

38

STANDING COMMITTEE ON ENERGY

(2003)

THIRTEENTH LOK SABHA

DEPARTMENT OF ATOMIC ENERGY

DEMANDS FOR GRANTS  
(2003-2004)

**THIRTY EIGHTH REPORT**

LOK SABHA SECRETARIAT  
NEW DELHI  
March, 2003/ Chaitra, 1925 (Saka)

# CONTENTS

COMPOSITION OF THE COMMITTEE  
INTRODUCTION

## PART - I

### CHAPTER - I

Introductory

### CHAPTER II

Analysis of Demands for Grants and Plan Budget of Department of Atomic Energy...

3

A.	Budgetary Allocation
B.	Nuclear Power Generation
C.	Gestation period of Nuclear Power Projects
D.	Selection of sites
E.	Private Sector / Joint Venture Participation and DAE Schemes
F.	Nuclear Fuel Complex
G.	Heavy Water Board
H.	Applied Uses of Nuclear Energy

**COMPOSITION OF THE STANDING COMMITTEE**  
**ON ENERGY (2003)**

Shri Sontosh Mohan Dev - Chairman

**MEMBERS**

**LOK SABHA**

2. Shri Basudeb Acharia
3. Shri Prasanna Acharya
4. Shri Prakash Yashwant Ambedkar
5. Shri Vijayendra Pal Singh Badnore
6. Shri Jagmeet Singh Brar
7. Shri Lal Muni Chaubey
8. Shri Bal Krishna Chauhan
9. Shri A.B.A.Ghani Khan Choudhury
10. Shri Bikash Chowdhury
11. Shri Laxman Giluwa
12. Dr. S. Jagathrakshakan
13. Shri P.R.Khunte
14. Shri Arun Kumar
15. Shri Subodh Mohite
16. Shri K. Muraleedharan
17. Shri Ali Mohmad Naik
18. Shri Ravindra Kumar Pandey
19. Shri Dalpat Singh Parste
20. Shri Amar Roy Pradhan
21. Shri B. Satyanarayana
22. Md. Shahabuddin
23. Shri Raghuraj Singh Shakya
24. Shri Chandra Pratap Singh
25. Shri Tilakdhari Prasad Singh
26. Shri Manoj Sinha
27. Shri Shibu Soren
28. Shri B. Venkateswarlu
29. Prof. Ummareddy Venkateswarlu
- 30\*. Prof. Rita Verma

---

\* Nominated to the Committee w.e.f. 21.2.2003 vice Shri Harpal Singh Sathi, M.P.

## **RAJYA SABHA**

31. Shri Devdas Apte
32. Shri Santosh Bagrodia
- 33#. Shri S.M.Laljan Basha
34. Shri Jayanta Bhattacharya
35. Shri Dara Singh Chauhan
36. Shri Aimaduddin Ahmad Khan (Durru)
37. Shri Ajay Maroo
38. Shri B.J.Panda
39. Shri Matilal Sarkar
40. Shri Gaya Singh
41. Shri Veer Singh
42. Shri D.P.Yadav
43. Vacant
44. Vacant
45. Vacant

## **SECRETARIAT**

1. Shri John Joseph - Additional Secretary
2. Shri P.K.Bhandari - Director
3. Shri R.S.Kambo - Under Secretary
4. Shri P.C.Tripathy - Assistant Director

---

# Ceased to be a Member of the Committee w.e.f. 14.3.2003 consequent upon his nomination to the Committee on External Affairs

## INTRODUCTION

I, the Chairman, Standing Committee on Energy having been authorised by the Committee to present the Report on their behalf, present this 38<sup>th</sup> Report (Thirteenth Lok Sabha) on Demands for Grants (2003-2004) relating to the Department of Atomic Energy.

2. The Committee took evidence of the representatives of the Department of Atomic Energy on 13<sup>th</sup> March, 2003.

3. The Committee wish to thank the representatives of the Department of Atomic Energy who appeared before the Committee and placed their considered views. They also wish to thank the Department for furnishing the replies on the points raised by the Committee.

