TAKSHASHILA INSTITUTION

# Comments to the Parliamentary Standing Committee on Science and Technology, Environment, Forests and Climate Change on Demand for Grants in the Union Budget for FY 2023-24

Shambhavi Naik, Pradeep Mohandas, Sarthak Pradhan, Saurabh Todi, Harshit Kukreja, and Aditya Ramanathan

Takshashila Policy Advisory 2023-01
Version 1.0, April 2023

*Recommended Citation:*
Shambhavi Naik, Pradeep Mohandas, Sarthak Pradhan, Saurabh Todi, Harshit Kukreja, and Aditya Ramanathan, "Comments to the Parliamentary Standing Committee on Science and Technology, Environment, Forests and Climate Change on Demand for Grants in the Union Budget for FY 2023-24," Takshashila Policy Advisory 2023-01, 2023 April, The Takshashila Institution

# Table of Contents

# I. Major Budgetary Trends

## 1. The Government's R&D spending in concerned ministries and departments as a proportion of the total budget has declined further

A. The budgetary allocation to R&D relative to the total budget of the Union Government has been on the decline except for FY 2020-21 (Figure 1).
B. For the calculation of total spending on R&D, the major heads that have been used are enumerated in Table 1 (Appendix).
C. Some departments and ministries have clearly demarcated the spending on research and development. For example, the Department of Atomic Energy uses 2 different heads - Atomic Energy Research, Capital Outlay on Atomic Energy Research. But it is difficult to delineate the same from the expenditure estimates of the Ministry of Environment Forest and Climate Change. Better accounting classification would help analysis in the future.
D. R&D spending needs to be prioritised.

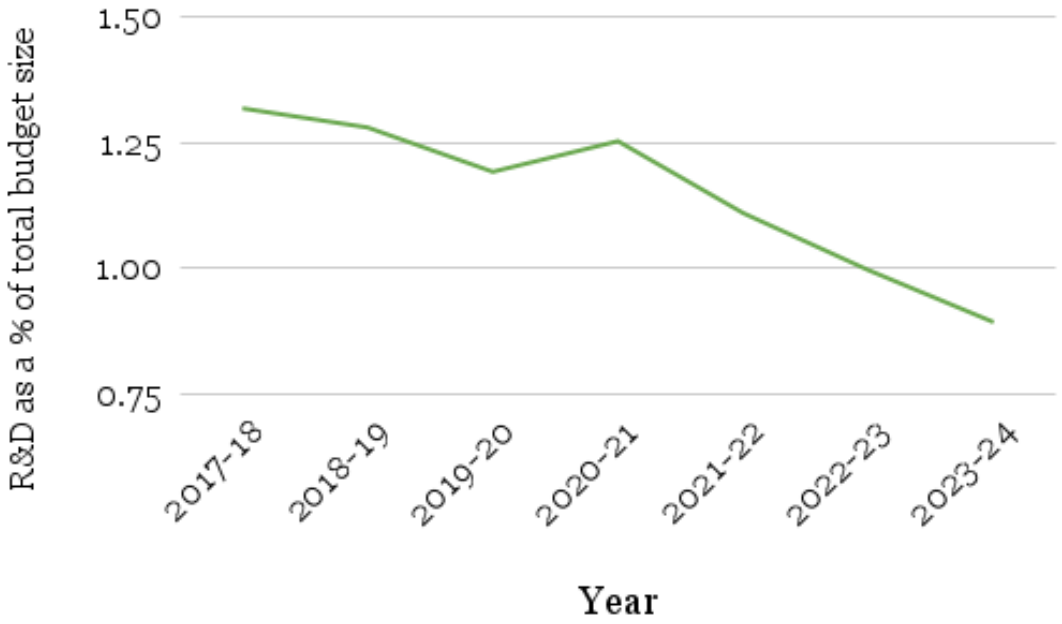


Figure 1: The ratio of R&D budget estimates to the grand total budget estimates expressed in Percentage

## 2. The Revised Estimates (FY 2022-23) of six of the seven departments/ministries diverge significantly from the Budget Estimates

