Press Release on the 406th Report of the Department-related Parliamentary Standing Committee on Science and Technology, Environment, Forests and Climate Change

Posted On: 25 MAR 2026 6:45PM by PIB Delhi

The Department-related Parliamentary Standing Committee on Science and Technology, Environment, Forests and Climate Change under the Chairmanship of Shri Bhubaneswar Kalita, M.P., Rajya Sabha presented/laid on the Table its 406th Report on Demands for Grants (2026-27) of the Department of Atomic Energy, in both the Houses of Parliament on the 25th March, 2026. The Committee considered and adopted the draft Report in its meeting held on 24th March, 2026. The Recommendations/observations made by the Committee in this Report are enclosed.

2. The entire Report is also available on *https://sansad.in/rs*.

406th Report on Demands for Grants (2026-27) of the Department of Atomic Energy

RECOMMENDATIONS/OBSERVATIONS-AT A GLANCE

BUDGET ANALYSIS

The Committee urges the Ministry of Finance to sympathetically consider the Department's requirements at the R.E. stage, particularly for time-sensitive nuclear programmes.

(Para 2.6)

The Committee observes that the capital expenditure utilization vis-à-vis the Revised Estimate has been consistently high — ranging from 97% to 109% over the five-year period from 2020-21 to 2024-25. The Committee notes, however, a persistent pattern of significant downward revision between the Budget Estimate and the Revised Estimate in capital allocations. This pattern, which recurs across multiple financial years, suggests systematic over-estimation at the budget preparation stage. To enhance financial discipline and project execution, the Committee recommends that the Department should adopt the following corrective measures: firstly, Budget Estimates for capital schemes should be prepared based exclusively on projects that have received formal sanction, while proposals pending approval are tracked separately as a forward pipeline to ensure transparency in future planning; and secondly, a mandatory pre-budget review should be conducted to evaluate procurement readiness and contractor availability prior to the finalization of capital provisions.

(Para 2.11)

The Committee notes certain significant anomalies in the head-wise expenditure data. The Nuclear Fuel Complex (NFC) recorded actual expenditure of Rs. 2,885.65 crore against an original Budget Estimate of merely Rs. 263.20 crore for 2025-26 — representing expenditure of over ten times the budgeted amount, met through Revised Estimate adjustments and supplementary provisions. Similarly, Heavy Water Pool Management recorded actual expenditure of Rs. 3,000 crore against a Budget Estimate and Revised Estimate of nil. The Committee recommends that the Department should ensure that anticipated extraordinary payment cycles of this nature are explicitly reflected in the Budget Estimates with adequate explanatory notes, so as to present a true and complete picture of planned expenditure.

(Para 2.13)

The Committee observes that the significant gap between BARC's capital R&D Budget Estimate and actual utilization reflects a recurring pattern of over-estimation at the budget preparation stage, compounded by procedural delays in project execution. The near-doubling of the capital allocation to Rs.1,800 crore in B.E. 2026-27 is a welcome recognition of BARC's expanded research mandate, but the Committee cautions that enhanced allocations must be matched with commensurate improvements in execution readiness. The Committee recommends that the Department should ensure that BARC's capital Budget Estimates are henceforth prepared strictly on the basis of sanctioned projects with verified procurement readiness, and that a formal mid-year review mechanism be instituted to identify and resolve execution bottlenecks before they result in year-end underutilization. The Committee also recommends that the contractor empanelment initiative be implemented expeditiously and extended to all secured DAE installations, so that procurement constraints unique to nuclear establishments do not continue to impede timely capital expenditure.

(Para 2.15)

Regarding the Indira Gandhi Centre for Atomic Research (IGCAR), the Committee has observed significant underutilization of capital R&D allocations, with actual expenditure amounting to just Rs.49.42 crore against a Budget Estimate of Rs.225 crore and a Revised Estimate of Rs.67.86 crore for 2025-26. While the Department attributed this to the completion of most capital projects in 2023-24 and the sanctioning of new projects only in October 2025, the Committee views this as indicative of a deeper structural issue. The gap between the conclusion of one project cycle and the initiation of the next has resulted in a prolonged expenditure vacuum at a premier nuclear research institution. To prevent such disruptions to institutional productivity, the Committee recommends that the Department should plan for a steady stream of projects at IGCAR.

(Para 2.16)

The Committee examined the financial performance of Raja Ramanna Centre for Advanced Technology (RRCAT) and noted with concern the sharp downward revision of its capital R&D allocation from Rs. 178.60 crore (B.E. 2025-26) to Rs. 63 crore (R.E. 2025-26) — a reduction of 64.7%. The Department informed the Committee that this revision was necessitated by the fact that B.E. 2025-26 was prepared on the basis of proposals for new projects that were in various stages of the approval process but could not receive final sanction in time. The Committee strongly recommends that RRCAT, and all DAE institutions, should align their Budget Estimates strictly with projects that have received full sanction and for which procurement activities are ready to commence.

