and NTPC Limited (49%), to take up nuclear power generation and associated activities in accordance with Atomic Energy Act, 1962. The Government further approved implementation of the Mahi Banswara project of 4X700 MW PHWR by ASHVINI.

2.27 It has also been informed that in respect of the NPCIL -IOCL JV, discussions are in progress to converge on a project that can be taken up for approval of the Government.

2.28 When asked about the strategic objectives of these joint ventures how they complement NPCIL's operations, NPCIL has stated that initially, considering the large equity requirements involved in implementing the planned nuclear power expansion programme, the concept of leveraging the strength of PSUs, to form Joint Ventures (JV) with NPCIL was evolved. Now the JVs have assumed a great significance in view of the enormous target of reaching 100 GW by 2047, which requires several companies to set up and operate nuclear power plants.

2.29 Regarding international collaborations for technology sharing, R&D, or project implementation, it has been submitted that presently, KKNPP 3 to 6 projects are being set up in technical cooperation with the Russian Federation. It has further been submitted that discussions are underway to set up nuclear power projects in technical cooperation with France and the USA. In addition, NPCIL has cooperation with international organisations like WANO, IAEA, COG, etc.

2.30 Moreover, an MoU (general framework for the possible collaboration) on nuclear cooperation between NPCIL and Emirates Nuclear Energy Company (ENEC), UAE in the field of Operation & Maintenance of NPPs, HRD training, R&D, providing nuclear consulting services etc., has been signed recently, in respect of potential cooperation in various fields related to Nuclear Energy.

Make in India and Atmanirbhar Bharat Initiatives

2.31 Regarding NPCIL's contribute to India's Make in India initiative and Atmanirbhar Bharat, it has been stated that all indigenous PHWRs are fully made in India with all components and equipment sourced from domestic manufacturers and works executed by Indian contractors and is thus fully Atmanirbhar. In respect of reactors being set up with foreign cooperation also, the construction and all works (equipment erection, piping, cabling, instrumentation etc.), commissioning and operation are in Indian scope and a significant component of supplies (~30 to 35%) are also being sourced from domestic

vendors. There has been a progressive increase in indigenous content. **[NPCIL Reply II (x)]**

NPCIL's Nuclear Capacity by 2047 (100 GW)

2.32 Regarding the role of NPCIL in meeting the national target of 100 GW nuclear capacity by 2047, in a written submission, NPCIL has furnished the following:

> "NPCIL will have a major role in meeting the national target of 100 GW by contributing to about half the capacity. NPCIL's present capacity of 8780 MW (excluding RAPS-1) is expected to reach about 21880 MW by progressive completion of projects being implemented by it (including its subsidiary ASHVINI). In the period from 2032 to 2047, NPCIL plans to add another 7000 MW of indigenous PHWRs at its existing and in principle approved sites, about 17650 MW Light Water Reactors with foreign cooperation at Jaitapur and Kovvada sites, taking its capacity to about 46.5 GW by utilising the potential of its available sites by 2047.
>
> NPCIL is also looking for a new site where it can set up another 7000 MW capacity fleet of indigenous PHWRs, taking its capacity to about 53.5 GW by 2047."

Strategic Advantages of Nuclear Power

2.33 Regarding the strategic advantages of nuclear over thermal, hydro, or solar power, it has been informed that unlike solar, wind, or hydro power, which depend on weather conditions, nuclear energy offers a reliable, clean, and continuous 24×7 base-load power source. It is a high-energy-density, environment-friendly option that supports long-term energy security and sustainability. As nuclear power generation produces no greenhouse gases, unlike thermal plants, it plays a vital role in deep de-carbonization and supports India's clean energy transition toward achieving Net Zero by 2070.

Role of UCIL in Uranium Procurement (Domestic and Imported)

2.34 When asked how dependent NPCIL is on imported uranium or whether NPCIL foresees increasing dependency on imported uranium and how uranium is imported into the Country and also to give a cost-benefit analysis of importing uranium vis-à-vis the locally sourced uranium, NPCIL, in a written submission, has furnished as under:

> "Currently, uranium requirement for 2.4 GW out of the 8.78 GW in operation is met from domestic sources and rest is imported. To meet the larger expansion nuclear

power programme of the Country, India would need to augment uranium supplies and also have commensurate processing and fabrication capabilities.

As regards cost of fuel, fuel is owned by the Government and is given to NPCIL at a notified rate for use and is taken back by the Government after use. The fuel rate notified by the Government presently is the same for a type of fuel irrespective from where it is sourced by the government."

2.35 On being asked what role UCIL plays in fulfilling NPCIL's uranium requirement, NPCIL, in a written submission, has stated that uranium for eight reactors with a total capacity of 2.4 GW is sourced from domestic mines. UCIL mines the uranium ore and processes the same into 'yellow cake' which is supplied to Nuclear Fuel Complex (NFC) for fabrication of fuel bundles, which are used in the reactors to generate energy.

Safety, Regulation & Environment

2.36 NPCIL, in a written submission, has stated that highest priority is accorded to safety in all aspects of nuclear power viz. siting, design, construction, commissioning, and operation. Nuclear power plants are designed adopting safety principles of redundancy, diversity and provided fail-safe design features following a defence-in-depth approach, in line with codes and guides of Atomic Energy Regulatory Board (AERB). The operations are performed adopting well laid out procedures by highly qualified, trained and licensed personnel. Appropriate Personal Protection Equipment and monitoring aids are provided to all the personnel working in the nuclear power plants. The safety of nuclear power plants is continuously monitored and reviewed by the AERB.

2.37 Regarding the mechanisms which are in place for monitoring safety and operational reliability at each nuclear plant, it has been submitted that safety is accorded highest priority in operation of nuclear power plants. The nuclear power plants are operated by highly trained and licensed personnel strictly in line with approved procedures and set technical specifications. AERB also independently monitors the safety and performance of nuclear power plants. Moreover, there is a robust, multitier safety review mechanism in place, both internal (within NPCIL) and independent (AERB). Within NPCIL, multi-tier safety review system comprising safety review at the Plant, and

at headquarters is in place. In the regulatory authority also multitier review by the safety committees is in place to review the entire gamut of operations.

2.38 Commenting on radiation safety aspect of all NPCIL nuclear power plants, the representative of NPCIL, during a deliberation on 26.06.2025, stated the following:

> "… Safety is our first objective. We have our motto of 'safety-first production later'. We do not produce if we feel it is not done safely. We have had an impeccable safety record. We have been operating for over 55 years as the first reactors were commissioned in 1969. We have not had any incident where radioactivity was released in the public domain beyond whatever is the permissible limit. This diagram shows that the green one is the natural background which exists. For example, we are sitting in this room. We are constantly bombarded by radiation from the walls, from these fire extinguisher sensors and so on and our own bodies are radioactive. This is how the fossil age is determined by how much carbon-14 we have.
>
> So, natural background average is about 2,400 micro sieverts per year. Micro sieverts per year is the unit which is used for measuring it. There are some places like the beach sands of Kerala where this figure of natural background is very high. In fact, Delhi has got a higher natural background radiation than Mumbai. So, it varies, but the global average is 2,400, and this background is not static. If you have a solar flare, then it goes up slightly and so on. Over and above 2,400 micro sieverts per year, 1,000 micro sieverts per year is permitted by the regulator. As against that, these are the values at various sites of ours. They are almost negligible."

2.39 On being asked how NPCIL ensures radiation safety and environmental compliance, particularly during plant operation and waste disposal and how frequently screening of radioactivity in and around nuclear plant sites is done, NPCIL, in a written submission, has stated as under:

> "NPCIL complies with all stipulations of AERB regarding environmental releases and those of MoEF&CC and the respective state Pollution Control Boards. All releases are strictly monitored.
>
> In the nuclear power plants, there are area radiation monitors located at different locations inside the plant buildings and environment radiation survey monitors in areas outside the buildings within the plant boundary to measure radiation levels.
> In respect of measuring radiation levels outside the plant boundary, an Environmental Survey Laboratory (ESL), which is independent of the site management, monitors various environmental matrices like, air, water, vegetation, crops, seafood, etc. for radioactivity around the site upto about 30 km.

The radioactive releases are monitored by the utilities and the regulatory authority, Atomic Energy Regulatory Board (AERB), to ensure that they are well within the stipulated limits.

India has had an impeccable safety record and there has been no accident or any incidence of release of radioactivity beyond limits stipulated by the AERB in over 55 years of nuclear power operation in the Country. The radiation dose limit stipulated by the AERB is 1000 micro sieverts per year. As against this limit, the actual figures (in micro sieverts) during the five years (2018-2022) areas follows:

Year	Tarapur Site	Rawatbhata Site	Kalpakkam Site	Narora Site	Kakrapar Site	Kaiga Site	Kudankulam Site
2018	3.160	38.300	17.510	0.300	0.190	0.890	0.005
2019	6.520	27.720	16.390	0.477	0.249	0.570	0.004
2020	1.565	14.550	17.992	0.429	0.480	0.640	0.010
2021	0.235	24.140	09.377	0.506	0.210	0.970	0.003
2022	0.268	25.350	15.961	0.574	0.250	0.680	0.002

2.40 Regarding the steps taken to ensure regulatory compliance with AERB and other agencies, NPCIL has submitted that regulatory compliance is envisaged since very inception of site planning, selection, construction, commissioning and operation. To ensure regulatory compliance continuous and periodic audits provisions made for operating as well as under construction units. There are also AERB observer stations stationed at some of the sites.

2.41 On being asked about the steps NPCIL has taken for nuclear waste disposal and what are the current practices for spent fuel management and long-term disposal plans, the following has been furnished in a written submission:

> "India follows a closed fuel cycle policy wherein spent fuel is not considered a waste but a valuable resource which is reprocessed to get fuel for the next stage. The wastes generated at the nuclear power stations during their operation are of low and intermediate radioactivity level. These wastes are appropriately treated, concentrated and subjected to volume reduction. The concentrates are immobilized in inert materials like cement, bitumen, polymers etc. and stored in specially constructed structures (near surface disposal facilities) located at the site under monitoring. The treated liquids and gases are diluted and discharged under continuous monitoring, ensuring that the discharges are well within the stipulated limits set by Atomic Energy Regulatory Board (AERB). The radioactivity level of the stored wastes reduces with time and by the end of the plant life, falls to very low levels. The releases are also monitored by the AERB."

2.42 Addressing the concerns of fishermen about hot water discharges from nuclear power plants impacting fish catch and the study conducted on this issue, NPCIL has submitted as under:

> "The cooling water drawn for condensing steam and discharged from a nuclear power plant is similar to that of any conventional thermal power station. The cooling water system is so designed that the temperature rise at the discharge point over the ambient temperature of the water body (Sea, lake etc.) is well within the limit set by the Ministry of Environment & Forests and Climate Change (MoEF&CC) and does not affect the marine life. The temperatures are also monitored. In this connection, thermo-ecological studies have been carried out. Thermo ecological studies around MAPS, Kalpakkam, Kaiga and Kudankulam by a Department of Atomic Energy – Board of Research in Nuclear Sciences (DAE-BRNS) study conducted through reputed national institutes viz. National Environmental Engineering Research Institute(NEERI), Nagpur and Central Institute for Fisheries Education (CIFE), Mumbai and Principal Investigators from University of Madras, University of Pondicherry, University of Mangalore, M. S. University at Alwarkurichi, Mangalore University and J. M. College, Trichy, have also indicated that there is no adverse effect of the nuclear power plants on the marine ecology due to discharge of condenser cooling water. Further, nuclear power plants do not release conventional pollutants and the radioactive releases are a very small fraction of limits prescribed by the Atomic Energy Regulatory Board (AERB)."

2.43 When asked about the side effects of radiation on the health of people and the impact of radiation on agriculture near the nuclear power plants, it has been submitted that the design of all Nuclear Power Plants is such that the radiation dose to members of the public is well within the limit stipulated by AERB. The monitoring of environmental matrices like, air, water, vegetation, crops, seafood, etc around the site is carried out by an independent Environmental Survey Laboratory (ESL) for radioactivity. The data collected has established that there is a negligible change in radioactivity and radiation levels in the environment / environmental matrices in over five decades of operation of the nuclear power plants in the Country. Thus, there are no adverse effects from nuclear power plants. As stated above, agriculture and crops are also monitored for radioactivity and there is no adverse impact on agriculture. Crops and fruit trees (horticulture) abound in the areas around nuclear power stations.

2.44 Regarding the emergency preparedness and disaster response measures incorporated at nuclear plant sites, NPCIL, in a written submission, has informed that Detailed Emergency Preparedness Plans for Plant, Site and Offsite emergencies in line with the regulatory codes and guides are prepared and submitted to AERB before the start of operations of the nuclear power plant. The plans have details of the various actions to be taken, responsible authorities and the procedures to be followed. The acceptance and successful demonstration of Emergency Preparedness Plan is a mandatory pre-requisite before issuing regulatory consent for first approach to criticality. Emergency exercises are carried out periodically at all nuclear power stations to validate and make improvements based on feedback.

2.45 When asked whether the Company has been penalized for any kind of violation of environmental rules, NPCIL has replied no such penalties imposed on the till date and added that India has had an impeccable safety record and there has been no accident or any incidence of release of radioactivity beyond limits stipulated by the AERB in over 55 years of nuclear power operation in the Country.

2.46 It has also been informed NPCIL has a comprehensive Corporate Environmental Policy and it has been implemented in line with ISO-14001 standards at all its operating stations. The system is effectively implemented at all operating stations of NPCIL and is certified by the accredited agencies.

2.47 Regarding the steps taken by the Company to reduce its environmental footprint and to achieve net zero targets, it has been informed that nuclear power plants are inherently clean and environment friendly, as they do not emit Green House Gases (GHGs) and have an important role in the Country's energy transition to net zero by 2070. It has also been informed that NPCIL continuously tries to reduce its minimal environmental footprint by adopting energy and resource conservation measures.

2.48 Commenting on the role of nuclear power plants in reducing CO2 emissions, the representative of NPCIL, during a deliberation on 26.06.2025, stated the following:

> "…Since nuclear energy, per se, is clean, the life cycle carbon emissions are comparable to that of hydro, wind, and other renewables. So, the avoidance of CO2 emissions, ever since the inception of nuclear power in India, we have

generated around 933 billion units. We have avoided around 800 million tons of CO2 emissions, and annually also, we are avoiding close to 45 to 50 million tonnes of carbon emissions. That is one of the reasons why a large nuclear capacity is needed going forward to achieve net zero." [VP 26.06.2025 p6]

2.49 As informed by NPCIL, its key strategic goals in the next 5-10 years in the light of India's net-zero commitments are the following:

a) Expeditiously complete the projects under implementation and increase its nuclear power capacity to 21880 MW.
b) Set up and operate the BSRs that may be deployed in various industries and contribute to de-carbonise hard to abate industries.
c) Initiate work on new projects at available sites.
d) Explore new suitable sites for setting up additional reactors
e) Enter into JVs/ partnerships and explore new vistas

2.50 As informed by the Company, nuclear power is a clean, environment friendly, 24X7 base load source of electricity generation and to enhance the electricity generation from nuclear power plants, ensuring rapid expansion of nuclear power capacity and contribution towards achievement of net zero objective, several new initiatives have been taken, which include the following:

- In line with the announcement in the union budget 2024-25, regarding setting up of Bharat Small Reactors in collaboration with private capital investment, invitation for 'Request For Proposal' (RFP) from Indian industries for setting up 220 MW Bharat Small Reactors (BSR) for captive use was published. A significant number of private parties have shown interest. Responses to pre-proposal clarifications sought by various interested parties have been provided. NPCIL is also working with BARC towards early development and deployment of Bharat Small Modular Reactors (BSMR).
- Purchase order for 'Hiring of System Implementer (SI) for implementation and maintenance of Enterprise Resource Planning (ERP) project' in NPCIL has been issued.