4. The Report was considered and adopted by the Committee at their sitting held on 28<sup>th</sup> March, 2003.

5. For facility of reference and convenience, the observations and recommendations of the Committee have been printed in bold letters in the body of the Report.

NEW DELHI;  
28<sup>th</sup> March, 2003  
7 Chaitra, 1925 (Saka)

SONTOSH MOHAN DEV,  
Chairman,  
Standing Committee on Energy.

**PART-I**  
**REPORT**  
**CHAPTER-I**  
**INTRODUCTORY**

The Department of Atomic Energy (DAE) undertake comprehensive programmes of harnessing nuclear energy and its applications for the benefit of the Indian society. The main mandate of the Department is to enhance the share of nuclear power through deployment of indigenous and other proven technologies and also develop Fast Breeder Reactors and Thorium Reactors with associated fuel cycle facilities. The Department build and operate research reactors and utilise the radioisotopes produced there for applications in medicine, agriculture and industry. They develop advanced technology such as accelerators, lasers, control & instrumentation, supercomputers, bio-technology, information technology, materials technology and others. The Department support basic research in nuclear energy and related frontier areas of science. They interact with universities and academic institutions and support development of their S&T programmes having a bearing on DAE's programme for mutual benefit. They also work in fields relating to national security.

1.2 The atomic energy programmes comprise three sectors, namely, Nuclear Power Sector, Industries & Minerals Sector and Research & Development Sector.

1.3 The Nuclear Power Sector of the Department deals with design, construction and operation of commercial power reactors with associated safety in all its phases. This comprises building of Pressurised Heavy Water Reactors and development of Fast Breeder Reactors and Thorium Reactors on commercial scale. Associated waste management and environment monitoring and technology development relating to operation and maintenance of the reactors also form part of the programmes.

1.4 Industries & Minerals Sector is involved in industrial application of technologies developed in the R&D facilities and includes (a) programmes related to nuclear fuel cycle

covering design, construction and operation of industrial plants for refining ores, fabrication of fuel, production of heavy water, instrumentation and control, etc. needed for sustained operation of the power reactors; and (b) applications of radioisotopes, radiation, laser and accelerator technology for development in industry, medicine, agriculture and food preservation.

1.5 Research & Development Sector provides R&D support to the Nuclear Power Programme of the Department. The R&D efforts of DAE are in multidisciplinary high technology areas. Significant achievements have been made in building technical capabilities in the design, construction and operation of Pressurised Heavy Water Reactors (PHWR); exploration, mining extraction, purification and conversion of nuclear materials; production of fuel element for nuclear reactors; production of heavy water; health and safety research; development and application of lasers and accelerators; development of Fast Breeder Test Reactors and related instrumentation; reprocessing of spent fuels; waste management and production and use of radioisotopes, besides basic research in frontier areas of S&T, particularly radio-astronomy, molecular biology, condensed matter physics, computer science, etc.

1.6 The Committee have examined in depth the detailed Demands for Grants of the Department for the year (2003-04). The Committee approve the Demands presented by the Department subject to their observations/recommendations which are contained in the succeeding Chapter.

## CHAPTER II

### **ANALYSIS OF DEMANDS FOR GRANTS AND PLAN BUDGET OF THE DEPARTMENT OF ATOMIC ENERGY**

The following two Demands for Grants have been submitted to Parliament by the Department of Atomic Energy (DA E) for the year 2003-04:

Demand No. 5 Atomic Energy  
Relating to Revenue and Capital Expenditure on Rs. 2765.77  
crore

Atomic Energy Research and Development, Industrial  
Projects and the Secretariat of the Department

Demand No. 6 Nuclear Power Schemes

Relating to Revenue and Capital Expenditure on Rs. 3466.58  
crore

Nuclear Power Generation and Ancillary Schemes

2.2 The two Demands aggregating to Rs. 6232.35 crore comprise Rs. 2800.00 crore for Plan schemes and Rs. 3432.35 crore for Non-Plan expenditure. In addition, Plan schemes to the extent of 1306.10 crore are to be met from Internal and Extra Budgetary Resources (IEBR).