(Para 2.17)

The Committee is gravely concerned about the underfunding of uranium exploration activities. Uranium discovery and resource delineation are long-gestation activities with lead times of eight to twelve years between exploration and mine production. Any reduction in exploration investment today will translate into a fuel supply bottleneck for India's nuclear programme a decade hence. The Committee strongly recommends that the full shortfall of Rs.118.18 crore in AMDER's capital allocation be restored at the Revised Estimate stage of 2026-27. The Committee further recommends priority-based funding for AMDER for increased uranium and rare metal exploration to secure a stable domestic supply of nuclear fuel in alignment with India's long-term energy security objectives.

(Para 2.19)

The Committee notes with concern that BRIT's persistent underutilization in capital projects occurs in a context of rapidly growing demand for radioisotope-based diagnostics and therapy in India. Radioisotopes play a critical role in the management of cancer, cardiac conditions, and other life-threatening diseases. The Committee recommends that BRIT should implement a quarter-wise, milestone-linked execution plan for its Rs.76 crore capital allocation for 2026-27.

(Para 2.21)

The Committee examined the budgetary utilization of Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI), the implementing agency for the Prototype Fast Breeder Reactor (PFBR) at Kalpakkam. The head-wise data reveals that BHAVINI utilized only Rs. 50 crore against an R.E. of Rs. 150 crore and B.E. of Rs. 374 crore for 2025-26 - a utilization of merely 33.3% of the Revised Estimate. The B.E. for 2026-27 has been set at Rs. 200 crore. The Committee observes that BHAVINI's severe underutilization is particularly concerning given that approximately 70% of the PFBR core has been loaded as on February 2026. As commissioning activities accelerate towards First Approach to Criticality, BHAVINI's expenditure requirements will increase significantly. The Committee recommends that the Department should prepare a quarter-wise cash flow plan for BHAVINI's Rs. 200 crore allocation for 2026-27, tied to specific commissioning milestones.

(Para 2.22)

The Committee notes that the wide year-to-year variation in utilization under this head - from 149.63% of R.E. in 2024-25 to a significant shortfall in 2025-26 - reflects India's considerable dependence on a single foreign supplier for an operationally critical input. The Committee recommends that the Department should prepare a comprehensive medium-term strategy for diversification of nuclear fuel supply for KKNPP, including assessment of the feasibility of indigenization of fuel fabrication for this reactor type. The Committee also recommends that payment schedules under the inter-governmental arrangement be structured, to the extent feasible, to minimize large year-to-year fluctuations in expenditure.

(Para 2.24)

The Committee examined the provisions made for the Atomic Energy Regulatory Board (AERB). AERB's operational allocation stands at Rs.132.80 crore for B.E. 2026-27, while the AERB Expansion Project capital allocation remains at Rs.14 crore — a level unchanged for two

consecutive years. The Department informed the Committee that major infrastructure expansions under Phase-II have been completed, and that additional funding is being sought under new projects. The Committee observes that with PFBR approaching commissioning, ten fleet-mode reactors planned, and Small Modular Reactors under active policy consideration, AERB's regulatory workload will increase substantially. The Committee recommends that the Department should prepare a comprehensive five-year capacity expansion plan for AERB — covering regulatory manpower, technical infrastructure, training facilities, and information systems — commensurate with India's planned nuclear expansion trajectory.

(Para 2.25)

The Committee notes that India's three-stage nuclear power programme is at an inflection point, with the imminent first criticality of PFBR marking the transition to Stage 2. The Fast Reactor Fuel Cycle Facility (FRFCF) at Kalpakkam has utilized Rs.311.51 crore against an R.E. of Rs.450 crore for 2025-26, and has been allocated Rs.600 crore in B.E. 2026-27. The Demonstration Fast Reactor F uel Reprocessing Plant (DFRP) has completed six hot commissioning campaigns. India's contribution to ITER for fusion research has been maintained at Rs.745 crore in B.E. 2026-27. The Committee commends the Department on these milestones, which represent decades of sustained scientific endeavour. The Committee recommends that the Department should prepare a consolidated roadmap for transition to Stage 2 and eventually Stage 3 - including projected timelines for PFBR commercial operation, fleet-mode FBR deployment, and FRFCF full commissioning.