Research & Development (R&D)

2.51 On being asked how much of NPCIL's turnover or profit is allocated to R&D, NPCIL, in a written submission, has informed the Committee as under:

> "The R&D in respect of nuclear power is mainly carried out by the R&D institutions of the Department of Atomic Energy. NPCIL R&D is focused on improvement in safety & performance and indigenization. These include setting up R&D facilities and experimentation, qualification of remote tools for inspection & maintenance of reactor components, indigenization of critical components & equipment, design and development of safety and safety related electronic hardware, computer-based control & instrumentation systems etc. The detail of expenditure incurred on R&D by NPCIL was as follows:

Year	2022-23	2023-24	2024-25
Expenditure (in Rs Crore)	34.07	26.76	16.65

2.52 When asked about the role NPCIL plays in the development of Bharat Small Modular Reactor (BSMR and the progress made on "Bharat Small Reactor" projects and interest shown from private sectors, NPCIL, in a written submission, has stated the following:

> "As regards implementation of 220 MW Bharat Small Reactors (BSRs) for captive use, a 'Request For Proposal' (RFP) from Indian private industries was published on December 31, 2024. A significant number of private parties have shown interest. Responses to pre-proposal clarifications sought by various interested parties have been provided. On the request of the industries, the last date for submission of RFPs has been extended to September 2025.
>
> NPCIL is also working with BARC towards early development and deployment of Bharat Small Modular Reactors (BSMR)."

2.53 When asked whether NPCIL is undergoing any R&D developing alternate fuel-based reactors such as thorium-based reactors, it has been submitted that NPCIL is not involved in development of thorium based fuel and thorium based reactors and it is being developed by other DAE institutions like BARC and IGCAR.

2.54 When asked whether NPCIL is involved in international R&D programs like the International Thermonuclear Experimental Reactor (ITER project, it has been informed

that it is not directly involved in the ITER project, however, DAE and one of its agencies Institute of Plasm Research (IPR) are involved in the ITER project.

Policy & Strategic Issues

2.55 When asked about what policy or regulatory bottlenecks NPCIL is facing in executing projects or expanding capacity, in a written submission, NPCIL has submitted the following:

> "A regulatory bottleneck faced in executing projects on time is multistage reviews and clearances by regulator, even in case of projects based on repeat designs. It has been suggested that while in respect of first-of-a-kind reactors, existing regulatory process needs to be followed, in respect of repeat designs, regulator may issue a consolidated clearance. Similarly in respect of Environmental Clearance also, a single window clearance by one authority would help reduce time taken in obtaining statutory clearances."

2.56 On being asked what support is required from the Department of Atomic Energy or the Government for smoother implementation, NPCIL has, in a written submission, stated that the support required from DAE and Government is higher delegation of powers to NPCIL Board in all matters, equivalent to those of Maharatna companies. Also, another policy change required is in obtaining project financial sanction, wherein NPCIL Board is empowered to accord financial sanction of projects funded by NPCIL equity. In case of projects funded by Government equity, the present system of sanction by CCS can be continued.

2.57 On being asked whether there are any recommendations NPCIL would like to place before the Committee for policy improvements or institutional support, NPCIL, in a written submission, has stated the following:

> "NPCIL would like to request the Committee to enable the following policy improvements:
> a) Restoration of Mega Project Concessions / GST Waivers for nuclear power: All projects presently under implementation were sanctioned with mega-project concessions (mainly Excise Duty and Customs Duty) which have been rendered ineffective since the implementation of the GST regime, leading to cost increases. As electricity is not under GST, and input credit cannot be claimed, the mega-project concessions may be restored or GST waivers accorded for nuclear power projects

b) Level Playing Field with Renewables: Although nuclear is a clean power technology with life cycle carbons emissions comparable or lower than renewable technologies, it does not have any of the financial incentives that are available for renewables. Thus nuclear may be provided a level playing field with Renewables in terms of various incentives, like Nuclear Purchase Obligation, green finance etc.

c) Inclusion in national green taxonomy, removal of nuclear power projects from 'Red' category listing by Central Pollution Control Board (CPCB) of MoEF&CC.

d) Evolution of institutional mechanism to resolve issues with States

e) Providing more Nuclear Liability Insurance Providers

f) Making provisions (reservations) for addressing aspirations of local people and PAPs in jobs.

g) Facilitating framework for enhanced employment of women in Nuclear Power Plants."

2.58 When asked how NPCIL acquires and manages land for nuclear plant projects, it has been informed that NPCIL acquires land for its projects through the respective state governments. The acquisition is generally done in line with the RFCTLARR Act and other provisions of the state government prevalent from time to time. The land acquired is used for setting up the plant buildings and facilities and rest of the land in the exclusion zone, a green belt is generally established. The land is fenced and managed in line with the various statutory clearances obtained (like environmental clearance from MoEF&CC, forest clearance in respect of designated forest land etc.) for the project.

2.59 On being asked what support NPCIL requires from State Governments for land acquisition and site development, it has been submitted that support of the State governments is vital for the entire cycle of the nuclear power plant, not just for land acquisition. The support of the State governments is needed for the following:

a) Identification and evaluation of potential sites.
b) Providing assurance of water for the plant
c) Land Acquisition
d) Formation and implementation of R&R package
e) Providing various clearances

f) Addressing local issues and ensuring a conducive environment during all stages of the plant – siting, construction and operation

g) Evolving the offsite emergency plans & conducting emergency exercises

CHAPTER III
UCIL's ROLE IN NPCIL's OPERATIONS

Profile of UCIL

3.1 Uranium Corporation of India Limited (UCIL), a wholly Government-owned Public Sector Undertaking under DAE, was established in 1967 with the mandate to mine and process uranium ore to produce uranium concentrate for the Country's nuclear fuel requirement. The Company had launched its operation with one underground uranium mine and process plant at Jaduguda in Jharkhand and over the years, massive expansion programmes has been undertaken in line with the requirement of uranium. UCIL now operates six underground mines (Bagjata, Jaduguda, Bhatin, Narwapahar, Turamdih and Mohuldih) and one open pit mine (Banduhurang) in the State of Jharkhand. Ore produced from these mines are processed in two process plants located at Jaduguda and Turamdih in the same state. UCIL is also operating one underground mine and process plant at Tummalapalle in Andhra Pradesh. The uranium concentrate produced from these plants are sent to Nuclear Fuel Complex (NFC), Hyderabad for further purification and fabrication of nuclear fuel rods. UCIL is responsible for supplying uranium to India's indigenous Pressurised Heavy Water Reactors being run by NPCIL.

3.2 As furnished by UCIL, in line with DAE"s requirement of uranium to fuel nuclear power plants, UCIL has outlined a plan for massive expansion which includes maintaining sustained supply from existing facilities through debottlenecking of certain deficiencies, modernization and capacity expansion of some existing units and construction of new production facilities (mines and plants).

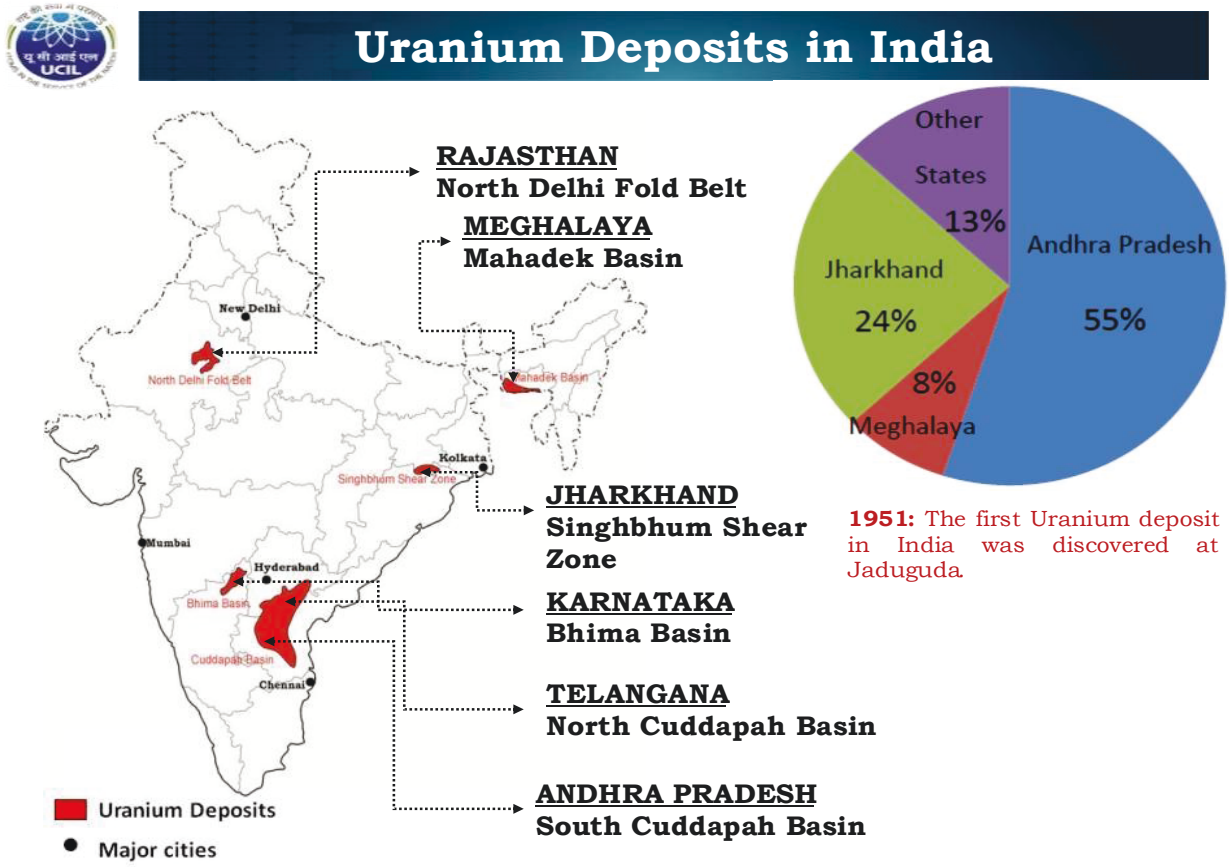
3.3 It has also been submitted that UCIL's major production centres are being planned in Jharkhand and Andhra Pradesh. For Rajasthan and Chhattisgarh, the reserve of resources has been identified by exploring different geological basins by Atomic Minerals Directorate for Exploration and Research (AMD). Continuous exploration and confirmation by AMD and other state governments are in progress.

3.4 It has further been submitted that the uranium production of India has maintained a steady trend. Uranium production from UCIL has its exclusive use in indigenous nuclear programme of the Country. Its role in first stage (PHWR reactors) of strategic

nuclear power programme has a vital link for long-term energy security of the Country. India's future nuclear programme growth route, to a large extent shall depend on the sustained supply of fuel and further progress. Introducing innovative practices and cutting-edge technology in all spheres of activities shall be the vital part of uranium sector.

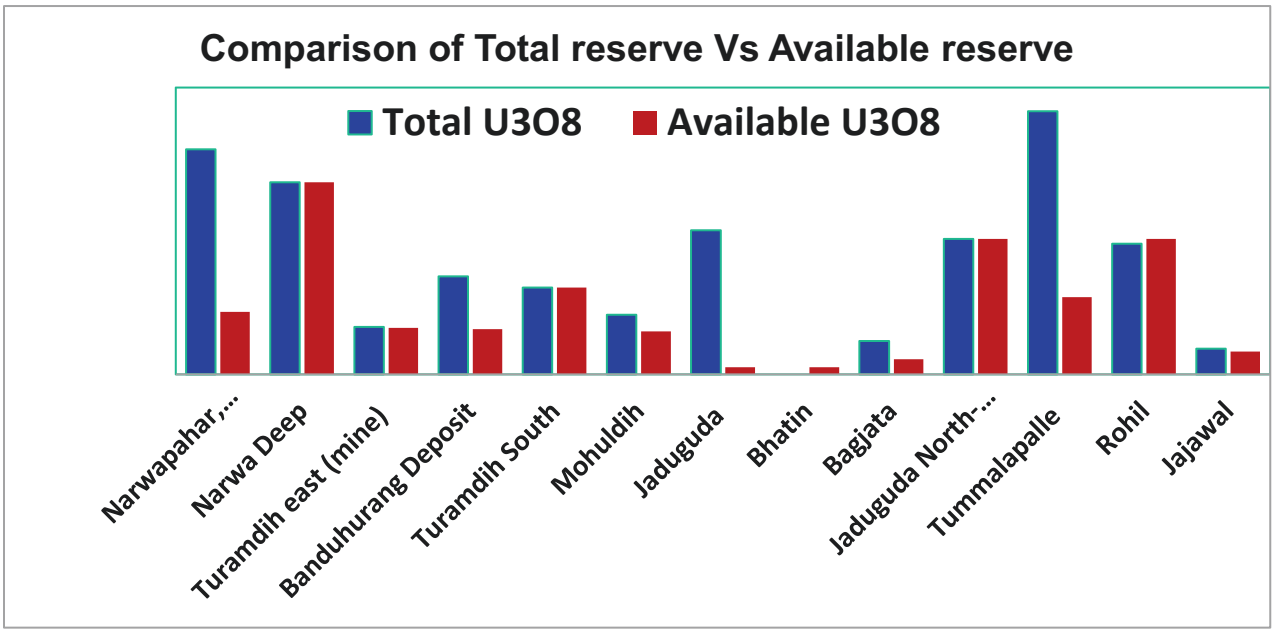
Uranium Reserves (U_3O_8) and its Domestic Availability

3.5 The following pictogram shows the places where uranium deposits have been found so far in India:



3.6 It has been submitted that till date AMD has cumulatively explored resources of 4,31,000 tonnes of U_3O_8, and out of which only 80,422.92 tonnes of U_3O_8 reserves is handed over to UCIL as per MMDR Act 1957 and AMCR-2016 for atomic minerals. Out of 80,422.92 tonnes, 39.22% of reserves is already mined or exhausted and the remaining 60.78% is presently available for mining of uranium.