2.3 The following are the budgetary allocations made to the Department of Atomic Energy during 2001-02, 2002-03 and 2003-04 and the percentage of increase over the previous year's allocation:-

(Rs. in crore)

Year	BE	Increase
2001-02	5190.23	5%
2002-03	6180.28	19.08%
2003-04	6232.35	0.84%

2.4 The Major Head-wise details of actual revenue and capital expenditure for the year 2001-02, the Budget and Revised Estimates for 2002-03 and Budget Estimates for 2003-04 of the Department are given in the Appendix.



## A Budgetary Allocation

2.5 The Budget Estimates (BE) and Actuals for the year (2001-02), Budget Estimates (BE) and Revised Estimates (RE) for the year 2002-03 and BE for the year 2003-04 in respect of the three Sectors viz. Power, Industries & Minerals and Research & Development (R&D) Sectors of the Department of Atomic Energy are as under:

(Rs. in crore)

SECTOR	BE 2001-2002			ACTUALS 2001-2002			BE 2002-2003			RE 2002-2003			BE 2003-2004		
	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
<b>Power</b>															
Budgetary Support	1093.00	1503.28	2596.28	938.57	1556.18	2494.75	1595.00	1665.60	3260.60	1720.00	1505.69	3225.69	2000.00	1466.58	3466.58
I.E.B.R.	149.00	0.00	149.00	467.93	0.00	467.93	121.00	0.00	121.00	199.00	0.00	199.00	1170.00	0.00	1170.00
<b>I&amp;M</b>															
Budgetary Support	340.00	1112.64	1452.64	237.51	1013.25	1250.76	370.00	1239.41	1609.41	260.67	1202.51	1463.18	336.00	1113.47	1449.47
I.E.B.R.	26.50	0.00	26.50	36.53	0.00	36.53	119.60	0.00	119.60	72.00	0.00	72.00	136.10	0.00	136.10
<b>R&amp;D BS</b>	459.00	682.31	1141.31	419.71	704.93	1124.64	535.00	775.27	1310.27	434.33	810.92	1245.25	464.00	852.30	1316.30
<b>Total Budgetary Support</b>	1892.00	3298.23	5190.23	1595.79	3274.36	4870.15	2500.00	3680.28	6180.28	2415.00	3519.12	5934.12	2800.00	3432.35	6232.35
<b>Total I.E.B.R.</b>	175.50	0.00	175.50	504.46	0.00	504.46	240.60	0.00	240.60	271.00	0.00	271.00	1306.10	0.00	1306.10
<b>GRAND TOTAL</b>	2067.50	3298.23	5365.73	2100.25	3274.36	5374.61	2740.60	3680.28	6420.88	2686.00	3519.12	6205.12	4106.10	3432.35	7538.45

IEBR - Internal and Extra Budgetary Resources

I&M - Industries & Minerals

R&D - Research & Development

2.6 It may be seen from the data that during the year 2001-02, the total expenditure out of the budgetary support component was Rs. 4870.15 crore as against the budgetary allocation of Rs. 5190.23 crore. Thus, there was a shortfall of Rs. 320.08 crore.

2.7 It is also seen from the data that the total Plan budgetary allocation for the Department during 2001-02 was Rs. 1892.00 crore whereas the expenditure was Rs.1595.79 crore during the year. Thus, there was a shortfall of Rs. 296.21 crore. The Plan budget of the Department has not been fully expended in either of the three Sectors of the Department.

2.8 The shortfall in the utilisation of Plan allocation in the R&D Sector was Rs.39.29 crore (Rs. 459.00 crore- Rs. 419.71 crore).

2.9 The Department of Atomic Energy have cited the following reasons for shortfall in Plan expenditure in the R&D Sector during the year 2001-02:

(i) Saving of Rs. 21.25 crore occurred in Institute for Plasma Research, Gandhinagar due to slippage in procurement of machinery & equipments and supplies & materials in the execution of the project "SST-1".