(Para 2.26)

NUCLEAR POWER PROJECTS

The Committee takes note of the significant increase in nuclear electricity generation from 47,971 MUs in 2023–24 to 56,881 MUs in 2024–25, representing a growth of approximately 18.6 per cent, and commends the Department for this achievement. The Committee notes, however, that nuclear energy's share in the country's total electricity generation remains at a modest 3.1 per cent. Given the ambitious national target of achieving 100 GW of nuclear capacity by 2047 as envisaged under the SHANTI Act and related policy frameworks, the Committee is of the view that the current pace of capacity addition falls significantly short of what would be required to realize this target. The Committee therefore recommends that the Government should establish a dedicated, ring-fenced funding mechanism for nuclear capacity addition, insulated from year-to-year budgetary variability, so as to provide long-term financial certainty to ongoing and planned projects. The Committee further recommends that the Department should undertake a comprehensive review of the legislative, regulatory, and institutional factors constraining the pace of nuclear capacity addition, and take appropriate remedial measures to accelerate project execution in line with national energy targets.

(Para 3.6)

The Committee observes that several units across multiple stations, including TAPS-1, TAPS-2, MAPS-1 and KGS-1, remain under project mode or maintenance for extended periods, contributing to avoidable generation gaps. The Committee recommends that the Government should introduce a performance-linked accountability framework for units that remain in project mode or extended shutdown for prolonged periods, so as to create institutional incentives for timely restoration of generation capacity.

(Para 3.7)

The Committee notes that while NPCIL's revenue from operations grew from Rs. 18,484 crore in 2023–24 to Rs. 19,880 crore in 2024–25, its Profit Before Tax declined sharply from Rs. 6,486 crore to Rs. 4,343 crore — a reduction of approximately 33 per cent in a year of record electricity generation. The Committee finds this divergence between revenue growth and profit contraction to be a matter of serious concern. The Committee recommends that the Government cause an independent performance audit of NPCIL's cost structure to be undertaken, so as to identify the structural drivers of the divergence between revenue growth and profit contraction and to assess the efficiency of India's nuclear generation operations against international benchmarks. The Committee further recommends that NPCIL be encouraged to develop a strategy for revenue diversification beyond electricity tariff income, so as to improve its long-term financial resilience and reduce cost-per-unit of generation over time.

(Para 3.13)

The Committee observes that the PFBR, representing a national investment of Rs. 8,181 crore, remains in the commissioning stage without having commenced power production, and that no operating revenue, profit or dividend has been generated by BHAVINI. The protracted delay in the PFBR achieving commercial operation is a matter of deep concern, particularly in view of its strategic centrality to India's three-stage nuclear power programme. The Committee recommends that Government should introduce a milestone-linked budgetary release mechanism for BHAVINI, whereby future funding tranches are contingent upon regulatory certification of defined commissioning achievements, so as to align financial flows with actual technical progress. The Committee further recommends that BHAVINI should be encouraged to draw upon relevant international operational experience in fast breeder technology to reduce the risk of recurring technical delays.

(Para 3.14)

The Committee observes with concern that actual expenditure under the Nuclear Power Projects head in 2025–26 stood at only Rs. 503.59 crore up to January 2026 against a Budget Estimate of Rs. 2,086 crore — a utilization of merely 37.78 per cent even against the substantially reduced Revised Estimate of Rs. 1,332.83 crore. Juxtaposed against 2024–25, when actual expenditure of Rs. 2,244.43 crore exceeded the Revised Estimate of Rs. 1,500 crore by 149.63 per cent, this pattern reveals significant volatility in budgetary planning and execution under this head. The Committee recognises that the milestone-based nature of nuclear fuel procurement under inter-governmental arrangements introduces inherent variability; however, the scale of the fluctuation — from significant overshoot to deep undershoot within successive financial years — indicates that the planning and estimation framework for this head is inadequate. The Committee recommends that the Department should institute a quarterly monitoring mechanism to track fuel delivery milestones and projected payment obligations and use this to arrive at more accurate Budget Estimates, thereby reducing the recurrence of large supplementary demands on the one hand and large unspent provisions on the other.

(Para 3.24)

The Committee observes that a substantial portion of India's nuclear fuel for the Kudankulam Nuclear Power Plant is procured under inter-governmental arrangements with the Russian Federation, and that geopolitical conditions affecting this supply relationship have a direct bearing on India's nuclear fuel expenditure and electricity generation. The Committee recommends that the Government should set a clear policy objective of progressively reducing dependence on any single

external source for nuclear fuel supply, and take concrete steps towards expanding domestic uranium production, fuel fabrication capacity, and supply agreements with a diversified set of partner nations.