3.7 It has further been submitted that at the present rate of production, if the reserves are not added, the current reserves can be mined upto 40 years only. However, AMD is continuously exploring ore body throughout the Country and more reserves will be added in the near future. The following graphical presentation shows the status of the total reserve vis-à-vis the available reserve of uranium in each of the mines:



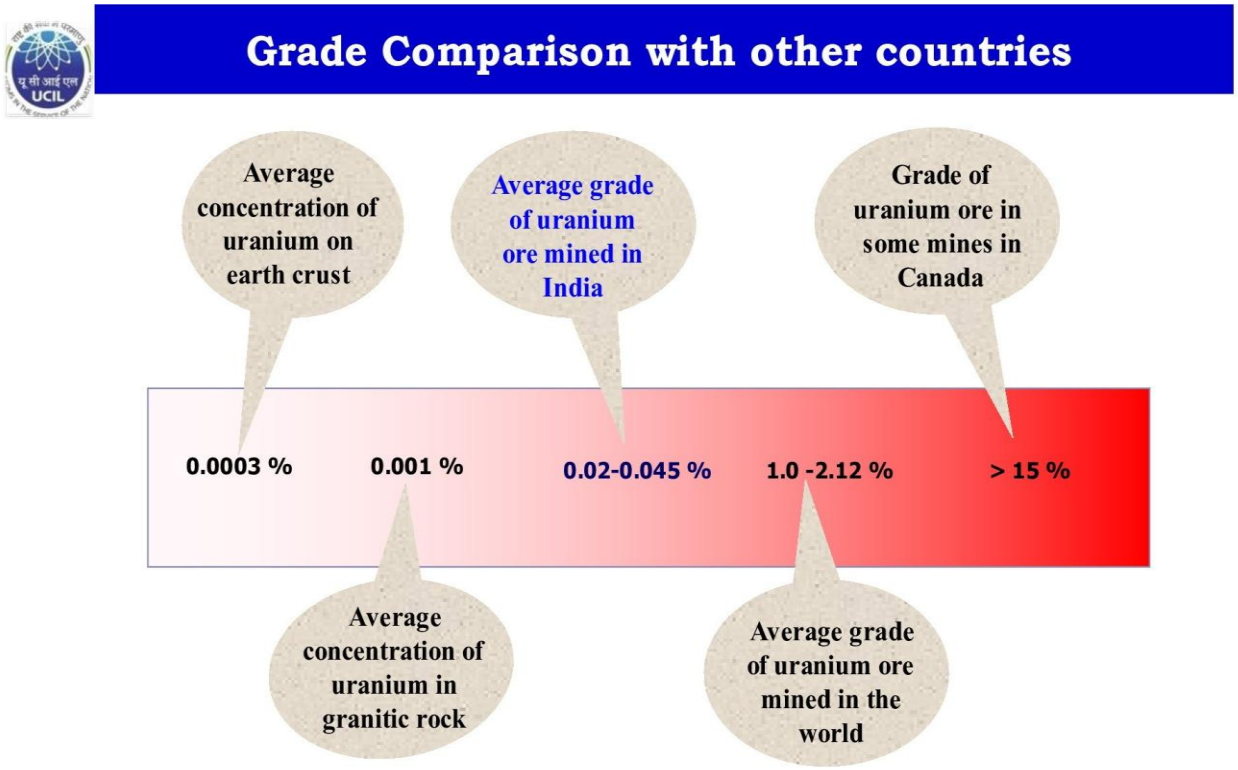
3.8 It has been submitted that uranium deposits in India are of very low grade. Explaining the different grades of uranium available around the world and the different uranium mining techniques and why cost of domestically mined uranium is much higher, the representatives of UCIL, during the sitting held on 31.07.2025, stated the following:

> "… Firstly, the average concentration of uranium in the Earth's crust is about 0.0003 per cent. In some granitic rocks, it is as low as 0.001 per cent. Currently, in India, we are mining ore with a grade ranging between 0.02 and 0.045 per cent. In comparison, the global average uranium ore grade is around 1.0 to 2.12 per cent, and in Canada, ore grades can reach up to 15 per cent. This explains why our production costs are significantly higher.
>
> … Globally, around 55 per cent of uranium is extracted using in-situ leaching, 18 per cent through open-pit mining, and 20 per cent via underground mining. In-situ leaching is much cheaper and usually involves higher-grade ore. Our costs are not comparable with countries that use such methods like in-situ leaching. Open-pit mining is also far more economical than underground mining. At Olympic Dam, for example, uranium is produced as a by-product. So, the costs are lower in foreign countries."

3.9 Commenting on the far inferior quality of uranium ores available in India when compared with those available in other countries and the challenges this entails during mining and extraction, the representatives of UCIL, during a sitting held 21.07.2025, has stated as under:

> "… Basically the major challenge is our distribution of uranium ore in earth crust in our mine. We are basically a poor Country, not even a lower Country with respect to grade… Mining of uranium ore body is moderate to thin width, which means width is lesser. Width is also lesser and grade is also lesser, and that is why, it has become a much more challenging aspect…
>
> Regarding stripping ratio, it is lower concentration basically. It is increasing that means waste is being mixed along with the ore. I will tell you that this is waste to waste. Basically our materials grades are in such a way that it is already waste type of material, and then after recovering the uranium, that also is a waste basically. That is also a big area because the moment its concentration is very less, that means for getting certain quantity of material, we have to process a bigger larger quantity. That is why, left out material is also equally in larger size…"

3.10 The following pictogram compares the various grades of uranium ores available across the world:



Mining of New Deposits *vis-a-vis* Lease Area Extension

3.11 It has been submitted that AMD has recently discovered deposits like Banadungri, Baglasai-Mechua-Jaduguda North and Tumallapalle deposits. In some cases, the new deposits lie within the existing mining lease at deeper level and further extending beyond the existing mining lease area also. For mining such deeper deposits, it will be prudent to use the existing facilities available within mining lease and further extending it beyond the mining lease to make it techno-economically viable deposit. However, as per the extant law, there is no provision for extension of existing mining lease even in cases where the ore body is later found to extend beyond the leased area. In such case, a separate Mining Lease and other clearances are required for deposit beyond the Mining Lease as a separate mine which may not be techno-economically feasible.

3.12 Commenting on the need to amend laws to allow UCIL to explore ore bodies of uranium beyond the leased areas**,** the representatives of UCIL, during the sitting held on 31.07.2025, stated the following:

> "… they (AMD) are also exploring the ore body beyond the leased area. This ore body is more than 600 metres deep. The existing ore body in the leased area is up to a depth of 600 metres, but the ore body which is being explored now is beyond 600 metres. The problem is that, at present, there is no provision in the laws which allows us to extend the leased area beyond our present boundary. In that case, if the law is not amended, then we will have a mine beyond 600 metres of depth. As a result, the cost, technical and everything will be very high. In fact, we can say that the feasibility of having a mine beyond 600 metres depth will not be viable. Our request is that the rules may be amended so that we continue mining beyond the leased area for strategic minerals and the leased area may be extended for the ore bodies of Uranium.
>
> This is another case of Narwapahar mines… Although, the ore body is huge, but the strike length of the ore body is very small and it is both in our existing lease area and beyond the lease area. The feasibility of mining the ore body beyond the lease area is not good. If this lease area can be extended up to the new findings, then it will be economical and losses of the ore body will be less."

Role of UCIL *vis-a-vis* NPCIL

3.13 When asked about the Strategies adopted/being adopted by UCIL for reducing India's dependency on imports of uranium and current estimate of reserves of uranium in India and how they can support the nuclear power plants, UCIL, in a written submission, has stated as under:

"UCIL) is working to reduce India's dependency on uranium imports through several strategies:

- Expanding Domestic Uranium Production: UCIL aims to increase domestic uranium production to meet the growing demands of India's nuclear power programme. This includes opening new mines in Jharkhand, Andhra Pradesh, and Rajasthan, and investing in modern mining technologies for highly mechanized underground mining with automation.
- Increasing Production Capacity: UCIL plans to increase uranium production capacity to meet DAE's vision of achieving self-sufficiency in uranium production. UCIL has targeted to double its uranium production by 2031-2032.

The total estimate of resources/total in-situ U-Oxide resource established by AMD in India presently stands at ~4,31,000 tonnes as on 01.03.2025. The assessment of mineable reserves is done by Joint Evaluation of AMD & UCIL mutually…"

3.14 Moreover, UCIL, in a written submission, has stated that as per the vision Amrit Kaal (Vision 2047), capacity addition plan provided by NPCIL, the total projected capacity envisaged is about 100 GWe. It is anticipated that out of 100 GWe, NPCIL shall need Uranium for operation of PHWRs to generate power of 25 GWe only. The fuel requirement for this purpose (PHWRs) is estimated to be 5400 tonnes of Uranium oxide per annum. UCIL may cater up to 30% of the annual requirement then rest of the quantity has to be imported on regular basis or stockpiled. However, ff the formation of a Joint Venture (JV) company for the purpose of acquisition of foreign assets/properties between UCIL and NTPC is successfully undertaken in accordance with the Companies Act, 2013 and Atomic Energy Act, then the dependency on the import may be reduced to a certain extent.

3.15 Commenting on the role played by UCIL in fulfilling the uranium requirement in India's indigenous Pressurised Heavy Water Reactors being run by NPCIL, UCIL, in a written submission, has stated the following:

"… NPCIL is presently operating 24 commercial nuclear power reactors with an installed capacity of 8780 MW. Presently, the reactor fleet generates power of 6460 MW from Pressurized Heavy Water Reactors (PHWRs) fuelled by Indian as well as imported fuel and 2320 MW from Light Water reactors (LWR) which is fuelled by imported uranium (Russia).

Out of 6860 MW, PHWR, Indian fuel is used to generate power for 2400 MW. Hence the existing facilities are importing 800 tonnes only for PHWR, which are

operating under IAEA safeguards. NPCIL has more reactors under planning and construction with a total capacity of 9100 MW. They are also additionally planning for 14000 MW, which totals to 29560 MW (29.56 GW).

As on date only 2.4GW is supported by indigenous fuel by UCIL. It is estimated that to run the reactors (PHWRs) India may have to import approximately 5400 TPA (tones per annum) of uranium to generate power from 27160MW (27.16 GW). The shortage of 5400 TPA of uranium fuel (natural uranium oxide) is planned to cater either by Indian fuel or by acquiring overseas Uranium mines through Joint venture and also allow domestic mining by private companies in MDO (Mine Developer cum Operator) mode. Rest of the uranium is imported by the Government of India."

Quantum and Mechanism for Uranium Import and Pricing

3.16 Regarding the quantum of India's uranium import and the countries from which India currently imports uranium, UCIL, in a written submission, has stated as under:

"Estimated future demand for the imported natural uranium for operating and proposed Pressurized Heavy Water Reactors (PHWRs) & LWRs under safeguards is about 9000 metric tonne units (MTU) for the period 2025 to 2033. Presently, India is importing from Kazakhstan, Russia, Uzbekistan, and Canada. Mostly the Light Water Reactors (LWR) is operated in collaboration with Russia and additionally planned 21000 MWe (21GWe) with other foreign countries under IAEA safeguards has to be operated on imported uranium.

At present, the long-term pricing agreement is with M/s. "Navoiyuran" State Company, Uzbekistan by Government of India. The contract is valid up to 2026. 600 MTU of Uranium ore concentrate (UOC) is supplied out of the total quantity of 1100 MTU."

3.17 On being asked how the price of uranium is worked out, whether the Government considers international price or any other factors while fixation and calculation of the price, UCIL, in a written submission, has stated as under:

"The compensation price for Uranium concentrate is calculated based on the methodology recommended by the Chief Advisor Cost, Department of Expenditure, Ministry of Finance. As per the said methodology, the compensation price is calculated every year based on actual cost arrived from audited Annual Accounts for the respective financial year. The actual cost is classified as fixed and variable cost based on the nature of expenditure. The various non cost items like provision for obsolete stores, provision for mine closure etc., are not considered in the cost of production. Other Income from sale of by-products, hire

charges of equipment and vehicles, etc. are deducted from the total cost, thus arrived and reasonable margin is considered. Return @ 12% (post tax) on average capital employed is considered towards recovery of interest and reasonable margin. Considering income tax and dividend, actual return to UCIL stands at 3.67% on average capital employed only. Per unit compensation price is determined every year by dividing with the actual quantity of Uranium concentrate produced in that particular year.

The international price of Uranium concentrate is not considered while fixing compensation price for Uranium concentrate."

Upgradation of Existing Mines and Development of New Mines

3.18 On being enquired about the need for aggressive development of uranium mining capacity of UCIL as NPCIL is rapidly setting up a lot of new reactors thereby increasing their capacity, UCIL, in a written submission, has furnished the following:

"AMD informed that the total in-situ U-Oxide resource established by AMD in India presently stands at ~4,31,000 tonnes as on 01.03.2025. Uranium resources have been augmented from Tummallapalle, YSR district, Andhra Pradesh; Jaduguda North–Baglasai-Mechua and Banduhurang blocks in East Singhbhum district, Jharkhand; Jahaz, Jhunjhunu district and Geratiyon Ki Dhani, Sikar district, Rajasthan.

It is pertinent to mention that inputs on actual mineable uranium resource established by AMD for supplementing the Nuclear Power Programme of DAE are very significant for DAE to decide whether the upcoming reactors are to be put under IAEA safeguards or not. It may be noted that AMD proves in-situ uranium resources but however, the mining and milling losses of about 50% have to be considered to calculate the net uranium availability for supplementing the nuclear reactors which is 215,500 tonnes. Hence, it is emphasized that the actual mine throughput from actual mineable reserves needs to be assessed as AMD has so far established large resources in different parts of the Country but the grade of uranium resources is low in India. Besides, there is limited uranium mining centres in the Country. In this context, UCIL has planned expansions in existing production centres and projects for increasing the mining and milling capacity and venture in new uranium deposits in India and abroad.

Being a strategic mineral, the commercial viability of uranium projects in India with low grades may not be disclosed in public, however, the imports of uranium is the decision of the Central Government."

UCIL's Future Plans, Strategies and Challenges

3.19 Regarding the road map of UCIL for the next 5, 10 and 15 years, it has been submitted that it has planned for expansion of existing mines/production centers like Turamdih and Banduhurang opencast mine, Jharkhand state, Modernization of Jadugoda Mill, by 2028 & Rohil project, Rajasthan state (both mine & Mill) state by 2031-32. Further expansions of Tummalapalle Deeper extension and Narwapahar Deeper extension, construction of new Turamdih uranium processing plant at Jharkhand and Tummallpalle mill at Andhra Pradesh of higher capacity is projected to be commissioned by 2035, which also includes the opening of large deposit of Uranium mines & processing plant of higher capacity, at Kannampalle Kadapa district, Andhra Pradesh. The above–mentioned projects are expected to be fully operational by 2038 to its full capacity. It has also been stated that, as of now, the demarcation of ore body in being done by State government, after which, UCIL may be nominated by DAE. Subsequently, the land acquisition and other statutory clearances from government bodies will play critical role in opening of projects.