(ii) Saving of Rs. 8.27 crore occurred due to deferment of purchase of flats from Air India, Mumbai and delay in clearance from Mumbai Municipal Corporation for the construction activities of the Department.

(iii) Saving of Rs. 6.41 crore was due to slow progress of major works at VECC for the project "Superconducting Cyclotron" as certain modifications were found necessary while the work was in progress. Two turbine cartridges for Liquid Helium Plant could not be procured due to deferment of delivery schedule.

(iv) Saving of Rs. 5.07 crore was due to slow progress of the project “Providing Additional Water Supply to the DAE Units at Kalpakkam” being executed by the Government of Tamil Nadu, as the work involved construction of sub-surface barriers across the Palar river. The delay is also attributable to the opposition from the public in the nearby villages.

(v) Saving of Rs. 4.71 crore was due to delay in finalisation of technical specifications and price negotiations with the bidders for equipments relating to “DAE-CERN Collaboration for LHC Project and Spring 8 Storage Ring” at CAT, Indore.

(vi) Saving of Rs. 1.60 crore was due to non-materialisation of supply order placed on Russian company for the project “Accelerator Technology and Applications” at CAT, Indore.

2.10 It is also observed that there was a huge shortfall of Rs. 102.49 crore (Rs. 340.00 crore- Rs. 237.51 crore) in the utilisation of Plan allocation in the I&M Sector during 2001-02.

2.11 The Department of Atomic Energy have attributed the following reasons for shortfall in Plan expenditure in the I&M Sector during the year 2001-02:

(i) Saving of Rs. 43.15 crore occurred in the project “New Technology Development” since, in view of the specific requirements of the project it was decided to implement the project with an entirely different approach i.e. Engineering, Procurement and Construction (EPC) mode. The process of finalisation of EPC contract through open tender got delayed as the bids received were not conforming to the specific requirements, hence re-tendered.

(ii) Saving of Rs. 27.91 crore occurred in the project “Revamping of Power Reactor Fuel Reprocessing” being executed in an operating plant where the availability of plot area for civil works was dependent on the planned shutdown of the running plant. This

also led to rescheduling of all down stream activities such as procurement of equipments, instrumentations, etc.

(iii) Saving of Rs.20.02 crore was due to delay in restructuring of ECIL.

(iv) Saving of Rs. 10.69 crore was in the project “6300 – M – 3/d Combined MSF-RO Desalination Plant to be set up at PHWR Kalpakkam since machinery & equipments like Membrane were to be procured from the USA firm, which called for clearance from USA Government agencies.

(v) Saving of Rs. 8.92 crore was due to delay in finalisation of works contracts and procurement of equipments for reasons of difficulty in getting export licence by the foreign suppliers for the project “Plutonium Based Fuels”.

(vi) Saving of Rs. 3.21 crore was due to the decision to go for development of Electron Beam Module Furnace (EBMF) indigenously instead of import for the project “Special Material and Alloys Development”.

(vii) Saving of Rs. 2.46 crore was due to slow progress of civil works for the project “Production & Processing of Uranium Compounds Upgradation Technology”, as the work is being executed by demolition of the old factory building where accumulated radioactive wastes and debris were to be disposed off. This process took longer time than expected. To avoid time overrun, the design and procurement of equipments was awarded to consultancy contract, which also took some time.

(viii) Saving of Rs. 2.22 crore was due to non-receipt of Radiation Shielding Windows, Master Slave Manipulators, Absorber Rod Transportation Flask, etc. in the projects handled by the Board of Radiation and Isotope Technology.

2.12 It is further seen that in the Power Sector, the shortfall in the utilisation of Plan budgetary allocation during 2001-02 was as much as Rs. 154.43 crore (Rs. 1093.00 crore – Rs. 938.57 crore).