(Para 3.25)

The Committee is concerned that the Gorakhpur Haryana Atomic Power Project (GHAVP-1 & 2), with an expected completion date of 2032, is currently only at the stage of civil construction of non-nuclear plant buildings. This means that the most technically complex and time-intensive element of construction — the nuclear island — has not yet been commenced. A 2032 completion date for a project at this early stage of construction appears highly optimistic. The Committee recommends that Government undertake a credible and independent reassessment of the project schedule for GHAVP-1 & 2, given that the nuclear island construction has not yet commenced, and ensure that project timelines are realistic and subject to robust oversight. The Committee is of the view that large public sector nuclear projects of this nature require stronger accountability mechanisms to prevent the recurrence of cost and time overruns.

(Para 3.30)

The Committee observes that India possesses among the largest known reserves of thorium in the world, and the utilization of thorium as a nuclear fuel is central to the long-term vision of India's three-stage nuclear power programme. However, the transition to thorium-based fuel cycles remains at an early stage of development, with significant technological and infrastructural challenges yet to be resolved. The Committee is of the view that a more accelerated and focused approach to thorium fuel cycle development is essential if India is to realize its long-term energy security potential from this indigenous resource. The Committee recommends that the Government should accord higher priority to research and development in thorium utilization, strengthen the institutional capacity and resource allocation of relevant research establishments engaged in this work, and put in place a clear developmental roadmap with defined milestones for the progressive introduction of thorium-based fuel in India's nuclear power programme.

(Para 3.31)

TATA MEMORIAL CENTRE (TMC)

The Committee observes that while DAE and TMC have taken commendable steps in expanding cancer care through the Hub-and-Spoke model, the pace of expansion remains insufficient relative to India's cancer burden of over 14 lakh new patients annually. Nine operational TMC centres, even supplemented by the NCG's 390 member organisations, cannot ensure geographically equitable access across a country of India's size and diversity, particularly in the North-Eastern states, tribal regions, and Tier-3 districts. The Committee therefore recommends that the Department frame a time-bound expansion plan with the objective of establishing at least one dedicated, fully equipped cancer centre in each State, with prioritizing aspirational districts and the North-Eastern region.

(Para 4.30)

The Committee observes that despite the NCG's longstanding efforts to develop resource-stratified cancer treatment guidelines, these guidelines are not mandatorily adopted across all Government-funded cancer institutions. The Committee therefore recommends that the Ministry of Health and Family Welfare, in coordination with DAE, ICMR, NMC, and the NCG, should notify comprehensive National Cancer Treatment Guidelines. These guidelines should be mandatorily adopted by all Central and State Government-funded institutions.

(Para 4.31)

The Committee observes that TMC and KEM Hospital, despite their geographic proximity in Parel, Mumbai, and their complementary patient populations, operate without a formal, structured framework for clinical coordination. The Committee notes that TMC's response, while acknowledging existing linkages, describes informal arrangements rather than a planned institutional integration. The Committee therefore recommends that TMC and KEM Hospital should jointly constitute a formal Coordination Committee for developing and implementing a structured integration plan covering joint tumour boards, combined patient referral pathways, shared diagnostic services, and coordinated training activities.

(Para 4.32)

The Committee observes that while TMC is conducting over 65 active clinical trials with significant scientific merit, several trials acknowledge that funding has not yet been received or is being applied for. This point to a systemic underfunding of cancer research relative to the scale of India's cancer burden and the scientific capability that TMC and its partner institutions have demonstrated. The Committee therefore recommends that the Department should ensure that TMC does not face any funding deficit for its clinical trials.

(Para 4.33)

The Committee observes that the regulatory framework governing radiopharmaceuticals in the country is fragmented across the Radiopharmaceutical Committee of DAE, CDSCO, DCGI, and State FDAs, with the RPC's jurisdiction confined only to DAE-produced products. This regulatory fragmentation creates significant grey areas for products developed by other Government agencies, academic institutions, and private innovators, and acts as a structural barrier to the growth of India's radiopharmaceutical ecosystem. The Committee therefore recommends that the Central Government should establish a unified single-window regulatory framework for radiopharmaceuticals in the country, with a clearly defined and publicly available approval pathway from pre-clinical development to patient use, applicable uniformly to all innovators — Government, academic, and private.

(Para 4.34)

The Committee observes that radiopharmaceutical production in India remains heavily concentrated around Delhi and Mumbai, while the Department's own evidence demonstrates critical unmet need in the North-Eastern region and other geographically peripheral states. The limitations on transport of short-lived PET radiopharmaceuticals to these regions further compound the access deficit. The Committee therefore recommends that the Department should establish regional radiopharmaceutical production and distribution hubs — one in the North-Eastern region and one in Southern India —with appropriate ground support infrastructure. The Committee also recommends that the Department should constitute a National Cyclotron Coordination Committee to rationalize production across the 30 operational cyclotrons, establish a minimum support price framework, and plan investment in high-energy 30 MeV and 70 MeV cyclotrons for next-generation isotope production.