3.20 Regarding the process and quantum of import of uranium UCIL's role and the countries from which uranium is imported, the representatives of UCIL, during the sitting held on 21.07.2025, has stated as under:

> "… लगभग 45 परसेंट फ्यूल यूसीआईएल से मिल रहा है, बाकी हम इम्पोर्ट कर रहे हैं।…
>
> … 60 परसेंट से ज्यादा इम्पोर्ट कर रहे हैं। 60 परसेंट से ज्यादा की रिक्वायरमेंट है, उसे हम लोग इम्पोर्ट कर रहे हैं। ज्यादातर कनाडा, रशिया, उज्बेकिस्तान और कजाकिस्तान से इम्पोर्ट कर रहे हैं।…
>
> … UCIL is not involved in this anyway. Whatever we can do or we are producing, we are handing over to the Government of India i.e. the Department of Atomic Energy (DAE). Under DAE, NFC is there and other mechanisms are there. They are organizing all those import related activities. Whatever requirements are there, they are fulfilling them."

3.21 Regarding the strategies being adopted to reduce India's dependence on import, UCIL, in a written submission, has stated as under:

> "… The meeting was held on 30.06.2025 under the co-Chairmanship of Secretary (Power) and Secretary, DAE to discuss 'Roadmap for achieving 100GW by 2047'. It was observed that the Domestic uranium production is not sufficient to meet the

requirement. At present only Central Govt. is authorized to import nuclear fuel, the Atomic Energy Act is being amended to allow all utilities to import nuclear fuel under continuous monitoring of Govt. of India and the safeguard of IAEA. Hence, it is necessary to acquire overseas Uranium mines and also allow domestic mining by private companies in MDO (Mine Developer cum Operator) mode. It was agreed that NTPC/UCIL MoU for acquisition of overseas Uranium mines to be pursued.

To meet the above national commitment, both the parties is in process of collaborating under this Memorandum of Understanding (MoU) is to formalize a framework to jointly explore opportunities for the acquisition of overseas uranium assets/properties by forming a Joint Venture (JV) company, with the aim to secure a long-term sustainable supply of Uranium and strengthen India's mineral supply value chain to support the Country's ongoing expansion of its nuclear power program.

This MOU will enable the formation of the Joint Venture between UCIL and NTPC, approval from the Department of Atomic Energy (DAE) shall be obtained for import of uranium ore / yellow cake, processing and modality of off-take between the JV partners. Both the parties will collaborate for identification, due diligence and acquisition of overseas uranium asset/mines utilizing the expertise of UCIL in mining technology and expertise of NTPC in handling overseas contracts."

3.22 UCIL, in a written submission, has stated that it faces many administrative, environmental and technical challenges delaying mine commissioning or expansion activities, some of which are listed below:

Technical & Geological Challenges-

- Low-grade and limited uranium reserves with complex ore geometry and host rock conditions.
- High cost of production and large tailings generation due to poor ore quality.
- Dependence on imported, high-value mining and processing equipment.
- Depletion of reserves in upper levels of operating mines like Jaduguda, Narwapahar, and Bagjata.
- Aging processing plants requiring modernization or replacement.

Site-Specific & Environmental Challenges-

- Remote location of deposits (e.g., Tummalapalle, Bagjata, Meghalaya, Chhattisgarh, Telangana).

- Social and political opposition, especially in Meghalaya and tribal areas.
- Land acquisition and employment issues causing delays and disruptions.
- Forest land and environmental clearance issues, especially in Telangana and Chhattisgarh.
- Difficulty in finding suitable tailings disposal sites.
- Water scarcity in regions like Rajasthan and Andhra Pradesh.

Administrative & Statutory Challenges-

- Lengthy clearance processes from multiple central and state authorities (MoEF&CC, AERB, DGMS, Pollution Control Boards, etc.).
- Coordination issues between central and state agencies for mining lease approvals.
- Shortage of skilled and competent manpower due to limited attractiveness of PSU employment.
- Dependence on 100% government funding for new capital-intensive projects.
- Legal constraints under Section 6A of the MMDR Act, 1957, limiting extension of lease areas despite viable adjacent ore bodies.

CHAPTER IV

CORPORATE GOVERNANCE

Board of Directors

4.1 The details of NPCIL's Board sanctioned strength and in-position at present is as follows:

Composition of the Board of Directors	Sanctioned	Presently in position
Functional (Whole time) Directors	7	6
Government Directors, Non-Executive (Part Time)	5	5
Independent Directors (IDs)	6	6
TOTAL	18	17

4.2 It has been submitted process is underway to fill one vacant post position of Director (Finance) in NPCIL by the Government.

4.3 As furnished by NPCIL, the details of the roles of functional, part-time, and independent directors in NPCIL are given below:

(i) **Functional Directors:** They are responsible for managing their designated areas such as Operations, Projects, HR, Technical and Finance, while aligning functions with corporate goals, budgeting, planning, policy implementation, resource management, performance monitoring, risk mitigation, and stakeholder coordination. As Board Members, they contribute to the company's strategic direction, participate in Board Committees, and are required to act in good faith, exercise due diligence, avoid conflicts of interest, comply with legal and regulatory frameworks, and follow the Code of Conduct.

(ii) **Part-time Directors:** Part-time Directors - including representatives of administrative Department (DAE), officials such as the Director, BARC, Chairperson, (Central Electricity Authority (CEA) and senior NITI Aayog personnel - do not engage in daily operations but contribute to Board and Committee decisions based on their

expertise, without any remuneration, and are expected to discharge statutory, fiduciary, and common-law duties diligently.

(iii) **Independent Directors:** They function as per the Companies Act, SEBI LODR, and Corporate Governance Guidelines, adhere to the Code of Conduct, and may serve on mandatory Board Committees such as Audit, Nomination & Remuneration, Risk Management, CSR, and Stakeholders Relationship Committees. They must attend separate annual meetings of Independent Directors, comply with disclosure requirements on directorships and interests, provide declarations of independence, promptly report conflicts of interest, and maintain confidentiality except when legally required or necessary for duty performance.

4.4 When asked how NPCIL aligns its governance policies with DAE guidelines, NPCIL, in a written submission, has furnished the following:

> "NPCIL is a wholly owned CPSE (100% Share Capital is held by the GoI) under the administrative control of Department of Atomic Energy (DAE) under PMO.
> Keeping in view the strategic nature of business of the Company, the Government of India had decided at the time of incorporation of the Company itself that NPCIL will be exempted from the guidelines of Department of Public Enterprises (then Bureau of Public Enterprises) and the Atomic Energy Commission (AEC) would evolve separate guidelines for the functioning of NPCIL. The AEC Guidelines for functioning of NPCIL were approved by the Cabinet in the year 2008. The AEC Guidelines, inter alia, covers Composition of Board of Directors, procedure to be followed for the selection and appointment of Directors, personnel & Human Resource Policies, Financial Policies, entering Memorandum of Understanding with DAE every year covering the targets for these parameters.
>
> a) The appointment of Board level functionaries, including Chairman, is done by the DAE instead of the Public Enterprises Selection Board (PESB). The detail procedure for selection and appointment of Directors is covered in Chapter 1 of the AEC Guidelines.
> b) Applicability of guidelines issued by DPE on Corporate Governance for CPSEs, 2010.
> c) Periodical review of performance by the administrative Ministry/ Department concern and DPE in the form of MoU evaluation.
> d) Review of performance by various committees including COPU, Parliamentary Committees etc.
> e) Laying of Annual Report of the Company before both the houses of Parliaments through its Administrative Ministry."

4.5 When asked whether DAE has undertaken interventions to deal with NPCIL management, financial support, technical expertise, managerial expertise, R&D support and facilitating collaborations with other parties in the past, DAE, in a written submission, has submitted as under:

> "Through board level participation by Joint Secretaries of the Department, the managerial expertise is extended. Through effective budget monitoring, the government equity and Russian State Credits are released to NPCIL for project implementation. Further, Standing Committees of the Department provide guidance and assistance for foreign collaboration, specifically in the area of procurement of nuclear fuel assemblies. DAE facilitates and supports technical support to NPCIL for IAEA/ WANO from outside the Country and within the Country, from other DAE institutions both on regular and case to case basis."

4.6 On being asked whether the Company has undergone any recent corporate governance audits and whether there are any legal or regulatory disputes currently involving the Company, it has been submitted that as required under the Guidelines, the Company obtains Certificate from a practicing Company Secretary every year and for FY 2024-25, the Company has obtained a certificate from M/s. Mehta & Mehta, Company Secretaries, Mumbai regarding compliance of conditions of corporate governance as indicated in the DPE Guidelines. It has also been stated that as NPCIL is high value debt listed company, the said audit also covered certification/audit of Corporate Governance Chapter of SEBI (Listing Obligations & Disclosure Requirements) Regulations, 2015. Moreover, as of now, there are no legal or regulatory disputes involving the Company.

4.7 On being asked to elaborate the main organizational challenges NPCIL currently faces, in a written submission NPCIL has stated as under:

> "Target of Capacity Addition of 100 GW by 2047 is set for Nuclear Power as per Vision of GoI for Viksit Bharat@2047 by using existing and new technologies. NPCIL is expected to contribute at least 50% of the target capacity addition i.e.54 GW.
>
> NPCIL's existing capacity 8780 MWe and presently, 13100 MWe capacity projects are under different stages of implementation. NPCIL is planning to increase its installed capacity to about 22,000 MWe by 2031-32. Another about 17000 MWe capacity addition is expected from the proposed imported reactors at Kovvada and Jaitapur sites. If it does not materialise then, NPCIL may have its own PHWRs which will require approval of the GoI.

In the Budget 2025, the Government announced its plan to amend the Atomic Energy Act to allow other players in the Nuclear Sector such as State Government owned PSUs, other PSUs and private sector.

With this backdrop and as a regular management function of identification of Risks and Mitigation measures, the following are the points/challenges identified, which need focused attention of the management to mitigate.

'Top Focused Areas for Mitigating Future Risks and concerns' identified by the Company:

- High Capital Work in Progress (CWIP) in Nuclear Power Projects.
- Execution of Ongoing Projects and Expansion Plans within scheduled time to ensure cost effectiveness.
- Few numbers of manufacturers/suppliers
- Availability of Manpower Trained in Nuclear Power.
- Identification of New Sites required for Expanding Nuclear Power Programme.
- Challenges in adaptation of New Models of Nuclear Power Generation as well as Implementation of Expanding Nuclear Power Programme.
- Impact of international scenario (i.e. prevailing geo-political conflicts) on nuclear industries from long term perspective.
- One of the obstacles in launching of new projects is public perception about nuclear power. It is felt that participation of State Government in nuclear would help bringing change in public perception."

Human Resource and Women Participation

4.8 As furnished by NPCIL, the total workforce of NPCIL as on 01.06.2025 is 10,663. The ratio of Technical to Non-Technical employees is 6:1 (Technical &Non-Technical employees are 9,154 and 1,509 respectively).Presently, the contract workforce in the operating units is 13,521 while in projects under implementation it is 29,502.

4.9 On being asked whether there are specific programs or incentives to recruit from local populations near nuclear plant sites, NPCIL, in a written submission, has furnished the following:

"NPCIL, being a Central Public Sector Enterprise (CPSE) under the administrative control of DAE, Govt. of India, follows the DoPT orders as endorsed by DAE on recruitment matters.
Further, for Project Affected Persons (PAPs) whose land has been acquired for construction of Nuclear Power Plants, relaxation in recruitment in regular jobs has been provided for Group 'C' posts with approval of the Boards of Directors as under:

(a) NPCIL provides 20% of the total marks as bonus marks, to be added in the marks secured by the candidates from the Project Affected Persons (PAPs) whose land has been acquired for Nuclear Power Projects of NPCIL in all stages of selection to Group 'C' posts. As far as Skill Test / Proficiency Test is concerned, where such candidates are not able to clear Skill / Proficiency Test, additional training will be provided for 3 months along with regular training. Subsequently, Skill / Proficiency Test will be conducted and if the candidate fails to clear this test, their traineeship/offer of appointment will be terminated.

(b) Relaxation is given in percentage of marks in basic qualification for appointment of Group 'C' posts in respect of Project Affected Persons (PAPs).

(c) Relaxation in age in respect of Project Affected Persons (PAPs) is also given for make them eligible for Group 'C' posts."

4.10 It has been submitted that NPCIL actively encourages women participation in technical and administrative cadres. As of March 2025, women employees constituted about 10% of the total workforce, serving across scientific, engineering and administrative roles.

4.11 Regarding the sanctioned and existing number of women employees in executive and non-executive categories and the measures being adopted to improve the gender equity, NPCIL, in a written submission, has stated as under"

"The operational sanctioned strength as on 01.01.2025 is 15088. NPCIL does not have gender-wise sanction strength. The representation of women employees as on 01.06.2025 in Executive and Non-Executive categories are 369 and 620 respectively.

NPCIL makes concerted efforts to increase representation of woman employees. To improve gender equity, NPCIL strives to have a workforce which reflects gender balance and women candidates are encouraged to apply in NPCIL. This fact is highlighted in recruitment advertisements notified by NPCIL. In addition, woman candidates are exempted from application fee for direct recruitment.

A woman member is included in the Selection Committee for recruitment to 10 or more vacancies. Even where vacancies are less than 10, no efforts are spared to include one lady officer in the Selection Committee."

4.12 Commenting on the positions occupied by women in NPCIL, the representative of NPCI during the sitting of the Committee on 26 June, 2025, stated as under:

"… As far as gender balance is concerned, we strive for gender balance. We also have women in senior management positions as well. Three of our Directors on the Board are women. Apart from that, within our organization also we have senior-level women in the management. We also have women who are actually operating the reactors in shifts. They are actually in charge of the shift at sites.

Though their numbers are not very large, but we have women who are operating them, and this trend has been growing... Mainly, in the technician category we do not have many women, but in the scientific and other categories we have a fairly sizeable number of women."

Employee Welfare and Capacity Building

4.13 Employee welfare measures include health care, housing, education facilities, insurance and recreational amenities. to provide induction and refresher courses to staff to uphold operational safety and efficiency. Trainings are conducted at various Nuclear Training Centers (NTCs) located at different Units of NPCIL and it comprises of classroom training as well as on-the-job training.

4.14 Regarding training mechanisms existed for engineers, supervisors and technicians, the following details have been furnished:

Executive Trainee (Trainee Engineers):

i. Training Period is 1 year

ii. Absorbed as Scientific Officer/C on successful completion of training.

Stipendiary Trainee/Scientific Assistant (Supervisors):

i. Training Period is 1.5 years

ii. Absorbed as Scientific Assistant/B on successful completion of training.

Stipendiary Trainee/Technician:

i. Training Period is 2 years

ii. Absorbed as Technician/B on successful completion of training.

4.15 Regarding the measures adopted to ensure effectiveness of the key Committees like Audit, Compensation, nomination/governance and the impact of such measures over a period of last five years, NPCIL, in a written submission, has furnished the following:

"The composition, terms of reference of the key Committees have been aligned with the provisions of the Companies Act, 2013, SEBI LODR (as amended from time to time) and DPE Guidelines on Corporate Governance.

a) Audit Committee:

Placement of Internal Auditors Reports for review of the Audit Committee along with the comments/response of Site/Corporate Finance has led to improvement in inventory management (SoPs have been issued Inventory management- for slow moving/non-moving items).