2.13 The Department of Atomic Energy have assigned the following reasons for shortfall in Plan expenditure in the Power Sector during the year 2001-02:

(i) During the year 2001-02, budgetary support in the form of loan of Rs. 242.21 crore was approved for NPCIL. The entire loan component was sought for Kudankulam Detailed Project Report in the form of Rs. 18 crore as Govt. loan and balance of Rs. 224.21 crore as Russian credit. The Russian credit was provided for making the balance payment for DPR works and also for the advance payments towards the order for making document as well as for long delivery equipments expected to be placed during 2001-02. These orders have since been placed and as per the terms, the payments are to be made in cash. The negotiations on techno-commercial offer and individual contracts were held subsequent to BE stage. Therefore, the provisions for the credit was reduced to Rs. 30.12 crore at RE stage. The saving in the loan is mainly due to change in initial funding pattern of Kudankulam Project after negotiation and finalisation of contracts for long - delivery items.

(ii) The reduction in the Budgetary support in loan has not impacted the Nuclear Power Programme as increased IEBR component has been budgeted at RE stage. NPCIL's Plan outlay at BE stage during 2001-02 was Rs. 1173 crore consisting of Rs. 1024.21 crore of gross budgetary support (GBS) and Rs. 149 crore of Internal and Extra Budgetary Resources (IEBR). At RE stage, this was revised to Rs. 1365 crore consisting of Rs. 883 crore of GBS and Rs. 482 crore of IEBR. The actual utilisation during the year has been Rs. 1351 crore consisting of Rs. 883 crore of GBS and Rs. 467.93 crore of IEBR. Thus, the outlay at RE stage is more than in the BE stage consistent with the pace of project progress.

(iii) Saving of Rs. 6.44 crore occurred as the order placed for machinery & equipment like Finning of AH2 tubes, development of dished end forging, development of damper

& bellows, AHX manufacturing and thick plate welding development could not materialise for the project “PFBR Phase-II”.

(iv) Saving of Rs. 4.86 crore was due to delay in supply of Transfer Arm, delay in finalisation of the order for the manufacture of inclined Fuel Transfer Machine. The Transfer Arm is a critical component of the project and is of developmental nature.

(v) Saving of Rs. 3.22 crore was due to delay in receipt of last consignment of Helium Refrigeration Plant and consequent rescheduling of other supplies like electronic absolute pressure transmitter, compressor package motor, etc. in the project “Additional Upgrading Facility for Nuclear Power Plant”.

2.14 Commenting on the shortfall in the utilisation of budgetary allocation, Secretary, DAE stated during oral evidence as under:-

“We are, in fact, organising ourselves to do even better but I must tell you that these difficulties are very genuine..... many of these things which are being done for the first time, they do face technical difficulties and their resolution takes time. So the payment does not get released because the payment is based on milestones and unless the manufactures go up to a particular milestone, the payment does not get released. But as per the contract, we have to make provision in the Budget. We make provision in the Budget but then actual realisation does not take place. So, these are some of the difficulties. Similarly, for example, when we are talking of a new project, we have to go through the development of the infrastructure and we have to go through the clearances of statutory agencies. But at times it takes a longer time. There are many things which are completely beyond our control. I am not trying to justify. We must improve our performance and we will do that”.

2.15 It is also seen that there were wide variations between Plan Budget Estimates (BE) and Plan Revised Estimates (RE) during 2002-03. This variation in the Power Sector was Rs. 125.00 crore (Rs.1720.00 crore – Rs.1595.00 crore).

2.16 The Department of Atomic Energy have assigned the following reasons for wide variations between Plan BE and Plan RE in the Power Sector during the year 2002-03:

(i) The increased allocation is required towards additional equity investment in NPCIL. Two Nuclear Power Schemes, Kudankulam-1&2 and RAPP-5&6 were sanctioned towards the end of the last financial year in December, 2001 and March, 2002 respectively. Consequently, a number of package contracts for these projects have been placed. As such, the required investment could not be fully visualised at BE stage. Additional funds are required to keep up with the pace of project implementation, which has now been completely charted out. While arriving at the Revised Estimates, the commitments already entered into with increased pace of work have been taken into account.

(ii) NPCIL's Plan budgetary allocation during 2002-03 was Rs. 1528.50 crore as GBS. Besides RE provision for the same at Rs. 1685.55 crore, another Rs. 210 crore has been accepted in principle by the Ministry of Finance to be provided through Supplementary Demands as equity support to NPCIL in the current year. With the provision in Supplementary Demand, the revised figure of GBSs will be Rs. 1895.55 crore.