(Para 4.35)

The Committee observes that there is an urgent need for an additional reactor dedicated exclusively to radioisotope production for health and industry, noting that many radioisotope targets are technologically advanced and that technology transfer is denied by countries with a monopoly in this field. The existing production infrastructure is ageing, with gaps in research and availability caused by funding shortfalls for consumables. The Committee therefore recommends

that the Department take necessary steps to augment radioisotope production capacity in a planned and phased manner, explore all available funding mechanisms, and ensure that existing production infrastructure is adequately maintained and its operational life suitably extended.

(Para 4.36)

The Committee observes that India's indigenous innovations in cancer treatment — the CAR T-cell therapy Tali-cel, the 90Y-BhabhaSphere for liver cancer, the high-dose MIBG therapy for neuroblastoma, and the TLC Scanner — represent breakthroughs with transformative potential for affordable oncology at scale. However, the Committee notes that these innovations remain confined to a few advanced centres and have not yet been systematically scaled to benefit patients across the country. The Committee therefore recommends that DAE, in coordination with Ministry of Health & Family Welfare, should take concerted steps to scale up indigenous cancer treatment innovations, ensure their availability at affordable costs in Government hospitals, and develop suitable mechanisms for their wider distribution across cancer care facilities in the country.

(Para 4.37)

The Committee observes that while the evidence-based community outreach programmes of TMC's Department of Preventive Oncology have demonstrated measurable impact — including a 31 per cent reduction in cervical cancer mortality and 30 per cent reduction in breast cancer mortality in programme areas — these programmes remain concentrated in Maharashtra and reach only a small fraction of country's population. The Committee further notes that the NP-NCD 2023-2030 draws upon TMC's experience, yet no efforts have been made to replicate these models at scale. The Committee therefore recommends that DAE, in coordination with the Ministry of Health & Family Welfare, should take suitable steps to scale up TMC's proven community outreach models for cancer awareness and early detection across the country, ensure wider dissemination of IEC materials in regional languages, and provide adequate budgetary support for cancer awareness activities within national health programmes.

(Para 4.38)

The Committee observes that the Department has identified AI, radiomics, and personalized dosimetry as the most significant frontiers for nuclear medicine research in the next decade, with TMC as the leading institution in these areas. However, the quantum and sustainability of funding for this research, and the mechanism for translating AI-driven models into widespread clinical use across resource-limited nuclear medicine centres, remain inadequately addressed. The Committee therefore recommends that DAE, in partnership with MeitY and DST, should establish a National AI Platform for Nuclear Medicine that pools de-identified imaging and clinical data from all Government nuclear medicine centres, supports training and validation of AI models for diagnosis, prognosis, and dosimetry, and makes validated AI tools freely available to all Government hospitals.

(Para 4.39)

The Committee also observes that instead of merely acknowledging the recommendations made by the Committee regarding TMC in its 404th Report, the Department should have been more proactive in implementing those recommendations. The Committee therefore recommends that the Department should formally approach the concerned Central/State Government Ministries/Departments for implementation of the Committee's recommendations.

(Para 4.40)

The Committee recommends that such theranostics platforms that integrate therapy and isotope production should be used to provide hospital deployable BNCT solutions. These systems combine advanced cancer treatment, isotope generation, and nuclear medicine research within a single platform, thereby reducing maintenance costs and operational risks compared to earlier lithium-based systems.

(Para 4.42)

The Committee further recommends that TMC should adopt the most advanced and effective solutions available to expand cancer treatment on a large scale, thereby benefiting more patients. The Committee also recommends that TMC should publish its findings to guide other cancer centres in the country in adopting similar protocols.

(Para 4.43)

The Committee strongly recommends that the Department should initiate a targeted program for the indigenous development of BNCT technology to achieve technological sovereignty and reduce reliance on other nations for this essential healthcare intervention.

(Para 4.44)

THE SHANTI ACT, 2025

The Committee observes that while the SHANTI Act provides statutory and de jure independence to AERB, the structural relationship between DAE — which actively promotes nuclear energy expansion — and AERB remains a source of potential conflict of interest. The Department's response does not adequately address the concern that the same Ministry driving India's 100 GW nuclear ambitions may influence the composition and leadership of the body meant to regulate it. The Committee therefore recommends that the Central Government should establish an independent Appointments Committee for the selection of AERB's Chairman and Board members, comprising members drawn substantially from outside DAE. This would create a structural firewall between the promotional and regulatory arms of nuclear governance.