A. In FY 2022-23, the revised estimates for five ministries/departments were lower than the budget estimates. The divergence of revised estimates from budget estimates is more than what was observed for FY 2019-20 (Figure 2) and FY 2021-22.
B. Lower revised estimates can imply insufficient delivery as compared to the initial budgetary promise. Also, it can indicate weaker capacities to estimate requirements. The reason for this must be analysed, and the demand for grants must be scrutinised considering the same.
C. For FY 2021-22, the revised estimate for the Ministry of Earth Sciences was 25% higher than the budget estimate. For FY 2022-23, the revised estimate for the concerned ministry is 23% lower than the budget estimate. The massive fluctuation in the spending of the ministry must be scrutinised.
D. For the Department of Atomic Energy, the difference between revised estimate and budgetary estimate has reduced but is still high at 14%. Higher revised estimates might reflect weaker capacities to

estimate requirements or ad-hoc expenditure. The reason for the higher revised estimates needs to be analysed.

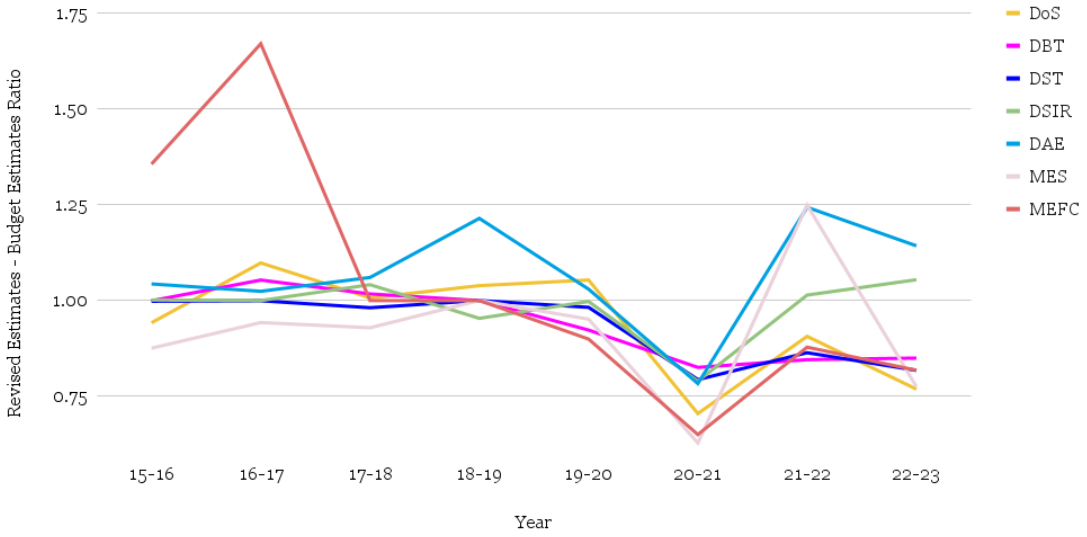


Figure 2: Revised Estimates (RE) diverge significantly from the Budget Estimates (BE) for 6 out of 7 departments/ministries

(DoS - Department of Space, DBT - Department of Biotechnology, DST - Department Of Science & Technology, DSIR - Department of Scientific and Industrial Research, DAE - Department of Atomic Energy, MES - Ministry of Earth Sciences, MEFC - Ministry of Environment, Forest and Climate Change)

## 3. The Actuals are lower than the Revised Estimates for the past several years

A. For FY 2021-22, the actual expenditure is less than the revised estimates for all the concerned ministries and departments. In FY 2020-21, FY 2019-20, and FY 2018-19, the actual expenditure of 5 out of 7 concerned ministries/departments was less than the revised estimates. (Figure 3)
B. It must also be noted that revised estimates tend to be lower than budgetary estimates (Figure 2).
C. The reason for lower actual expenditures needs to be analysed and scrutinised while considering the demand for grants for the upcoming fiscal year.