2.17 It is also seen that the Plan BE of Rs. 370.00 crore was reduced to Rs. 260.67 crore at RE stage in the I&M Sector during 2002-03. Thus, there was a reduction of Rs. 109.33 crore.

2.18 The Department of Atomic Energy have attributed the following reasons for wide variations between Plan BE and Plan RE in the I&M Sector during the year 2002-03:

(i) The entire provision of Rs.29 crore made for the VRS of ECIL has been dropped, as the scheme could not be finalised with the approval of the competent authority.

(ii) In respect of UCIL, the RE was substantially reduced from Rs. 70 crore to Rs. 35 crore due to the non-availability of infrastructure facility and delay in getting clearance from various statutory authorities for Lambapur and Domiasiat Projects.

(iii) Provisions have been reduced in respect of BARC and IGCAR for the new projects of the 10<sup>th</sup> Plan where financial sanctions are yet to be received. The reduced levels are Rs. 139 crore and Rs. 8.33 crore from Rs. 165.81 crore and Rs. 15 crore respectively. Similarly, for the DAE- IREL Project also the provision has been reduced from Rs. 15 crore to Rs. 7.26 crore for the same reasons.

2.19 It is also seen that the Plan BE of Rs. 535.00 crore was reduced to Rs. 434.33 crore at RE stage in the R&D Sector during 2002-03. Thus, there was a reduction of Rs.100.67 crore.

2.20 The Department of Atomic Energy have attributed the following reasons for wide variations between Plan BE and Plan RE in the R&D Sector during the year 2002-03:

(i) The provisions were substantially reduced from Rs. 186 crore to Rs. 120 crore in respect of BARC due to delay in sanction of 10<sup>th</sup> Plan Projects and consequent slow progress.

(ii) In respect of IGCAR, the Plan Revenue provision of Rs. 6.50 crore kept for O&M of projects completed during 9<sup>th</sup> Plan has been transferred to Non-Plan side resulting in apparent lower expenditure under Plan.

(iii) The provision for Institute for Plasma Research has been brought down as the Institute had substantial unspent provision of Rs. 9.95 crore at the beginning of the year. The progress of execution of project in the current year was also slower than anticipated at the BE stage.

(iv) In respect of "Housing", the provision of Rs. 10 crore kept for purchase of ready built flats from Air India has been dropped. Also there has been slow progress in respect of other construction projects undertaken by DCSE&M.



(v) Considering the slow progress of projects, the budget provisions have been reduced marginally for VECC, TIFR, AEES, etc. to make the estimates realistic.

2.21 The Department of Atomic Energy, in a written reply, have furnished the following details regarding BE, RE and actual expenditure in respect of the Department since 2000-01 as well as the steps taken by the Department to ensure that the actuals are close to BE / RE :

<i>Rs. in crore</i>				
Sl. No.	Year	BE	RE	Actuals
<b>1</b>	<b>2000-01</b>	<b>4942.99</b>	<b>4789.34</b>	<b>4551.50</b>
<b>2</b>	<b>2001-02</b>	<b>5190.23</b>	<b>4994.81</b>	<b>4870.15</b>
<b>3</b>	<b>2002-03</b>	<b>6180.28</b>	<b>5934.12</b>	<b>* 4874.15</b>

**\* upto February 2003**

The progress of expenditure with reference to BE/RE is being monitored very closely at the constituent unit level and in the Department by the concerned Joint Secretaries. Secretary, DAE also reviews the progress by holding meetings with the Heads of constituent units, PSUs and Aided Institutions periodically. Significant progress has been achieved during the current year where the expenditure has reached upto 80% over RE upto February, 2003.