(Para 5.20)

The Committee observes that the current disclosure regime under Section 39 and Section 24(3)(h) places the burden of accessing safety information on citizens, making safety reports, inspection findings, and incident summaries available only "upon request" and subject to broad exceptions including commercial confidence and national security. This passive disclosure approach is inadequate for a sector that directly affects public health and environmental safety, particularly as private operators — who have stronger commercial incentives to suppress unfavourable findings — now enter the nuclear space. The Committee therefore recommends that AERB should be mandated through Rules framed under the SHANTI Act to proactively and periodically publish inspection findings, regulatory decisions, and incident summaries on a publicly accessible digital platform, with only a narrowly defined category of genuinely sensitive information withheld. This would bring India in line with international best practices followed by regulators such as the US Nuclear Regulatory Commission and France's ASN, build public trust in the regulatory process, and act as a structural deterrent against both operator complacency and regulatory capture.

(Para 5.21)

The Committee observes that while the Central Government retains the power to amend the liability caps specified in the Second Schedule, this power is entirely discretionary with no mandatory timeline, triggering mechanism, or independent oversight requirement. The liability caps ranging from ₹100 crore to ₹3,000 crore risk becoming inadequate over time as reactor sizes increase, population densities around plant sites grow, inflation erodes the real value of compensation, and new reactor technologies introduce different risk profiles. The absence of a structured review cycle means caps could remain outdated for extended periods without any institutional pressure for revision, leaving victims of a potential nuclear incident severely undercompensated. The Committee therefore recommends that the Rules framed under the SHANTI Act should mandate a statutory review of the Second Schedule liability caps at least once every five years, conducted by an independent expert committee comprising legal, technical, actuarial, and public interest representatives, whose recommendations should be placed before Parliament before any revision is notified. This would ensure that compensation limits remain meaningful, provide long-term planning certainty to private operators and insurers, and uphold the State's fundamental obligation to victims of the nuclear catastrophe.

(Para 5.22)

The Committee observes that the SHANTI Act's removal of the statutory right of recourse against suppliers — limiting it solely to contractual terms — eliminates a significant legal deterrent that previously incentivized suppliers to maintain rigorous component quality standards. While the Department has justified this change on the grounds of compliance with the Convention on Supplementary Compensation and the enhanced safety features of modern reactors, this reasoning presupposes the very quality control effectiveness that supplier liability was designed to enforce. As private operators begin procuring from a wider range of domestic and international suppliers, often under cost pressures, the risk of substandard components entering nuclear facilities without adequate legal accountability is a genuine concern. The Committee therefore recommends that the removal of supplier liability must be compensated by making third-party independent auditing of supplier manufacturing sites a statutory requirement under Section 28, with audit findings reported directly to AERB rather than routed through the operator. This structural safeguard would preserve the quality assurance function previously served by the threat of legal liability, protect potential victims without burdening international nuclear commerce, and ensure that the channeling of liability exclusively to operators does not come at the cost of supply chain integrity.

(Para 5.23)

The Committee observes that while the SHANTI Act opens the nuclear sector to private participation, the Act and the Department's responses do not specify any minimum financial, technical, or operational qualification thresholds that private entities must meet before receiving a licence to operate in the sector. Unlike other infrastructure sectors opened to private investment, a failure in nuclear facility operation is not recoverable — it carries the risk of irreversible environmental contamination, transboundary harm, and long-term public health consequences. The experience of private sector participation in other sensitive infrastructure sectors in India has shown that without robust pre-qualification criteria, cost-cutting and regulatory arbitrage can emerge, particularly in early years of a new framework. The Committee therefore recommends that the Rules framed under the SHANTI Act must prescribe clear, publicly available and non-negotiable minimum qualification criteria for private nuclear operators, including minimum net worth requirements, mandatory insurance coverage, demonstrated technical competency, and operational

track records, before any private licence is granted. Further, a dedicated continuous monitoring mechanism should be established specifically for private operators during their initial years of operation to ensure that commercial pressures do not compromise nuclear safety.

(Para 5.24)

The Committee observes that the Department's response on public information during a nuclear incident focused primarily on the Claims Commissioner's role in publicising compensation procedures under Section 65, entirely conflating the immediate public safety alert function with the subsequent claims settlement process. These are two fundamentally distinct needs — the former requiring real-time, wide-area communication within hours of an incident, and the latter being a judicial process that unfolds over months or years. The Committee is of the opinion that delayed and fragmented public communication during a nuclear emergency significantly compounds the humanitarian impact, regardless of the quality of subsequent compensation mechanisms. The Committee therefore recommends that the Rules framed under the SHANTI Act must mandate a statutory real-time public alert protocol, specifying defined timelines for initial public notification, designated responsible authorities at local, state, and national levels, and mandated communication channels — including digital, broadcast, and community-level systems — that are activated immediately upon a nuclear incident being declared, entirely independent of the claims process. This protocol should be tested through mandatory periodic drills and reviewed annually by AERB in coordination with State Disaster Management Authorities.