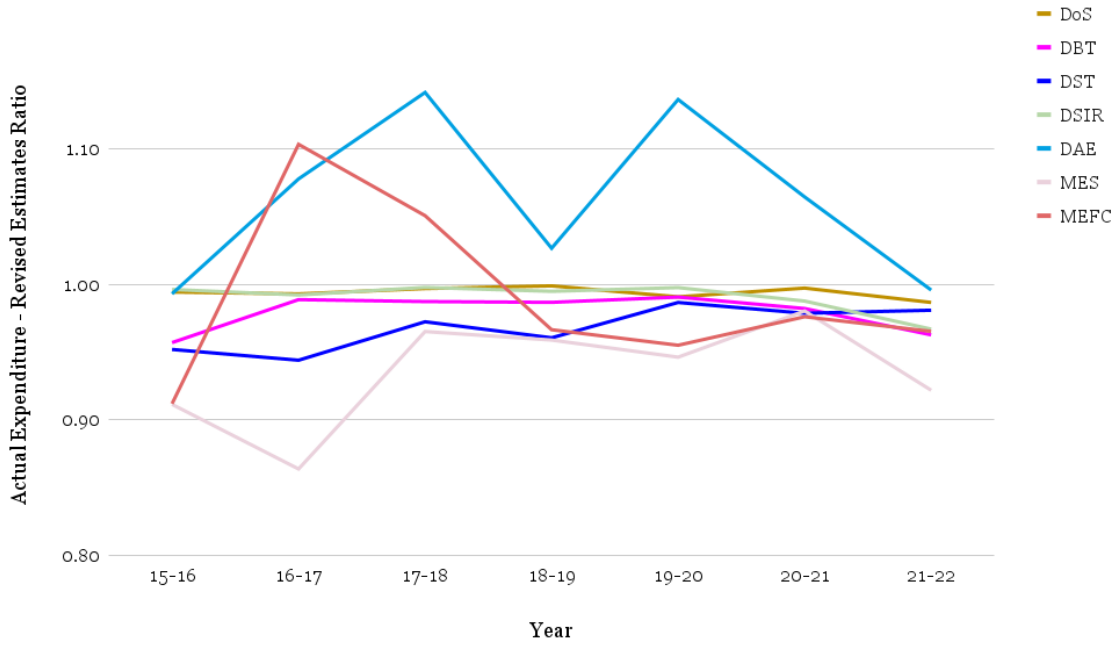


Figure 3: Actual Expenditure to Revised Estimates ratio

## 4. The actual capital expenditure for many of the concerned departments and ministries has been minimal

A. The ratio of capital to revenue expenditure for 5 of the seven departments/ministries has been lower than 5% (ratio < 0.05). Low capital expenditure might imply a lesser focus on building laboratories, R&D infrastructure etc.
B. The capital expenditure for the Department of Biotechnology, as per the Union Budget documents, has been 0 for the last 12 years. It might be an accounting issue.
C. The actual capital expenditure (FY 21-22) for the Department of Space and Department of Atomic energy has increased. It is a positive indicator.