1) As per the 5th amendment to SEBI LODR Regulations, 2015 in the year 2021, the term 'High Value Debt Listed Entity' introduced/defined vide the said amendment. Post the aforesaid amendment to SEBI LODR, NPCIL is required to submit its financial results on quarterly basis to the Stock Exchange (prior to this amendment the financial results were required to be submitted on half yearly basis). The same led to increase in frequency of Audit Committee Meetings and thus, regular monitoring/reviewing the financial statements, interaction with the Auditors is taking place.
   Auditors during presentation of their Reports also presents Emphasis of Matters (EoM) in which the Auditors, inter alia, draws attention of the management to a specific matter (without modifying the audit opinion).

2) The Audit Committee has been reviewing the details of contracts awarded on nomination basis on quarterly basis from the FY 2012-13, the regular review and interaction with the users i.e. PO/WO issuing authorities and Finance, has brought down the number of contracts awarded on Nomination basis. The data for the quarter ended on March 2025 is given below:

i) No. of the contracts (of below ₹5 lakh) awarded on nomination basis – Nil
ii) % age of Work Contracts awarded on Nomination basis w.r.t. total Work Orders issued in the Quarter - 1.97%
iii) Purchase Orders awarded on nomination basis w.r.t. to total POs.- 0.05%

3) The following agenda items are placed before the Audit Committee for its review/information on regular intervals as required under Guidelines on Corporate Governance, the Companies Act, 2013 and SEBI LODR:

i) Information regarding statement of uses/application of funds raised through an issue of NCDs.
ii) Information on Related Party Transactions for the six months.
iii) To review functioning of Whistle Blower Mechanism.
iv) CEO/ CFO Certification as required under the requirement of Corporate Governance Norms – Certification of Financial Reporting as to disclosures/presentation of Financial Statements, Internal Control, Accounting standards, policies, etc.
v) Statement containing salient features of financial statements of subsidiaries/ associate companies/JVs.
vi) Interaction with Credit Rating Agencies (CRAs) once in a year in compliance with comply with SEBI Circular No. SEBI/HO/MIRSD/CRADT/CIR/P/2019/121 dated November 04, 2019.
vii) Compliance with the provisions of Regulation 9A (4) of SEBI (Prohibition of insider Trading) Regulations, 2015.
viii) Details of Foreign Exchange Exposures and Exchange Rate Movement.

ix) Proposed changes in the accounting policy, if any.

b) Nomination & Remuneration Committee

The Committee is headed by Independent Director and all other Members of the Committee are non-executive Directors.

The Committee helped in setting up of norms and procedure for selection of Executives one level below the Board. At present, there are 14 positions/functions identified under the category.

The Committee do not play any role in the matters of Remuneration. Since, the Company follows Government of India pattern of pay scales and DA to its employees (including whole time directors). The perks available to the employees are broadly based on the pattern followed by the GoI for its employees or as available to the employees of other PSEs of the GoI.

The Non-official Independent Directors are paid only sitting fees at the rate approved by Department of Atomic Energy, GoI.

c) Risk Management Committee constituted as required under Regulation 21 of the SEBI LODR in the year 2022:

The Board of Directors in its 215th meeting held on 22nd July 2022 has constituted the Risk Management Committee (i.e. Sub-Committee of Board) in line with the SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015.

The Committee formulated Risk Management Policy and approved appointment of Chief Risk Officer, who reports to CMD for the specific function. CRO prepares/compiles the quarterly report covering Risks identified and mitigation measures. The quarterly reports along with the minutes of Risk Management Committee meetings are placed before the Board.

c) Stakeholders Relationship Committee

The Committee is headed by an Independent Director. The Committee monitors Investors' Complaints, if any, relating to transfer of securities, non-receipt of interest and redemption proceeds, etc. The Committee also advised on the matters relating to rendering of services to the Investors."

4.16 When asked to elaborate the Code of Conduct for executives and employees of NPCIL and the steps being taken in case of violation of such code of conduct, NPCIL has furnished the following:

"As per applicable service conditions, the employees working in NPCIL are categorised into three categories:-

(i) Permanent Deputationists - Employees on permanent deputation from DAE – Workmen, Supervisors and Executives;

(ii) Executives and Supervisors - NPCIL Employees who are other than 'Workmen';

(iv) Workmen

Applicability of Rules/Orders for the three different categories with respect to conduct and discipline

Permanent Deputationists from DAE	Central Civil Services (Conduct) Rules, 1964 and Central Civil Services (Classification, Control and Appeal) Rules, 1965
NPCIL employees Other than 'Workmen'	NPCIL (Conduct) Rules, 1994 NPCIL (Discipline & Appeal) Rules, 1996
NPCIL Workmen	Standing Orders certified under Industrial Employment (Standing Orders) Act, 1946, where Standing Orders have been certified. Model Standing Order where Certified Standing Orders are not available. (Standing Orders cover Conduct, Discipline and Appeal provisions besides other aspects of service conditions.)

It may be noted that Stipendiary Trainees, Fixed Term Appointees, Consultants and Advisors are outside the purview of the above Rules/orders. In their cases, contractual terms of their engagement will govern their continuance or otherwise.

Disciplinary Authorities

The competent authority for disciplinary action is the "Disciplinary Authority" (DA). The disciplinary authorities for the different categories of employees, Group 'A', 'B' and 'C', in Headquarters and Units/Sites, have been notified in the Schedule to the NPCIL (Discipline and Appeal) Rules or the Standing Orders."

4.17 Regarding the existing whistleblower protection policy to encourage reporting of unethical behaviour, NPCIL has submitted that the Board at its meeting held on 29th August 2023 has approved the Whistle Blower Policy in line with the provisions of Section 177 of Companies Act, 2013 read with Rule 7 of the Companies (Meeting of Board and its Powers) Rules, 2014 and the same is available on the Company's website www.npcil.nic.in. The policy provides protection to the Whistle Blower provided the complaint is filed as the per procedure laid down in the Policy.

4.18 Regarding the mechanisms available for collecting and addressing employee feedback, NPCIL has furnished the following mechanism:

a) **Guidelines on exit interview of employees:** Objective of these guidelines is to get the feedback from the employee who has resigned and initiating necessary corrective action if required for organizational development.
b) Similar provision exists for obtaining feedback from Executive Trainees (Trainee Engineers) resigning during training period.

   [Analysis of feedback is done on half yearly basis and submitted to Director (HR) for discussion in Directors' Level Meeting (DLC). Annual Feedback Analysis is prepared and submitted to Chairman & Managing Director for information].
c) QA Directorate collects annual feedback from all QAD employees once in a year. Feedbacks are discussed in Management Review Committee (MRC) for disposition.
d) **Safety Culture Survey/ feedback:** Health Safety & Environment group collects feedback from employees at HQ, operating plants and projects every year.
e) **Grievance Redressal System:** Grievance Redressal mechanism is one of the mechanisms through which feedback on company policies are being gathered and improvement actions are taken.
f) **Meetings with Employees' Unions and Associations:** Periodical meetings with Employees' Unions and Associations are being conducted, through which feedbacks & suggestions to improve the system are gathered and acted upon.

CSR Activities

4.19 As has been furnished, NPCIL undertakes Corporate Social Responsibility (CSR) activities mainly in the vicinity of its project and plant sites within 16 km radial distance. If the project Resettlement and Rehabilitation (R&R) colony for Project Displaced Families (PDFs) is situated beyond 16 km from the plant site, the same is also considered for implementing CSR projects. In addition, NPCIL also implements developmental projects in Aspirational Districts notified by the Government, under its CSR programme.

4.20 The major focus areas of NPCIL's CSR activities include education, healthcare, sanitation, infrastructure, sports promotion and skill development and sustainable development. NPCIL spent ₹168.5 crore on CSR activities in FY 2024-25. Regarding the

impact assessments conducted to evaluate the effectiveness of CSR activities, especially in project-affected areas, NPCIL has stated as under:

> "As per the CSR Rule 8 2021, impact assessment of the projects with expenditure of more than ₹1 crore has to be carried out by independent agencies, one after completion of the project. NPCIL has been carrying out impact assessment of such of its projects by independent agencies. In 2024-25, impact assessment of 10 projects completed at least a year before was carried out. The impact assessment reports are reported to the Board and included in the CSR annual reports. The impact assessment of NPCIL's CSR projects have been found to be effective in addressing the specific needs of the communities."

4.21 On being asked how CSR priorities are determined and what is the mechanism for community consultation or grievance redressal, NPCIL has, in a written reply, submitted the following:

> "The CSR priorities are determined based on the need assessment and close interactions with local community, people's representatives like Sarpanchs and authorities like Block / Tehsil / District authorities. In respect of areas, NPCIL's CSR policy considers the 16km radius around its site / township as local area and its CSR activities are focussed in this area. However, priority is also given to thematic sector and aspirational districts as per the Government guidelines. NPCIL's CSR authorities have regular interactions with the local communities and their representatives to determine projects to be taken up and address grievances, if any."

Risk Management and Compliances

4.22 When asked how NPCIL ensures transparency and accuracy in disclosing financial statement, NPCIL, in a written submission, has stated as under:

> "NPCIL ensures transparency and accuracy in disclosing financial statements through a combination of regulatory compliances, independent audits, Annual Accounts Closing Guidelines for preparation of financial statements and adherence to established reporting frameworks. NPCIL follows Companies Act, Indian Accounting Standards, SEBI (LODR) Regulations and other relevant regulations.
>
> a) **IND AS Standards and Companies Act 2013:** NPCIL adheres to Ind-AS standards ensuring consistency and comparability of financial reporting. NPCIL management certifies the compliance of IND AS standards and Internal and Statutory auditors also conducts various audit procedures to check the compliance of accounting policies and IND AS. NPCIL also complies with specific disclosures requirements and reporting under various IND AS and Companies Act. Disclosure of all material information that could influence the

users of financial statements. NPCIL executives are trained in IND AS and Companies Act through internal and external trainings and monthly review meetings.

b) **SEBI (LODR) Regulations:** NPCIL Debt securities are listed in NSE and it mandates to comply the SEBI (Listing Obligation and Disclosure Requirements) Regulations 2015, in a time bound manner viz. submission of quarterly financial results with 45 days from the end of the quarter along with limited review certification, disclosure of key financial ratios and other material information. Specific disclosure of events occurring after the reporting date and before approval of accounts.

c) **NPCIL Head Quarter Instructions (HQIs), Policies and Standard Operating Procedures (SOPs):** NPCIL has a strong base of Head Quarter Instructions, Policies and Standard Operating Procedures for Purchase Contracts, Works Contracts, Consultancy and Service Contracts, etc. along with delegation of financial powers to various executives in NPCIL, right from indenting to award of contracts, and delegation for making payments against the contracts. NPCIL is committed to transparency in awarding contracts through public procurement i.e. Government – e Market place portal (GeM) and CPPP Portal. NPCIL has various policies in place including Related Party Transactions Policies, Whistle Blower Policy, Risk Management Policy, etc.

d) **Integrated Business Application (IBA) Software:** NPCIL records all accounting and financial transactions in oracle based IBA software. It generates various transaction reports viz. voucher detail reports, bank books, ledgers, General ledgers, Trial Balance. Audit Trail log is also maintained in the software as mandated by the Companies Act. Further, NPCIL has already initiated the process of shifting towards ERP software package, which is more advance and integrated with other modules like operations and projects.

e) **Statutory Audits:** NPCIL's Financial Statements are audited by Statutory auditors appointed by Comptroller and Auditor General (CAG) of India u/s 139 of the Companies Act.

f) **CAG Audits:** In addition to Statutory Audits by external firm of Chartered Accountants, CAG also conducts supplementary audit of financial statements and audit report to ensure accuracy and compliance with regulations under section 143 of the Companies Act." **[NPCIL Reply I (xiii)]**

4.23 Regarding the internal control mechanisms existed for financial reporting, NPCIL has submitted that NPCIL implements internal control mechanisms for financial reporting to ensure accuracy, reliability, and compliance with regulations. Defined policies and procedures for financial processes are in place to guide executives to carrying out their responsibilities effectively and in line with regulatory requirements and accounting

principles. NPCIL has various Head Quarter Instructions, Policies and SOPs for major activities and processes along with delegation of financial powers. NPCIL monitors the internal controls mechanisms through risk control matrix at unit level for different processes viz. borrowings, timely interest servicing, timely reporting to SEBI, Debenture trustees, investments, interest monitoring, finance cost, purchase and works vendor payments, monthly financial reporting MIS, etc.

4.24 It has also been submitted that NPCIL has segregation of duties to reduce the risk of errors or frauds and strong authorisation processes in accounting software and restricted access to IT Systems. Monthly ledger scrutiny, daily bank reconciliations process identifies and minimizes the errors and maintaining the accuracy of financial reporting is the process of internal control mechanism in NPCIL. Apart from management checks and controls, external audit firms are appointed as internal auditors of NPCIL by following the public tender process, to conduct internal audit and to check and report the internal control mechanisms for financial reporting and suggests for further improvements.

4.25 Regarding the mechanisms available to mitigate operational and financial risk, it has been submitted that for identification of key risk areas and formulating appropriate risk mitigation plans for taking corrective action, NPCIL has Risk Management Policy document which is periodically reviewed as per emerging business scenario. The Company has a Board Sub-committee on Risk Management (Risk Management Committee), comprising of various functional Directors and an independent Director, for periodic review of risks including implementation of risk management policy and provide directions for required further actions, if any. The Board members are informed about the risk management related discussions/decisions of the Risk Management Committee taken in its periodic risk management review meetings. A corporate level Chief Risk Officer (CRO) co-ordinates with various Directorates in identifying major/critical risks and assessing, evaluating, evolving possible mitigating measure for the identified risks, monitoring the status and presenting report on risk management to Risk Management Committee for its periodic review. Accordingly, risks, if any, are identified in the areas of operation and finance on periodic basis and mitigation measures are taken up.

4.26 Regarding the measures taken/to be taken for protecting sensitive information and cyber security, it has been submitted that Information Security in NPCIL is governed by the guidelines from the Computer & Information Security Advisory Group (CISAG) – DAE. NPCIL document HQI 4505 (R-I) provides the Information Security Policy covering all electronic information assets of NPCIL and leading to implementation of Information Security Management System (ISMS) in NPCIL to ensure the protection of information systems and assets, and to allow the use, access, storage and disclosure of such information in a secured way. The scope of this document also covers the Digital I&C (DI&C) System.

4.27 It has further been submitted that as far as protections against cyber-attacks are concerned, there are cyber security measures in place include authorization, authentication & access control mechanisms, strict configuration control and surveillance. Additionally, the nuclear power plant systems are isolated from internet and are not accessible from administrative network. Several measures have been taken to strengthen Information Security in administrative networks in nuclear power plants including, hardening of internet and administrative intranet connectivity, restriction on removable media, blocking of websites & IPs, etc.

PART-II

OBSERVATIONS/RECOMMENDATIONS OF THE COMMITTEE

1. ***Overview***

The Committee note that the Nuclear Power Corporation of India Limited (NPCIL) is the sole nuclear power generating company in the Country and a wholly owned Central Public Sector Undertaking under the administrative control of the Department of Atomic Energy (DAE). Established in 1987, NPCIL plays a crucial role in India's strategic energy programme by designing, constructing, operating and maintaining nuclear power reactors for civilian electricity generation. It is entrusted with ensuring that nuclear power contributes to India's clean energy mix in a safe, reliable and environmentally responsible manner.