(Para 5.25)

The Committee observes that the SHANTI Act defers the framing of a radioactive waste management policy to a future Central Government notification under Section 32, without specifying any timeline or minimum standards that such a policy must meet before private operators are licensed to construct or operate nuclear facilities. This sequencing is a significant governance concern. Radioactive waste management is not an operational afterthought — it is a fundamental safety, environmental, and intergenerational responsibility that must be planned and regulated from the earliest stages of facility design. The original Atomic Energy Act, 1962, reserved spent fuel management exclusively for the Government precisely in recognition of its extreme sensitivity and long-term consequences. Allowing private operators to begin construction or operation without a legally binding, comprehensive, and publicly available waste management framework in place risks the development of ad hoc, inconsistent, and potentially unsafe waste handling practices that could have irreversible environmental consequences. The Committee therefore recommends that the Central Government should frame and publicly notify the radioactive waste management policy under Section 32 as a mandatory precondition before the first private nuclear licence is granted under the SHANTI Act. This policy should specify standards for waste classification, storage, transportation, reprocessing, and long-term disposal, and should be subject to periodic review by AERB in consultation with the Central Pollution Control Board and relevant State authorities.

(Para 5.26)

ATOMIC ENERGY REGULATORY BOARD

The Committee observes that providing guidance and participating in professional forums is a passive approach. The development of indigenous medical devices requires proactive and structured support. The Committee therefore recommends that AERB should establish a formal "Innovation Facilitation Cell" or a "Regulatory Sandbox" framework. This would allow developers of indigenous radiology and radiotherapy devices to engage in early, confidential, and structured pre-submission dialogues with AERB experts. This formalizes the ad-hoc expert committee approach used for Proton Therapy and makes it accessible for domestic R&D, helping them navigate safety norms from the design stage itself, thus reducing time-to-market.

(Para 6.18)

The Committee also recommends that to build greater trust and identify process bottlenecks, AERB should publish more granular performance data on its public dashboard. This could include: (a) TAT broken down by type of application (import vs. license vs. type approval), (b) TAT for "first-of-its-kind" technologies vs. standard equipment, and (c) the number of applications that went through multiple review cycles. This aligns with the global best practice of regulatory transparency and helps stakeholders manage their own planning.

(Para 6.19)

The Committee further recommends that AERB should move towards a more dynamic, risk-based post-market surveillance system. This could involve utilizing data from the eLORA system to identify trends in equipment performance, recurring non-compliances, or specific manufacturers/models that may require more frequent oversight. AERB should establishing a clear, mandatory, and simple mechanism for users (radiologists, technicians) to report any safety-related malfunctions or "near misses" directly to AERB, creating a national database for learning and preventative action.

(Para 6.20)

The Committee notes that the current coordination of AERB with CDSCO needs a more proactive approach. To provide clarity to the industry and avoid duplication, the two agencies should formalize their coordination through a Standard Operating Procedure (SOP) or a Memorandum of Understanding (MoU). This document should clearly map the regulatory pathway for a medical device and establish a joint review mechanism for technologies that blur the lines between radiation safety and medical efficacy. This "single-window" clarity would greatly benefit the "Make in India" initiative.

(Para 6.21)

PROMOTION OF HIGHER MATHEMATICS IN THE COUNTRY

The Committee acknowledges the extensive and multifaceted efforts undertaken by the DAE and its aided institutions to promote advanced mathematics. The programmes like SPIM, the Maths Circle, and the Vigyan Pratibha initiative are particularly noteworthy for their depth and reach. However, the Committee notes that while individual institutes like HRI, TIFR, and IMSc run excellent programmes, the overall effort appears fragmented. A student or teacher in a small city may not be aware of opportunities available at different DAE institutions. To maximize impact, optimize resource utilization, and create a more cohesive national strategy, the Committee recommends that the DAE should develop a centralized, user-

friendly web portal that aggregates all mathematics outreach activities across its institutes (NISER, HRI, IMSc, TIFR, CEBS, etc.). This portal should feature a common calendar of events (workshops, camps, lectures), a repository of learning resources (including Vigyan Pratibha modules in multiple languages), and information on internships and fellowships. This would act as a single window for students and educators nationwide, significantly increasing the visibility and accessibility of DAE's programmes.