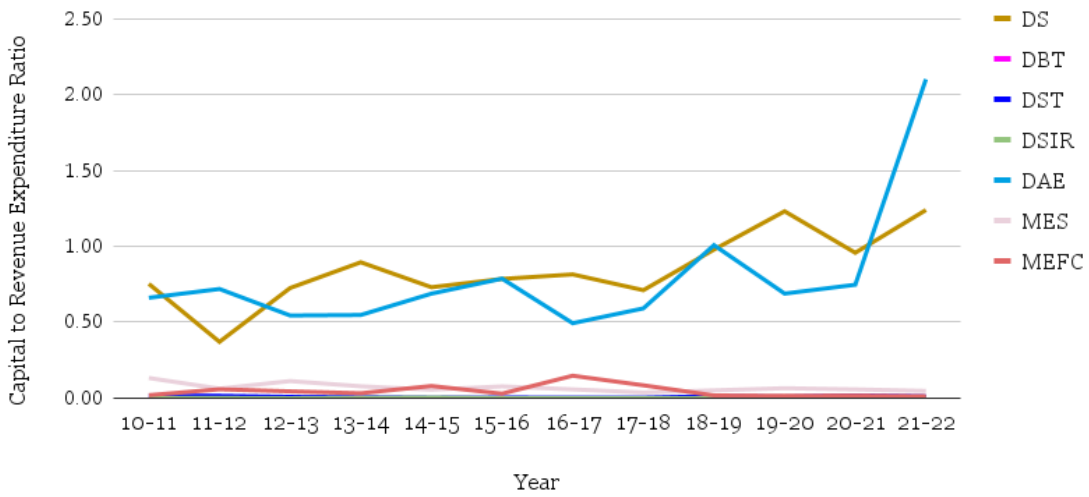


Figure 4: Ratio of Capital to Revenue Expenditure

# II. Demand for Grants (2023-24) for the Department of Space

## 1. Major Trends & Observations

A. The Union Budget for FY 2023-24 has allocated ,₹12,543.91 crores to the Department of Space (DoS). This is a decrease of about 8.5% from the allocation of ,₹13,700 crores allocated in FY 2022-23. However, it is an increase of about 19% over the revised allocation of ,₹10,530.04 crores.

B. Similarly, capital expenditure for FY 2023-24 is ,₹6,356.81 crores, a decline of about 15% from the ,₹7,465.60 cores allocated in FY 2022-23. However, it is an increase of nearly 40% over the revised allocation of ,₹4553.15

C. While the budget for the DoS has not increased, it is encouraging to note that adequate budgetary support continues in 2023-24. The output/outcome document for DoS is also more detailed in FY 2023-24 than in FY 2022-23, besides containing more realistic goals for undertakings such as the Gaganyaan human spaceflight project.

D. However, the lack of policy support continues to remain a challenge. Since five-year vision documents are no longer available from ISRO,

it is not possible to systematically track progress in long-term projects that span several years.

E. Further, the Space Policy has not been released, though this would further the aims of the government's laudable reforms in the space sector. This policy would not only give clearer guidance to IN-SPACe, but would also foster greater confidence in India's commercial space sector and encourage private investment.

## 2. Space Technology

A. With the commercialisation of the LVM3 following the launch of OneWeb satellites, the DoS must have a plan for increasing the rate of production of LVM3. This will be needed to satisfy the demands of commercial missions, missions of national importance, and human spaceflight.

B. If the DoS plans to phase out the launches of GSLV, an alternative plan must be identified for satellites designed to launch with GSLV. This is pertinent since IRNSS-1G/NVS-01, CMS-4/IDRSS-1, and NISAR are all expected to launch on GSLV.

C. The successful flight of SSLV-D2 with a fast turn-around time gives hope that the technology can be developed and transferred in the timeframe expected by ISRO.

D. The transparent handling of the Failure Analysis Committee Reports for GSLV and SSLV is an encouraging signal.

E. Space transportation systems have an impact on the development and launch of satellites. At present, there is no clearly stated basis for the prioritisation of launches, whether those be for commercial missions, missions of scientific importance, or missions of national importance. Increasing the availability and reliability of launch systems will improve India's ability to put much-needed satellite assets in orbit. It is necessary for India to prioritise the replacement of ageing earth observation, navigation, and communication satellites in a timely manner.

## 3. Space Applications

A. There has been a doubling in the demand for grants for space applications without significant changes in output/outcomes budget.
B. There needs to be further improvement in Earth Observation/ Communication/ Navigation payloads. In addition to the payloads needed for missions of national importance, space applications centres must understand the requirements of data for private industry and realise the payloads needed to fulfil the same.
C. BHUVAN was developed in 2009 with the first stable beta release in 2015. There must be an increase observed in the number of states that are using the BHUVAN platform. An effort must be made to move all states and state-generated geospatial data to BHUVAN by 2025, in time for its tenth year anniversary.

# 4. Space Sciences

A. The requested budget of ₹138.80 crores for space sciences is less than the ₹206.11 crores given to the DoS for the same in 2022-23. The lack of line items related to Space Sciences in the outcomes/output budget for the same is concerning.
B. Missions like Chandrayaan-3, Mangalyaan-2, Aditya-L1, etc. are facing significant delays. Aditya-L1 is slated for launch this calendar year. The reasons for the delay must be studied and understood. If the reasons are financial, the DoS must request for more funds for future Space Science missions.