The Committee were further informed that NPCIL's installed nuclear capacity has grown from only six operating reactors at formation to 25 reactors with 8780 MW capacity today, and 17 additional reactors totalling 13100 MW are in various stages of execution. NPCIL has consistently maintained profitability with the highest AAA credit ratings, supported by strong asset growth to ₹1,91,607 crore as on March 2025 and a net worth of ₹65,475 crore. In addition to the above, the Committee also note from the submissions made by NPCIL that the Company achieved its highest-ever electricity generation of 56,681 Million Units in FY 2024-25, indirectly avoiding the release of approximately 49 million tonnes of CO_2 equivalent. Further, NPCIL has maintained consistently high operational reliability, registering about 639 reactor-years of cumulative safe operation as of May 2025, demonstrating sustained excellence in plant operation and maintenance practices. These achievements indicate commendable organisational maturity and operational excellence.

However, the Committee highlight that NPCIL's contribution to national electricity generation is currently modest, with potential to play a greater role in advancing the nation's clean energy ambitions and the broader goal of de-carbonization. Further, with strong performance indicators such as a Plant Load Factor (PLF) of 86.60%, the scale and pace of nuclear capacity addition needs enhancement when

compared to renewable and thermal sectors of India's power mix. The Committee note that NPCIL continues to rely significantly on imported uranium, posing a strategic sensitivity with regard to stable fuel supply. The future expansion of the nuclear fleet is also closely linked with Uranium Corporation of India (UCIL)'s ability to increase domestic uranium production, an element that remains beyond NPCIL's immediate purview. Additionally, the long gestation period of nuclear projects, issues related to regulatory and environmental clearances, public perception, scarcity of specialised manpower and high capital investment requirements further limit growth in nuclear power generation.

The Committee also note that NPCIL is the sole nuclear power generator in India, implementing both indigenous Pressurised Heavy Water Reactor (PHWR) technology and Light Water Reactors, established with international cooperation. NPCIL continues to be the cornerstone of India's nuclear energy programme, which is executing the first stage of India's three-stage nuclear power programme, which is crucial for long-term sustainability in fuel supply and energy security ensuring high safety culture, operational excellence and adherence to national energy goals. The Committee further observe that NPCIL has entered into Joint Ventures, notably Anushakti Vidyut Nigam Limited (ASHVINI) with National Thermal Power Corporation (NTPC) for the development of the Mahi Banswara (4×700 MW) nuclear project, marking a significant step in expanding the nuclear power generation base through collaborative models. Therefore, the Government has set an ambitious national target of achieving 100 GW nuclear capacity by 2047, and NPCIL is expected to contribute nearly half of this capacity, reflecting its pivotal role in the country's clean energy transition. Considering its critical role in clean energy transition, energy security and strategic technological independence, the Committee have carried out a detailed examination of NPCIL in this Report. The Committee express confidence that NPCIL will continue working to address the highlighted challenges and further enhance its performance, contributing to India's vision for a sustainable and secured energy future.

2. ***Operational Performance and Capacity Augmentation***

The Committee note that the operational performance of NPCIL has generally been robust, demonstrating strong operational discipline, sound maintenance practices and commendable adherence to safety, quality and performance excellence standards. In addition, NPCIL's PLF has remained consistently above global averages, with NPCIL reporting PLFs ranging between 84% and 88% in recent years, compared to global averages of around 80%. The Committee observe that several nuclear power units achieved continuous uninterrupted operation for more than a year during FY 2024-25, including Tarapur Atomic Power Station (TAPS-3) (478 days) and Rajasthan Atomic Power Station (RAPS-6) (444 days), indicating robust maintenance and operational strategies.

The Committee further observe that Unit-7 of Rajasthan Atomic Power Project (RAPP-7 & 8) commenced commercial operation in April 2025, and that the capacity under implementation is expected to progressively increase the installed capacity to over 22,000 MW by 2031-32, subject to timely execution of ongoing and sanctioned projects. The Committee are of the considered view that effective coordination between NPCIL, DAE, regulatory bodies and State agencies will be essential for ensuring that this implementation pipeline progresses without avoidable delays. However, while these performance indicators are strong, the Committee highlight that NPCIL's contribution to national electricity generation remains modest in the context of India's rising energy demand and clean base load requirements. The Committee observe that this limited contribution stems not from operational deficiencies, but from, relatively limited addition and need for timely implementation of new reactors, particularly those involving technology collaboration and high capital investment, thereby influencing the growth of nuclear power in the Country's energy mix.

The Committee, therefore, recommend that NPCIL should accelerate capacity addition and enhance operational efficiency by strengthening project execution mechanisms, improving coordination for statutory clearances and expanding the domestic industrial and vendor ecosystem. To this extent, the Committee

recommend creation of a National Nuclear Project Facilitation Mechanism within NPCIL to coordinate clearances, regulatory interactions, vendor readiness, skilled manpower deployment, and supply-chain scheduling for all reactors under construction. The Committee further recommend that NPCIL and State Governments jointly develop integrated township, transport corridor, water supply and workforce housing plans, to ensure timely readiness of supporting infrastructure essential for smooth project execution. The Committee also recommend strengthening knowledge retention through structured training academies, ensuring transfer of operational experience from senior reactor specialists to upcoming project teams. The Committee further emphasize the need to ensure timely completion of upcoming reactors so that nuclear power can make a meaningful contribution to India's clean energy goals and baseload requirements.

3. ***Accelerated R&D for Capacity Enhancement of India's Nuclear Reactors and Development of Scalable Nuclear Reactor Technologies***

The Committee observe that although PHWRs have evolved to 700 MW unit sizes, reactor capacities in India remain modest compared to global trends where larger LWRs and advanced designs exceed 1000 MW, and this more gradual scale-up has influenced overall nuclear generation levels and may have implications for economic competitiveness. The Committee also note that NPCIL has achieved commendable technological progress in developing indigenous Light Water Reactors (LWRs) such as the Bharat Small Modular Reactor (BSMR) of 220 MW and design evolution toward 900–1000 MW reactors. The Committee further note that while large capacity LWRs of 1000, 1200 and 1730 MW are being pursued through foreign cooperation, however, sustained dependence on external technology may not align with India's strategic objective of technological autonomy. The evidence furnished indicates that BSMR is intended not merely as a standalone modular reactor but as a prototype platform for progressive scaling to 300 MW, 500 MW, and eventually 1000–1200 MW indigenous reactors, with R&D primarily done in NPCIL's laboratories.

In view of the above, the Committee recommend that the Government should accord high national priority status to indigenous nuclear reactor R&D programmes, with clearly earmarked long-term funding and time-bound milestones for the development of scalable large capacity Indian LWR technologies beyond 700 MW. The Committee further recommend the establishment of dedicated advanced reactor design and testing facilities, accelerated prototyping of the BSMR platform for rapid scale-up moving towards higher capacity. Additionally, the Committee urge that a national roadmap for next-generation reactor technologies including that of larger capacity, aligned with fuel sustainability and the three-stage programme, be periodically reviewed at the highest level to ensure timely indigenisation, global competitiveness, and strategic self-reliance in nuclear power.

4. ***Strengthening Indigenous Reactor Technology and Advancing Self-Reliance***

The Committee note that NPCIL has successfully developed and commercialized indigenous Pressurised Heavy Water Reactor (PHWR) technology, progressively scaling unit sizes from 220 MW to 700 MW, incorporating enhanced safety features and operational efficiencies. The Committee further appreciate NPCIL's capability enhancement across multiple reactor technologies, including experience gained in Boiling Water Reactors (TAPS-1&2) and Light Water Reactors (Kudankulam Units with Russian cooperation), as well as the ongoing initiatives for developing Bharat Small Modular Reactor (BSMR) and evolving 900–1000 MW Indian Light Water Reactor (LWR) designs, which are essential for future deployment and technological competitiveness. The Committee also recognize that these technological advancements form a critical component of India's long-term three-stage nuclear power programme to ensure fuel sustainability and strategic autonomy.

However, the Committee are of the opinion that India's overall installed nuclear capacity remains modest compared to leading global nuclear nations, primarily due to historical technology denial regimes and slower scale-up of indigenous advanced reactor designs. The Committee observe that although PHWR

technology remains the backbone of the nuclear programme, there is an opportunity to steadily advance towards higher-capacity reactors, gradually reducing reliance on foreign collaborations for LWRs, and encourage the development of next-generation reactors, in support of the nuclear energy expansion target of 100 GW by 2047.

In view of the above, the Committee recommend that NPCIL, in coordination with DAE and BARC, should fast-track indigenous development of advanced reactor technologies including Indian LWR designs, BSMR deployment, and future reactors aligned with India's three-stage programme. Moreover, indigenisation of nuclear equipment manufacturing should be aggressively expanded through technology transfer, vendor development, certification frameworks, and creation of multiple supply chain sources for critical components. The Committee further recommend that a well-defined technology advancement roadmap should be established with clear milestones, benchmarking against global standards, and periodic review to ensure sustained innovation and competitiveness. Human resource development in advanced nuclear technologies should also be prioritized through enhanced collaborations with academic and R&D institutions, long-term skill development programmes and international knowledge exchange through platforms such as World Association of Nuclear Operators (WANO), International Atomic Energy Agency (IAEA) and CANDU (Canadian deuterium uranium) Owners Group (COG).

5. *Financial Sustainability and Capital Investment Strategy*

The Committee note that NPCIL has consistently demonstrated sound financial performance, with capital expenditure showing an upward trend and reaching its highest-ever level of ₹17,984 crore in FY 2024-25, reflecting strong project implementation momentum and the ability to mobilize significant financial resources from the market to support an estimated ₹2.6 lakh crore capital outlay for 17 reactors under implementation. In addition to this, the Committee note from the submissions of NPCIL that the Company has maintained a AAA credit rating over several years, reflecting strong financial fundamentals and lender confidence.

Further, NPCIL has been complying with SEBI (LODR) requirements as a High Value Debt Listed Entity, ensuring public disclosure of quarterly results and adherence to corporate governance norms.

While this reflects financial stability and lender confidence in NPCIL's long-term business model, the Committee underline the value of resolving ongoing tax matters related to decommissioning funds, R&D and renovation funds, which have been subjected to extended litigation across multiple assessment years. The Committee further note that some of these matters remain pending for considerable periods, including a refund from IT authorities, resolution of which could help improve liquidity and financial efficiency. Therefore, NPCIL may conduct periodic financial risk scenario analysis covering exchange-rate variations, interest rate exposure, project delays and cost escalation risks to maintain financial stability.

Additionally, the Committee recommend that DAE should expeditiously resolve the ambiguity regarding ownership and accounting responsibility of the decommissioning fund by formally confirming the liability position, in order to settle the ongoing taxation disputes and avoid undue financial burden on NPCIL. Moreover, NPCIL should pursue timely recovery of pending refunds and continue to strengthen financial governance by closely monitoring contingent liabilities and litigation-linked financial exposures.

6. *Enhancing Nuclear Safety Framework and Regulatory Oversight*

The Committee note that NPCIL accords highest priority to nuclear safety across siting, design, construction, commissioning and operation, incorporating defence-in-depth features and redundancy as per Atomic Energy Regulatory Board (AERB) codes and guidelines. The Committee also observe that NPCIL operates a multi-tier safety review mechanism, internally at plant and headquarters level, and independently through AERB with continuous monitoring of radiation levels and operational performance. While acknowledging India's impeccable safety record over 55 years with no incidents of radioactive release beyond permissible limits, the Committee recommend further strengthening of regulatory transparency

through periodic publication of safety review findings, implementation of global peer-review mechanisms, and accelerated deployment of advanced safety technologies including digital instrumentation and control upgrades. The Committee desire that AERB capacity be enhanced for real-time surveillance and timely enforcement actions to ensure sustained compliance with evolving nuclear safety standards. To this extent, the Committee recommend developing centralized digital safety oversight platforms linking plant instrumentation systems with AERB and NPCIL safety monitoring centres for near real-time surveillance. The Committee further recommend strengthening internal safety culture audits, cross-site peer reviews, and emergency preparedness exercises involving district and State disaster response institutions. The Committee also recommend periodic evaluation of aging management programmes to extend safe reactor life cycles in compliance with regulatory conditions.

7. ***Strengthening Radiation Monitoring, Environmental Protection and Community Confidence***

The Committee take note of the comprehensive environmental monitoring system including Environmental Survey Laboratories (ESLs) covering up to 30 km radius, and strict compliance with (Ministry of Environment, Forest and Climate Change (MoEF&CC) and State Pollution Control Board norms on discharges. In addition, the Committee note that ESLs located at all nuclear power stations continuously monitor air, water, soil, marine life and agricultural produce in the surrounding areas, and data has consistently shown radiation levels to be well below regulatory limits.

The Committee appreciate that radiation dose levels around NPCIL plants remain significantly lower than the AERB limit of 1000 µSv (micro sieverts)/year across all sites between 2018-2022. However, recognising public apprehensions regarding marine ecology, agriculture and fisheries, the Committee recommend expansion of independent, publicly-accessible reporting on environmental indicators and increased involvement of scientific institutions in continuous thermo-ecological and radiological studies. Additionally, the Committee recommend installation of

public-facing real-time radiation and environmental monitoring display boards at prominent locations in plant-adjacent communities. The Committee further place importance on effective emergency preparedness frameworks, periodic multi-agency exercises with community participation and improved stakeholder engagement to bolster public confidence in nuclear safety and environmental protection.

8. *Improving Waste Management Practices and Advancing Closed Fuel Cycle Technologies*

The Committee note that India follows a closed-fuel cycle wherein spent fuel is treated as a resource and wastes generated in nuclear stations are immobilized and stored in certified engineered structures with AERB oversight. Further, reprocessing and waste management activities are undertaken at Trombay, Tarapur and Kalpakkam, which have demonstrated sustained operational performance excellence. The Committee also acknowledge that discharges from the nuclear plants remain well within regulatory limits with no adverse impacts recorded on public health or agricultural productivity. While appreciating these measures, the Committee recommend that NPCIL expedite long-term strategies for deep geological repositories, strengthen tracking of radioactive waste throughout its lifecycle and integrate advanced volume reduction and vitrification technologies. The Committee also desire closer coordination with BARC and global research partners to enhance reprocessing efficiency and minimize environmental footprint, thereby reinforcing nuclear power as a safe and sustainable contributor to India's net-zero commitments and future energy requirements.