(Para 7.28)

The "Maths Circle India" initiative led by TIFR is a powerful model for nurturing deep mathematical thinking and a sense of community among pre-university students. The Committee recommends that DAE should consider providing dedicated funding and administrative support to scale this programme. This could involve establishing new Maths Circles in different regions, anchored by other DAE institutes like IMSc in the South, HRI in the Central region, and NISER in the East. The Department could also come up with a "Maths Circle in a Box" toolkit (with curated problem sets, activity guides, and training manuals) to enable motivated teachers or college clubs anywhere in the country to start their own circles, supported remotely by the DAE Institutes.

(Para 7.29)

The Committee observes that many programmes target either school students (Vigyan Pratibha, Maths Circle, Talent Search) or undergraduate/postgraduate students (SPIM, Summer Research Fellowships). There is an opportunity to create a more seamless pipeline. The Committee recommends that DAE should develop a formal Mathematical Talent Nurturing Pipeline. The Department should leverage the Talent Search Examinations and Vigyan Pratibha to identify motivated students. The Department could invite the top performers from these school-level programmes to special introductory tracks within advanced programmes like SPIM or the Maths Circle, or create dedicated "bridge camps" to ease the transition from school-level problem-solving to university-level conceptual thinking. The Department should ensure that students who excel in these programmes are actively mentored and guided towards opportunities like the NISER undergraduate programme, summer internships, and the NBHM Olympiad training camps. The Department should explicitly connect the summer research programmes (at HRI, IMSc, TIFR) to the PhD programmes within the DAE system, potentially creating a fast-track channel for the most promising students.

(Para 7.30)

The Committee also feels that the curriculum of Mathematics in the schools is outdated and inadequate in generating curiosity towards the subject amongst the students. Moreover, the curriculum is heavily skewed towards the theoretical aspects and lacks application of the subject in daily life. The Committee therefore recommends that the Department should approach CBSE, NCERT, State Boards and SCERTs for a complete overhauling of the Mathematics curriculum in the country. The Committee also recommends that the Department should develop dedicated training modules for school teachers of Mathematics in the country. The module should focus on training teachers to kindle interest in the subject amongst the young children, highlighting achievements of the country's ancient and modern geniuses of the country in the subject and the vast applications of the subject in not only our day to day life but in modern technologies like AI/ML, cybersecurity, genetics, etc.

(Para 7.31)

HUMAN RESOURCE MANAGEMENT

The Committee observes that while the Central Recruitment Agency mechanism was designed for efficiency, it has instead become a significant bottleneck, with units like BRIT reporting no independent recruitment since 2005 and many others, including AMD, DCSEM, and RRCAT, merely informing CRAs of vacancies without assured timelines for completion. Therefore, the Committee strongly recommends an urgent and comprehensive overhaul of the CRA process to establish clear, binding timelines and fix accountability for delays at each stage, complemented by a system-wide special recruitment drive to tackle the thousands of accumulated vacancies. The Committee further recommends that instead of designating its different agencies as CRA, the Department should establish a separate CRA dedicated solely to the recruitment exercise and let its agencies focus on their core mandate.

(Para 8.35)

The Committee also observes that while the current reliance on stop-gap arrangements such as additional responsibilities, contractual staff, and re-employed retirees—as noted by BHAVINI, DCSEM, UCIL, and IREL—is a necessary short-term measure, it leads to staff fatigue and compromises work quality. These measures must be formalized with strict oversight, clear limits, and a definitive timeline for replacement by regular recruits, and their impact on both project quality and employee well-being should be rigorously monitored. Concurrently, given the widespread technical shortages in operational units, the Committee recommends that the Atomic Energy Regulatory Board should conduct an independent assessment to ensure that no residual risk to safety has arisen from these persistent manpower deficits.

(Para 8.36)

The Committee also recommends that critical and safety related functions, particularly those pertaining to operation and maintenance must neither remain vacant nor be entrusted to contractual personnel. The Committee therefore recommends that the Department should undertake a comprehensive review to identify all such posts across its constituent agencies and fill them on an urgent basis. The Committee also recommends that the Department should institutionalize a mechanism for proactive manpower planning to pre-emptively address and mitigate the risks associated with vacancies arising in critical and safety related areas.

(Para 8.37)

The Committee also observes that the situation in aided institutions like SINP, NISER and CEBS, with vacancy rates exceeding 50%, signals a deep crisis threatening the very purpose of these premier research bodies, necessitating a high-level review of their recruitment rules and work environment to make them globally competitive. Even TMC, the apex institute in the country for cancer research and treatment has more than 30% posts vacant. The Committee recommends that the Department should launch a special time bound recruitment drive to fill up all the vacancies in all the 11 aided institutes under its domain.

(Para 8.38)

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