# III. Demand for Grants (2023-24) for the Department of Biotechnology

## 1. Make demand for grants more detailed

The DBT Outcome Output budget FY 2023-24 as those for previous years have contained only 2 sub-heads under Central Sector Schemes/ Projects - Biotechnology Research and Development, and Industrial and Entrepreneurship Development. This had been raised in previous committee reports as well:

> *Point 3.8 "Further it was submitted that the Demand for Grants contains only 2 sub-heads under Central Sector Schemes/ Projects - Biotechnology Research and Development, and Industrial and Entrepreneurship Development, and that further details on grant requirements in alignment with the various outputs indicated in the Outcome Budget are required."*

Instead of providing further details, the Outcome Output budget also shows outcomes and outputs only under the Biotechnology Research

and Development Scheme and Industrial and Entrepreneurship Development heads. More details in the funding allocation in concert with the outcome output minor heads, would help with better analysis.

## 2. Biotechnology Research and Development (CS)

Though there has been a slight increase (2.2%) in BE for FY 2023-24 as compared with FY 2022-23, there has been a significant decrease in the expected outcomes as assessed in the Outcome output budget. Below table shows the revised estimates for publications, technologies and patents from the outcome output budgets.

| | **FY2022-23** | **FY2023-24** |
|---|---|---|
| No. of publications resulted from completed projects in the current year | 3,799 | 892 |
| No. of products or technologies developed/transferred/commercialized (including software and databases) resulted from completed projects in the current year | 119 | 66 |

| | | |
|---|---|---|
| No. of Patents filed/granted/commercialized resulted from completed projects in the current year | 83 | 84 |

Curiously, the outcomes for PIs supported, and particularly women PIs supported has disappeared from the FY 2023-24 framework. In contrast with the reduction of number of products or technologies, there has been a stark increase in the number of softwares and databases estimated (45 from 12 as planned in FY 2022-23). This discrepancy needs to be explained. Overall the indicators in the first section of the outcome output budget have been reduced from FY 2022-23. Though some of these can be found redistributed in the other sections, for example, workshops to be conducted, this is not true for all the outcomes. The inclusion of infectious disease biology as a specified area of research is a welcome move.

1.2 of the outcome output budget notes, “Screening for Genetic Diseases (in Aspirational Districts) under the UMMID Initiative”. Earlier this outcome was specific to screening of pregnant mothers (point 3.2 in FY 2022-23). It is not explained whether the Department will now screen more than just pregnant mothers and if yes, why the number of people to be screened has reduced from 2,10,000 to 1,80,000 from last year.

## 3. Over past reports, DBT has not categorised capital and revenue expenditure separately

Unlike other departments, DBT has not provided capital expenditure for the last 5-6 years, despite investing in capacity building. Building new institutions is key to India's progress in science and technology - and the addition of bioparks and infrastructure is expected. This was also raised in a previous committee report –

> *3.9 The Committee notes with utmost concern that details of the activities planned to be undertaken by the Department with the increased allocation for creation of Capital assets are not available in the documents furnished by the Department and break-up of budgetary allocations for Revenue and Capital Expenditure as well as funds allotted for Establishment Expenditure under various Budgetary Heads. Without the above information, the Committee is constrained in analysing the spend on new infrastructure and research. The Committee recommends that the Department should invariably furnish the above information to the Committee to facilitate analysis of Demands for Grants, and recalibrate the outcomes and outputs based on the complete Departmental funding.*

*3.10 The Committee further recommends that the Department should immediately take up the matter with the concerned authorities and explore the possibility of bringing the necessary changes in the classification of allocation of funds under revenue and capital expenditure. Despite this note, there is no breakdown of expenditure for FY 2023-24.*

# 4. Alignment with Broader Goals

The Bioeconomy Report 2022 envisions India to achieve a $300 billion bioeconomy by 2030. Yet, with lowering targets for outputs, it is unclear how this aim will be achieved. Similarly, the number of international collaborations, which would be required for a resilient bioeconomic growth have also been tempered down in this year's outcome output budget. Hence, there is a need to reconcile the desired growth of the biotechnology sector, which significantly contributed to India's resistance to COVID-19, with the roadmap required to achieve this growth. There has been a specific allocation to ICGEB, but its basis is unclear.