9. *Accelerating Policy Reforms and Strategic Enablers for Nuclear Capacity Expansion*

The Committee note that NPCIL continues to face certain policy and regulatory requirements, including multi-stage reviews and clearances for repeat design projects as well as varied procedures for environmental consents, which may at times contribute to schedule extensions and additional project costs. The

Committee also observe that NPCIL has sought enhanced delegation of financial and administrative powers to its Board—similar to Maharatna PSUs—to expedite decision-making, alongside restoration of mega-project concessions/GST waivers, and inclusion of nuclear power within national green taxonomy and financial incentive frameworks at par with renewable energy. Furthermore, the Committee recognise the need for strengthened participation of State Governments across the full lifecycle of nuclear plants, especially in land acquisition, local engagement and facilitation of critical infrastructure, water supply and emergency planning. Additionally, the Committee note that pre-project activities, including land acquisition, environmental clearances and public consultations, are underway at Kaiga, Gorakhpur, Chutka and Mahi Banswara, and timely State-level support is critical for their progress. The Committee believe that strengthening State coordination mechanisms, ensuring timely water and infrastructure provisioning, and integrating nuclear power into national clean energy finance frameworks will accelerate commissioning timelines and enhance energy security outcomes.

While appreciating the initiatives undertaken by NPCIL to expand indigenous nuclear capacity, the Committee recommend that the Government establish a streamlined, single-window regulatory clearance system for repeat reactor designs and environmental approvals, revisit fiscal incentives to restore competitive project economics. The Committee desire that the Government may explore options to consider empowering NPCIL's Board with greater autonomy in financial sanctioning of equity-funded projects. The Committee further desire that mechanisms be developed for proactive resolution of State-level issues, enhanced nuclear liability insurance availability, and stronger frameworks supporting local employment, women's participation and welfare of Project Affected Persons (PAPs). The Committee believe that these reforms will accelerate the timely commissioning of new nuclear projects and bolster India's march towards energy security and net-zero commitments.

10. *Scaling Domestic Uranium Output Despite Geological Constraints*

The Committee note that UCIL is mandated to mine and process uranium for India's PHWR fleet, operating multiple underground and open-pit mines with processing plants in Jharkhand and Andhra Pradesh, and sending uranium concentrate to National Fuel Complex (NFC) for fuel fabrication for NPCIL's reactors. The Committee also observe that while Atomic Minerals Directorate for Exploration and Research (AMD) has established about 4,31,000 tonnes of in-situ U_3O_8 (Uranium oxide) resources, only about 80,423 tonnes have been transferred to UCIL under MMDR/AMCR provisions, of which about 39.22% is already depleted, leaving about 60.78% presently available; at current production rates, these reserves can last about 40 years if no new reserves are added. Additionally, the Committee observe that new exploration and resource definition efforts by AMD in Jharkhand, Andhra Pradesh, Rajasthan and Chhattisgarh are ongoing to support long-term supply sustainability. The Committee also note that UCIL has highlighted challenges such as ore body depth, low ore grades, land acquisition hurdles, public resistance and tailings management, which can affect production schedules. Recognising the criticality of ore grades in India (0.02–0.045%) vis-à-vis much higher grades abroad, which raises costs and tailings burdens, the Committee underline the need to mitigate grade-related inefficiencies through technology upgrades and process intensification.

The Committee recommend that UCIL streamline and upgrade its existing mines/mills and commission higher-capacity plants on firm timelines; deploy advanced ore-body knowledge (3D seismic, downhole geophysics), sensor-based ore sorting and mine automation to improve head grades and reduce unit costs; expand brownfield capacity at Turamdih/Jaduguda/Tummalapalle while accelerating greenfield centres in Rajasthan and Andhra Pradesh with clear stage gates for resource-to-reserve conversion with AMD; and adopt best available tailings and water management practices proportionate to low-grade, high-throughput conditions. The Committee believe that adoption of automation, digital mine planning, advanced geophysics, enhanced beneficiation processes and State-level facilitation in land and water access will be essential to support NPCIL's

long-term fuel assurance strategy. The Committee expect UCIL's stated plan to double production by 2031–32 to be placed under a quarterly milestone-based review with transparent disclosure to DAE/NPCIL, given UCIL's pivotal role in fuelling the first stage of India's nuclear programme and long-term energy security.

11. *Regulatory Enablement: Lease-Extension, Single-Window Clearances and State Coordination*

The Committee note that newly identified or deeper extensions of ore bodies sometimes extend across existing lease boundaries, yet current statutes do not permit seamless lease-area extension, compelling separate leases and clearances which influence techno-economic viability, especially at depths beyond 600 metres, as highlighted for Narwapahar and other prospects. The Committee further observe that UCIL is required to follow multi-agency clearances (environment, forests, AERB, Directorate General of Mines Safety, Pollution Control Board, land and water permissions), along with social-license considerations and site-specific factors (such as tailings siting and water availability), which together can lengthen the process of initiating mining and ramping up capacity. The Committee observe that these multi-agency approval pathways can extend project timelines, with possible implications for fuel supply planning for PHWR reactors.

The Committee believe that time-bound single-window clearance mechanisms, coordinated between Central and State authorities, and provision for contiguous lease extensions for strategic minerals, with due safeguards, will significantly improve project viability and uranium production reliability. The Committee recommend that the Government may consider to amend relevant provisions under the MMDR/associated rules to enable contiguous lease-extension for strategic minerals like uranium when ore bodies extend beyond current boundaries, subject to stringent safety and environmental safeguards; operationalise a single-window clearance mechanism with statutory timelines for uranium mining/milling projects, integrating Central–State approvals and parallel processing of consents; institute a State-level facilitation framework covering land acquisition, PAP/R&R implementation, assured industrial water linkages, and

offsite emergency planning; alongwith creating an inter-agency escalation platform chaired by DAE to resolve bottlenecks within defined service-level agreements. The Committee believe that these reforms will meaningfully compress 'permit-to-production' cycles and improve UCIL's delivery reliability to NPCIL.

12. *Securing Fuel Supply: Pricing, Imports, Overseas Assets and Strategic Stockpiles*

The Committee note that the Nuclear Fuel Complex (NFC) ensures complete domestic fabrication of fuel assemblies for PHWRs using uranium concentrate supplied by UCIL or imports arranged under Government oversight. The Committee observe that DAE has pursued long-term supply agreements with multiple international partners to ensure continuous fuel availability for safeguarded reactors. Also, as per NPCIL's capacity expansion trajectory, PHWRs alone could require approximately 5,400 tonnes U_3O_8 per annum for about 25 GWe, while UCIL currently estimates catering to about 30% of this need, implicating persistent import reliance unless domestic production accelerates and diversified supply lines are established. The Committee also observe that (a) imports presently originate from Kazakhstan, Russia, Uzbekistan and Canada, with an Uzbek long-term contract valid upto 2026; (b) the pricing for domestic concentrate is cost-plus under the Chief Adviser (Cost) methodology and does not reference international prices; and (c) UCIL is not involved in import logistics, which are coordinated by DAE/NFC, while a UCIL–NTPC JV is being pursued to acquire overseas uranium assets to reduce exposure to market risks.

The Committee believe that establishing strategic uranium stockpiles, calibrated to refueling cycles and outage risks, is essential to sustaining reactor operations during supply disruptions. While appreciating the Government's careful stewardship of import contracts, the Committee recommend expediting the UCIL–NTPC JV with clear governance, due diligence protocols and sovereign-risk mitigation to acquire stakes in low-cost overseas mines; instituting a blended pricing and performance framework for UCIL that preserves cost transparency while benchmarking productivity (recovery, availability, unit costs) and incentivising efficiency gains; and finalising a policy pathway for Mine Developer-

cum-Operator (MDO) participation under strict DAE oversight to augment domestic output where appropriate.

13. ***Enhancing Corporate Governance, Board Effectiveness and Risk Oversight at NPCIL***

The Committee note that NPCIL has an established Board structure comprising Functional Directors, Government (Part-Time) Directors and Independent Directors, with 17 Members presently in position against a sanctioned strength of 18, and that the process is underway to fill the vacant post of Director (Finance). The Committee also observe that NPCIL follows AEC-approved governance guidelines aligned with strategic considerations of the nuclear sector, and the Company regularly undergoes corporate governance audits, including compliance with DPE Guidelines and Securities and Exchange Board of India Listings Obligations and Disclosure Requirements (SEBI LODR) requirements as a high-value debt-listed entity, with no current legal or regulatory disputes reported.

While appreciating initiatives like establishment of key Board committees including Audit, Nomination & Remuneration, Risk Management, and Stakeholders Relationship Committees and operational policies such as Whistle Blower protection and Code of Conduct adherence, the Committee recommend that NPCIL further strengthen governance transparency and risk oversight by expediting timely appointments to all Board-level positions, enhancing capacity of Independent Directors to scrutinize management decisions in line with expanding nuclear ambitions, and instituting more rigorous monitoring of audit findings and risk mitigation actions. Additionally, Committee observe that the Risk Management Committee is supported by a Chief Risk Officer and mandated quarterly reporting to the Board. The Committee also note that NPCIL has implemented Whistle Blower and Vigil Mechanisms, as well as employee communication and welfare initiatives. The Committee desire that the Company, in view of the large-scale expansion target of adding 54 GW nuclear capacity by 2047, adopt globally benchmarked practices on disclosure, stakeholder engagement including public perception and employee feedback mechanisms and digital governance systems

to ensure accountability, financial prudence and ethical compliance across its rapidly growing operational footprint. The Committee further recommend strengthening Board-level project monitoring dashboards covering cost, schedule, safety compliance and procurement risks, establishment of structured stakeholder engagement and employee feedback frameworks, ensuring transparent and responsible organizational growth.

14. *Strengthening NPCIL's Global Competitiveness and International Market Presence*

The Committee note that the Nuclear Power Corporation of India Limited (NPCIL) has emerged as a technologically capable organisation in the international nuclear power landscape, having built strong indigenous design, construction and operational capacities through sustained focus on domestic nuclear power development. The Committee also note that NPCIL has successfully developed and scaled its Pressurised Heavy Water Reactor (PHWR) technology from 220 MW to 700 MW, in close collaboration with BARC and the Department of Atomic Energy, thereby establishing a credible technological foundation and a strong safety and performance record.

However, the Committee observe that NPCIL's international footprint remains limited in comparison to major global nuclear vendors, especially in the context of larger capacity reactors and scaling up the power generation capacity. Additionally, the committee are of the considered view that continued reliance on domestic deployment alone may limit its ability to evolve as a globally competitive nuclear power company.

In view of the above, the Committee recommend that NPCIL adopt a focused and time bound internationalisation strategy, by accelerating the development and commercialisation of indigenous Light Water Reactors (LWRs) and modular reactor technologies aligned with prevailing global market demand. The Committee further recommend that NPCIL strengthen strategic partnerships with established international nuclear vendors and actively participate in joint ventures and global supply chains to enhance credibility and market access. The Committee also

encourage NPCIL to enhance project execution efficiency, strengthen cost competitiveness and explore suitable financing mechanisms for overseas projects. Further, the Committee recommend expanding collaboration with international regulatory and safety bodies and investing in advanced human resource development to enable NPCIL to attain global standards of excellence and competitiveness.

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New Delhi:
08 December, 2025
17 Agrahana, 1947(S)

BAIJAYANT PANDA
Chairperson,
Committee on Public Undertakings

APPENDIX - I

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

MINUTES OF THE SECOND SITTING OF THE COMMITTEE

The Committee sat on Thursday, 26 June, 2025 from 1500 hrs. to 1640 hrs. in Committee Room No. '1', Ground Floor, Extension to Parliament House Annexe, New Delhi.

PRESENT

Shri Baijayant Panda - Chairperson

MEMBERS

Lok Sabha

2. Shri Tariq Anwar
3. Smt. Kanimozhi Karunanidhi
4. Shri B.Y. Raghavendra
5. Shri Mukesh Rajput
6. Shri Pratap Chandra Sarangi
7. Shri Kodikunnil Suresh
8. Shri Prabhakar Reddy Vemireddy
9. Shri Lalji Verma

Rajya Sabha

10. Shri Neeraj Dangi
11. Dr. Bhagwat Karad
12. Shri Arun Singh

SECRETARIAT

1. Shri Anjani Kumar - Joint Secretary
2. Shri Dhruv - Under Secretary

PART-A:

XXX XXX XXX XXX

Then, the Committee took up the next agenda of the day.

PART-B:

REPRESENTATIVES FROM NUCLEAR POWER CORPORATION OF INDIA LIMITED

1.	Shri B.C. Pathak	-	CMD
2.	Shri V. Rajesh	-	Director
3.	Shri B.V.S. Sekhar	-	Executive Director
4.	Shri K.N. Babooraj	-	Executive Director

4. As the second agenda of the sitting, the Chairperson informed the Members that the Committee would be briefed by the representatives of the Nuclear Power Corporation of India Limited (NPCIL) in connection with its comprehensive examination. The Committee Secretariat, then, made a Power Point Presentation explaining major issues relating to the subject.

[The witnesses were, then, called in]

5. The Chairperson welcomed the representatives of NPCIL to the sitting of the Committee and noted that this was the first-ever appearance of NPCIL before the Committee. He, then, put forth the major points the Committee desired to discuss relating to the subject and drew their attention to Direction 55(1) of the 'Directions by the Speaker' regarding maintaining confidentiality of the discussion held before the Parliamentary Committee.

6. Thereafter, the representatives of NPCIL made a Power Point Presentation highlighting an overview of NPCIL's profile, history, performance, safety protocols, CSR activities, future plans, current electricity generation capacity of 8,880 MW across 25 reactors, target of 22,000 MW to be achieved by 2031-32, status of the ongoing 17 sanctioned reactor projects, initiatives for Bharat Small Modular Reactor in collaboration with Bhabha Atomic Research Centre (BARC), etc.

7. The Members, then, sought clarifications from the representatives of NPCIL on various issues related to the subject viz., Safety & Environmental Impact of warm water discharge on marine life, nuclear waste management, safeguards for radiation exposure; operational and financial aspects such as cost of nuclear power generation vs. other energy sources; import of uranium, role Uranium Corporation of India of India Limited

(UCIL) in supplying uranium to NPCIL; ongoing projects; measures to improve women participation, local recruitment near project sites, hostel facilities, training programs. The other issues which were discussed included CSR activities- allocation for SC/ST, tribal, and fishermen communities, CSR beyond 16 km radius; strategic and R&D issues such as use of fusion vs. fission; research on thorium fuel and advanced reactors, plan for private sector participation; cases of surveillance activity or notice issued by foreign agencies on our nuclear power plants, mechanism to protect secrecy of the nuclear power projects/plants in the case of a trainee or an employee leaving the Company, etc.

8. Thereafter, the representatives of NPCIL responded on majority of the issues raised by the Members. In the end, the Chairperson thanked the representatives of NPCIL and directed that in respect of points for which information was not readily available or if more information were required to be furnished, written replies thereon may be furnished to the Committee Secretariat within 10 days.

The Committee, then, adjourned.

A copy of verbatim proceedings of the sitting has been kept on record.

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APPENDIX – II

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

MINUTES OF THE THIRD SITTING OF THE COMMITTEE

The Committee sat on Monday, 21 July 2025 from 1530 hrs. to 1640 hrs. in Committee Room No. '3', Ground Floor, Extension to Parliament House Annexe, New Delhi.