# IV. Demand for Grants (2023-24) for the Department of Science & Technology

## 1. Make the demand for grants more detailed

The DST budget FY 2023-24 does not go into adequate details. The grant should have more minor heads and details about the further distribution of funds. For instance, ₹1,068.40 crore is allocated to Science and Technology Institutional and Human Capacity Building. The document offers no details on how it will be spent. We propose a more micro level description of funds. Usually, other departments categorise these under the institutions that they are allocated to.

## 2. Central Sector Schemes/Projects show no Capital expenditure

Central Sector Schemes such as the National Mission on Interdisciplinary Cyber Physical Systems etc. show no capital expenditure in Budget Estimates FY 2023-24 and have no

expenditure data done in Actual Expenditure 2021-2022 or Revised Estimates 2022-23. This most probably points to an error in accounting or data categorisation. This should be corrected to give a better picture of the expenses.

## 3. National Research Foundation (NRF) has been granted ₹2000 crores

This is a welcome, though delayed allocation . The move of NRF to DST from the PSA office and thus, bringing it within the purview of the Parliamentary Committee on Science and Technology is a good step. However, as envisioned in the original NRF project report, the Board for operationalising NRF should be independent of DST, otherwise its vision to fund " well-coordinated research across disciplines and across all types of institutions" will be hampered. Further, the allocation is disappointing when compared with the initially promised financial outlay of 50,000 crores over 5 years in the budget of FY 2021-22. We advocate for more resources to be allocated to NRF along with a preliminary proposal with a roadmap for their use.

## 4. Rationalisation of Outcome Output Framework

There is a need to rationalise the setting up of targets in the form of output achieved and expected outcome. No public audit is also available to reflect on what targets were achieved. Targets also show huge changes without any justification. For instance, in the FY 2023-24 under Inspire-MANAK, in the output indicator "No. of Innovative Ideas" has been reduced to 50,000 from 1,00,000 in the previous year.

## 5. Reduced utilisation of DST central schemes in the FY 2022-2023

There has been a 33% reduction in Revised Estimates for the FY2022-2023 to the amount originally budgeted. The reduction has been huge from ₹2894.55 crores to ₹1925.00 crore. There is a need to investigate and correct this underutilisation of funds.

# V. Demand for Grants (2023-24) for the Department Of Scientific And Industrial Research

## 1. The Council of Scientific and Industrial Research(CSIR) shows no Capital Expenditure

Under FY 2023-2024, CSIR shows no Capital Expenditure. This likely is an accounting error which needs rectification.

## 2. There is no Output Outcome Framework

Outputs , outcomes have not been identified for this department. The purpose of an output -outcome budget is to promote accountability and efficiency in government spending. The framework also allows decision makers to evaluate whether the desired outcomes are being achieved to determine the cost-effectiveness of different programs and can help to identify areas

where spending can be reduced or reallocated to more effective programs.

# VI. Demand for Grants (2023-24) for the Department of Atomic Energy

## 1. Reduction in R&D expenditure

Capital outlay for central sector R&D projects for FY 2023-24 is estimated at ₹1590 crore, which is around **10.5% less** than budget estimate of ₹1775 crore for FY 2022-2023. Furthermore, the revised estimate for FY 2022-2023 is just ₹1514 crore, which indicates only 85% utilisation of outlay for R&D expenditure. Actuals for the same for FY 2021-2022 were ₹1775 crore, indicating a decline in R&D expenditure over the last two years.

## 2. The R&D Outputs and Outcomes are not identified

While the Budget details the Research and Development projects undertaken by the various centres under the Department of Atomic Energy like BARC, IGCAR and RRCAT, a detailed breakdown in the

form of an output-outcome framework has not been provided by the DAE. The 2023-24 Budget has a capital outlay of ₹1590 crore specifically for central sector R&D schemes and projects under the DAE. A positive step can be to create an output-outcome framework similar to those released by the DST and DBT.

## 3. Increased Allocation for Nuclear Power Projects

The budgetary estimate also gives an overview of the capital outlay across the developmental heads and other economic services under the DAE. A promising sign is the more than two-fold increase in capital outlay for nuclear power projects in this year's budget. While the capital allocation for the same in BE FY 2022-2023 was around ₹1337 crore, the allocation in this year's budget has been over ₹3200 crore. It is worth noting that the capital outlay in the revised estimates for FY 2022-2023 has increased to around ₹2160 crore, which is around 60% higher than the budget estimates for FY 2022-2023. It is likely that this increase is due to the reported aim to construct 10 nuclear power plants of 700 MW each in fleet mode at a cost of ₹1.05 lakh crore. However, having a outcome output budget

for DAE would help in better understanding the expenditure incurred during nuclear reactor construction.

## 4. Reducing dependency of Nuclear Power Corporation of India Limited (NPCIL) on budgetary support

The NPCIL remains the government's go-to agency in the field of nuclear power. The budgetary allocations show that a predominant percentage of the DAE's budget goes towards the running and maintenance of NPCIL. This year's budget alone has set aside over ₹9400 crore for the efficient functioning of the PSU. This puts severe financial stress on the DAE and its budget along with meeting the nuclear power demand. There must be an alternative to reduce this single point dependency on the NPCIL. A way forward might be to sell a percentage of the stake to a well-renowned private actor established in the nuclear power area. The arrival of private entities in building domestic nuclear power capabilities remains the only way forward for India to reach its renewable energy goals.

# VII. Appendix

Table 1 - Research and Development Budget Estimates. All figures are in Crores

| Departments/Ministries | Heads | 2023-24 | 2022-23 | 2021-22 | 2020-21 | 2019-20 | 2018-19 | 2017-18 |
|---|---|---|---|---|---|---|---|---|
| DAE | Atomic Energy Research | 7618.13 | 7257.91 | 7183.44 | 6973.78 | 6064 | 5712 | 5247 |
| | Capital Outlay on Atomic Energy Research | 2358.06 | 2674.05 | 2040.81 | 2178.88 | 1939 | 1603 | 1859.91 |
| MES | Oceanographic Research | 1081.45 | 1133.11 | 658.9 | 812.8 | 726 | 716 | 576.6 |
| | Other Scientific Research | 78.77 | 79 | 72.8 | 98.2 | 100.5 | 82 | 52.6 |
| | Capital Outlay on Oceanographic Research | 226.95 | 225 | 15 | 17 | 18 | 15 | 16 |
| MoEFCC | Capital Outlay on Other Scientific and Environmental Research | 95.17 | 83 | 89 | 118 | 30 | 55 | 26.7 |
| | Autonomous Bodies | 309 | 287.45 | 305 | 340 | 324.9 | 301 | 244.8 |
| DST | Other Scientific Research | 7744 | 5817.3 | 5851 | 6108 | 5142 | 4963 | 4718.53 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Capital outlay on Other Scientific and Environmental Research** | 88.3 | 82.7 | 122 | 101 | 90 | 67.5 | 11.59 |
| | **Loans for other Scientific Research** | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| **DBT** | **Other Scientific Research** | 2472.97 | 2377.82 | 3205 | 2560 | 2372 | 2219.29 | 2046.75 |
| **DSIR** | **Other Scientific Research** | 5719.14 | 5606.26 | 5185 | 5361 | 4873 | 4772.71 | 4425.56 |
| | **Capital Outlay on Other Scientific and Environmental Research** | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| | **Loans for other Scientific Research** | 2.2 | 2 | 1.65 | 4 | 4 | 5 | 5 |
| **DoS** | **Space Research** | 6033.1 | 6201.4 | 5693 | 5668 | 5839 | 5466 | 4908.82 |
| | **Capital Outlay on Space Research** | 6356.81 | 7465.6 | 8228 | 7775 | 5663 | 5287 | 4155.38 |


The Takshashila Institution is an independent centre for research and education in public policy. It is a non-partisan, non-profit organisation that advocates the values of freedom, openness, tolerance, pluralism, and responsible citizenship. It seeks to transform India through better public policies, bridging the governance gap by developing better public servants, civil society leaders, professionals, and informed citizens.

Takshashila creates change by connecting good people, to good ideas and good networks. It produces independent policy research in a number of areas of governance, it grooms civic leaders through its online education programmes and engages in public discourse through its publications and digital media.