PRESENT

Shri Baijayant Panda - Chairperson

MEMBERS

Lok Sabha

2. Shri Tariq Anwar
3. Shri Chandra Prakash Joshi
4. Shri Shankar Lalwani
5. Smt. Poonemben Hematbhai Maadam
6. Shri B.Y. Raghavendra
7. Shri Mukesh Rajput
8. Shri Sukhjinder Singh Randhawa
9. Shri Pratap Chandra Sarangi
10. Shri Kodikunnil Suresh
11. Shri Lalji Verma

Rajya Sabha

12. Dr. John Brittas
13. Shri Neeraj Dangi
14. Shri Milind Murli Deora
15. Dr. Bhagwat Karad
16. Shri Arun Singh

SECRETARIAT

1. Shri Anjani Kumar - Joint Secretary
2. Smt. Mriganka Achal - Director
4. Shri Tenzin Gyaltsen - Deputy Secretary

REPRESENTATIVES FROM URANIUM CORPORATION OF INDIA LIMITED (UCIL)

1.	Shri Santosh Kumar Satpati	-	CMD
2.	Shri Manoj Kumar	-	Director (Technical)
3.	Shri B.K. Das	-	Director (Finance)
4.	Shri M.K. Singhal	-	Executive Director
5.	Shri B.C. Gupta	-	Company Secretary

2. At the outset, the Chairperson welcomed the Members to the sitting of the Committee and briefly apprised them about the agenda of the sitting i.e. to have a briefing by the representatives of UCIL in connection with the comprehensive examination of the subject “Nuclear Power Corporation of India Limited (NPCIL)”. The Committee Secretariat, then, made a Power Point Presentation explaining the major issues relating to the subject.

[The witnesses were, then, called in]

3. The Chairperson welcomed the representatives of UCIL to the sitting of the Committee and put forth the major points which the Committee desired to discuss with regard to the subject. He, then, drew their attention to Direction 55(1) of the 'Directions by the Speaker' regarding maintaining confidentiality of the discussion held before the Parliamentary Committee.

4. Thereafter, the representatives of UCIL made a Power Point Presentation highlighting an overview of UCIL’s profile, map of Uranium deposits across India, UCIL’s growth history including its vision for the future, information regarding networks of existing mines and ore processing facilities, current status of its workforce, alongwith focus areas of CSR activities, forthcoming challenges and outlook of uranium mining and milling, and steps taken for Research and Development (R&D) work and related developmental activities.

5. The Members, then, sought clarifications from the representatives of UCIL on various issues related to the subject viz., issues regarding India’s uranium reserves and its quality, UCIL’s role in India’s nuclear power production esp. w.r.t. the target of producing 100 GW by 2047, proportion of imported and domestic uranium being used in

India's nuclear power plants by NPCIL, role of UCIL in import of uranium, plans for thorium mining alongwith UCIL's role in thorium mining, roadmap and steps taken for meeting the uranium demands of the country, plans and proposals for progressively increasing nuclear power production in the near future. The other issues that were discussed included any collaboration activity being planned with foreign countries and entities, physical and financial progress of the ongoing uranium mining and expansion projects including new projects, coordination between UCIL and NPCIL in forecasting the demand regarding uranium logistics and strategical reserve management, long-term strategy for reducing India's dependency on imported uranium, pricing mechanism of domestic uranium vis-à-vis the international pricing, etc.

6. Thereafter, the representatives of UCIL responded to some of the issues and queries raised by the Members. In the end, the Chairperson thanked the representatives of UCIL and directed that in respect of the points for which information was not readily available or if more information were required to be furnished, written replies thereon may be furnished to the Committee Secretariat within 10 days.

The Committee, then, adjourned.

A copy of verbatim proceedings of the sitting has been kept on record.

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APPENDIX – III

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

MINUTES OF THE FOURTH SITTING OF THE COMMITTEE

The Committee sat on Monday, 31 July 2025 from 1500 hrs. to 1620 hrs. in Committee Room 'C', Parliament House Annexe, New Delhi.

PRESENT

Shri Baijayant Panda - Chairperson

MEMBERS

Lok Sabha

2. Shri Tariq Anwar
3. Shri Chandra Prakash Joshi
4. Shri Kaushalendra Kumar
5. Shri Shankar Lalwani
6. Smt. Poonemben Hematbhai Maadam
7. Shri Mukesh Rajput
8. Shri Sukhjinder Singh Randhawa
9. Shri Kodikunnil Suresh
10. Shri Lalji Verma

Rajya Sabha

11. Dr. John Brittas
12. Shri Neeraj Dangi
13. Dr. Bhagwat Karad
14. Shri Arun Singh

SECRETARIAT

1. Shri Anjani Kumar - Joint Secretary
2. Smt. Mriganka Achal - Director
4. Shri Tenzin Gyaltsen - Deputy Secretary

REPRESENTATIVES FROM NUCLEAR POWER CORPORATION OF INDIA LIMITED (NPCIL)

1.	Shri B.C. Pathak	-	CMD
2.	Shri Shri V. Rajesh	-	Director (Technical)
3.	B.V.S. Sekhar	-	Executive Director
4.	Shri K.N. Babooraj	-	Executive Director

REPRESENTATIVES FROM URANIUM CORPORATION OF INDIA LIMITED (UCIL)

1.	Shri S.K. Satpati	-	CMD
2.	Shri Manoj Kumar	-	Director (Technical)
3.	Shri B.K. Das	-	Director (Finance)

2. At the outset, the Chairperson welcomed the Members to the sitting of the Committee and briefly apprised them about the agenda of the sitting i.e. to take evidence of the representatives of NPCIL and UCIL in connection with the comprehensive examination of NPCIL.

[The witnesses were, then, called in]

3. The Chairperson welcomed the representatives of NPCIL and UCIL to the sitting of the Committee and put forth the major points which the Committee desired to discuss with regard to the subject. He, then, drew their attention to Direction 55(1) of the 'Directions by the Speaker' regarding maintaining confidentiality of the discussion held before the Parliamentary Committee.

4. Thereafter, the representatives of NPCIL made a Power Point Presentation followed by that of UCIL. NPCIL's presentation highlighted various aspects of nuclear power production such as features of India's three stage nuclear power programme, differences between nuclear fuel and spent fuel including storage of spent fuel, details regarding India's closed fuel cycle and radioactive waste management at nuclear power plants, perspective on radiation exposure, development of surrounding areas of nuclear power plants as green belts and exclusion zones together with the management of flora and fauna in such areas, ratio of women in the workforce of NPCIL, etc.

5. UCIL's presentation highlighted a comparison of the quality of India's uranium vis-a-vis that of other countries, availability and comparison of India's total uranium reserve, existing mines and projects available with UCIL for mining, different mining methods being adopted in the country and the world, challenges being faced by UCIL in mining and milling, price fixation mechanism of uranium concentrate, strategies to reduce import dependency, etc.

6. The Members, then, sought clarifications from the representatives of NPCIL and UCIL on various issues relating to the subject, viz. NPCIL's dependency on UCIL for uranium regarding its indigenous nuclear power plants, coordination between NPCIL and UCIL including roadmap for achieving the set targets of both companies, strategies being adopted for reducing import dependency, yearly targets for setting up of new nuclear power plants and steps taken for doubling nuclear power production by 2032-33 and beyond, fuel security, need for self-sufficiency in uranium capacity expansion including its efficiency, pricing aspects, operational safety and environmental impact. The other issues which were discussed included land acquisition issues and delay in compensation, cases of time and cost overruns of nuclear power projects, quantum of funds required in the next 10 years by both NPCIL and UCIL and mechanism for mobilization of funds, challenges and constraints being faced by both the companies, UCIL's requirement regarding concession to mine beyond lease areas, lack of cooperation from State Governments regarding demarcation of mining areas, etc.

7. Thereafter, the representatives of both NPCIL and UCIL responded to majority of the points and queries raised by the Members. In the end, the Chairperson thanked the representatives of NPCIL and UCIL and directed that in respect of the points for which information was not readily available or if more information were required to be furnished, written replies thereon may be furnished to the Committee Secretariat within 10 days.

The Committee, then, adjourned.

A copy of verbatim proceedings of the sitting has been kept on record.

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APPENDIX – IV

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

MINUTES OF THE FIFTH SITTING OF THE COMMITTEE

The Committee sat on Friday, the 1st August, 2025 from 1500 hrs. to 1550 hrs. in Committee Room No. '1', Ground Floor, Extension to Parliament House Annexe, New Delhi.

PRESENT

Shri Baijayant Panda - Chairperson

MEMBERS

Lok Sabha

2. Shri Tariq Anwar
3. Shri Kaushalendra Kumar
4. Shri Mukesh Rajput
5. Shri Pratap Chandra Sarangi
6. Shri Prabhakar Reddy Vemireddy
7. Shri Lalji Verma

Rajya Sabha

8. Shri Neeraj Dangi
9. Dr. Bhagwat Karad
10. Shri Surendra Singh Nagar
11. Shri Arun Singh

SECRETARIAT

1. Shri Anjani Kumar - Joint Secretary
2. Smt. Mriganka Achal - Director
3. Shri Tenzin Gyaltsen - Deputy Secretary

PART-A:

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Then, the Committee took up the next agenda of the sitting.

PART-B:

REPRESENTATIVES FROM DEPARTMENT OF ATOMIC ENERGY (DAE)

1.	Dr. Ajit Kumar Mohanty	-	CMD
2.	Shri Karthigeyan P. Subramanyam	-	Joint Secretary
3.	Smt. Anjali Sinha	-	Joint Secretary

2. Before the start of the second agenda of the sitting, the Committee discussed and decided to undertake a study visit around mid-September of this year, i.e. 2025.

3. The Chairperson, then, informed the Members that the Committee would take evidence of the representatives of DAE in connection with the comprehensive examination of the subject “Nuclear Power Corporation of India Limited (NPCIL)”. The Committee Secretariat, then, made a Power Point Presentation explaining the major issues relating to the subject.

[The witnesses were, then, called in]

4. The Chairperson welcomed the representatives of DAE to the sitting of the Committee and put forth the major points which the Committee desired to discuss with regard to the subject. He, then, drew their attention to Direction 55(1) of the 'Directions by the Speaker' regarding maintaining confidentiality of the discussion held before the Parliamentary Committee.

5. Thereafter, the representatives of DAE made a Power Point Presentation highlighting an overview of DAE’s role in India’s nuclear programme, various organisations and institutes under DAE, scenario on uranium, thorium and rare earth mining in India, various Heavy Water Plants, process of nuclear fuel fabrication, the way forward for increasing the capacity of India’s nuclear power production, etc.

6. The Members, then, sought clarifications from the representatives of DAE on various issues related to the subject viz., issues regarding DAE's support for NPCIL's plan of adding 50 GW of nuclear power capacity by 2047, timelines for achieving the same, year-wise capacity additions, DAE's role and effort in achieving self-sufficiency in uranium and reducing import, policy constraints being faced, safety and environmental concerns and financing mechanism for the ongoing and future projects of NPCIL. The other issues which were discussed included per unit cost of generation of power, overall return on investment, contingency plan in case of any disruption in the uranium supply chain, uranium stockpiling for use in future and uncertain times, concerns about Chinese control of rare earths, UCIL's request for certain relaxation of norms to expand their uranium mining, addressing public's negative perception regarding radiation effect and safety of uranium mining and nuclear plants, difficulties being faced by DAE or NPCIL in implementing their plans and policies, etc.

7. Thereafter, the representatives of DAE responded to most of the issues and queries raised by the Members. In the end, the Chairperson thanked the representatives of DAE and directed that in respect of the points for which information was not readily available or if more information were required to be furnished, written replies thereon may be furnished to the Committee Secretariat within 10 days.

The Committee, then, adjourned.

A copy of verbatim proceedings of the sitting has been kept on record.

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APPENDIX – V

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

MINUTES OF THE FIFTEENTH SITTING OF THE COMMITTEE

The Committee sat on Friday, 05 December, 2025 from 1000 hrs. to 1045 hrs. in Committee Room No. '2', Ground Floor, Extension to Parliament House Annexe, New Delhi.

PRESENT

Shri Baijayant Panda - Chairperson

MEMBERS

LOK SABHA

2. Shri Tariq Anwar
3. Shri Chandra Prakash Joshi
4. Shri Kaushalendra Kumar
5. Shri Shankar Lalwani
6. Shri B.Y. Raghavendra
7. Shri Mukesh Rajput
8. Shri Sukhjinder Singh Randhawa
9. Shri Prabhakar Reddy Vemireddy
10. Shri Lalji Verma

RAJYA SABHA

11. Dr. John Brittas
12. Shri Neeraj Dangi
13. Shri Milind Murli Deora
14. Dr. Bhagwat Karad
15. Shri Surendra Singh Nagar
16. Shri Debashish Samantaray
17. Shri Arun Singh

SECRETARIAT

1. Shri Anjani Kumar - Joint Secretary
2. Smt. Mriganka Achal - Director
3. Shri Tenzin Gyaltsen - Deputy Secretary

2. The Hon'ble Chairperson briefly apprised the Members on the Eleven draft Reports. The Committee then considered and adopted the following draft reports, without any changes/modifications: -

i. Sagarmala Finance Corporation Limited (SFCL) (Comprehensive Examination);

ii. Rural Electrification Corporation Limited (REC Limited) (Comprehensive Examination);

iii. Nuclear Power Corporation of India Limited (NPCIL) (Comprehensive Examination);

iv. Review of Performance of Petroleum & Natural Gas Sector CPSUs (Horizontal Examination);

v. "Para No. 2.4 of C&AG Report No. 14 of 2021 regarding 'Loss due to flaring of High-pressure gas' relating to Oil & Natural Gas Corporation (ONGC) Limited. (Audit Based Examination);

vi. Action Taken by the Government on the Observations/ Recommendations contained in the First Report (18th Lok Sabha) on "Procurement of hardware/software item to the tune of Rs. 890.34 Crores through strategic alliance" relating to National Informatics Centre Services Inc. (NICSI)" [Based on Audit Para No. 6.1 of C&AG Report No. 03 of 2021];

vii. Action Taken by the Government on the Observations/ Recommendations contained in the Third Report (18th Lok Sabha) on "Undue enrichment through recovery of turnover tax from consumer" relating to Indian Oil Corporation Limited (IOCL) [Based on Audit Para No. 2.1 of C&AG Report No. 14 of 2021];

viii. Action Taken by the Government on the Observations/ Recommendations contained in the Ninth Report (18th Lok Sabha) on "Industrial Finance Corporation of India Limited (IFCI ltd)";

ix. Action Taken by the Government on the Observations/ Recommendations contained in the Tenth Report (18th Lok Sabha) on "Design and Development (D&D) in Hindustan Aeronautics Limited (HAL)" [Based on Chapter-II of C&AG Report No. 18 of 2023];

x. Action Taken by the Government on the Observations/ Recommendations contained in the Eleventh Report (18th Lok Sabha) on "Reviewing timely

submission of Action Taken Notes (ATNs) on C&AG Paras/Reports (Commercial) by the Ministries/Departments"; and

xi. Action Taken by the Government on the Observations/ Recommendations contained in the twelfth Report (18th Lok Sabha) on "IREL (India) Limited".

3. The Committee authorized the Chairperson to finalize the draft Reports on the basis of factual verification as suggested by the concerned CPSUs/Ministry/ Department/C&AG and presentation of the same during the current session of Parliament.

The Committee, then, adjourned.

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