2.22 The Department of Atomic Energy have stated that the Capital Budget of the Department is spent on the following activities:

- (i) In the R&D Sector the Plan schemes of DAE R&D Units except aided institutions
- (ii) Housing construction activities of DAE units and aided institutions
- (iii) In the I&M Sector the Plan schemes of DAE I&M Units and PSUs (except NPCIL)
- (iv) The expenditure on operation of Heavy Water Plants

- (v) In the Power Sector, equity investment to NPCIL and ancillary Plan schemes of IGCAR and BARC. During the year 2003-04, the construction of Fast Breeder Reactor is expected to commence and the expenditure for the same has been included in the Power Sector.

2.23 The Committee are concerned to note that the Department of Atomic Energy have been unable to fully utilise the budgetary allocations during any of the last three years. As against the budgetary allocations of Rs. 4942.99 crore, Rs. 5190.23 crore and Rs. 6180.28 crore for the years 2000-01, 2001-02 and 2002-03, the actual expenditure by the Department has been to the tune of Rs. 4551.50 crore, Rs. 4870.15 crore and Rs. 4874.15 crore (upto February, 2003) respectively. The Committee are further concerned to note that out of the total Plan budgetary support of Rs. 1892.00 crore during 2001-02, the expenditure by the Department has been to the extent of Rs. 1595.79 crore only during the year. Thus, there has been a huge shortfall of Rs. 296.21 crore. All the three Sectors of the Department viz. Power, Industries & Minerals (I&M) and Research & Development (R&D) have registered significant shortfalls in the utilisation of the Plan budgetary allocations during 2001-02. While R&D Sector has contributed Rs. 39.29 crore to the overall shortfall of Rs. 296.21 crore, the shortfalls registered by the Power and I&M Sectors have been as much as Rs. 154.43 crore and Rs. 102.49 crore respectively. The shortfalls, shown as 'savings' by the Department, have been ascribed to difficulty / delay in procurement of machinery & equipments, delay in getting clearances, slow progress of some items of work, change in the scope of some projects, delay in finalisation of contracts, etc. While the Committee understand the difficulties of the Department in procuring some of the imported equipments, they are not inclined to accept the other reasons cited by the Department which could have been avoided if the Department had acted with some advance planning and foresight. What pains the Committee more is that the Department have been surrendering Plan budgetary allocations year after year. Considering the fact that the resources are scarce and hard to come by, the Committee recommend that the Department should fully utilise whatever allocations are made to them.

2.24 The Committee are unhappy to note the wide variations between the Budget Estimates (BE) and the Revised Estimates (RE) in respect of the Department. The Budget Estimates of Rs. 4942.99 crore, Rs. 5190.23 crore and Rs. 6180.28 crore for the years 2000-01, 2001-02 and 2002-03 have been scaled down to Rs. 4789.34 crore, Rs. 4994.81 crore and Rs. 5934.12 crore respectively. Similarly, the total Plan budgetary support of Rs. 2500.00 crore has been scaled down to Rs. 2415.00 crore at RE stage during the year 2002-03. While the Plan BE in respect of the Power Sector was enhanced by Rs. 125.00 crore at RE stage, the same for the I&M and R&D Sectors was reduced at RE stage by Rs. 109.33 crore and Rs. 100.67 crore respectively. This is indicative of the fact that the budgeting

exercise in respect of any of the three Sectors has not been done meticulously. The reduction in the I&M and R&D Sectors have been attributed to non-approval of the Voluntary Retirement Scheme of the Electronics Corporation of India Limited, delay in getting clearances for some projects of the Uranium Corporation of India Limited, lack of sanction for some projects of the Bhabha Atomic Research Centre and the Indira Gandhi Centre for Atomic Research, slow progress of projects of the Variable Energy Cyclotron Centre, Tata Institute of Fundamental Research and some other organisations, dropping off the purchase of ready built flats from Air India, etc. In the opinion of the Committee, the reasons cited by the Department for reductions at RE stage are not such which could not have been foreseen and avoided. Instead, these factors indicate administrative slackness and lack of foresight on the part of the Department. The Committee desire that the Department should strengthen their budgeting mechanism so as to ensure that realistic budget estimates are made in future by making an in-depth analysis of each and every project.

## **B. Nuclear Power Generation**

2.25 The Nuclear Power Corporation of India Limited (NPCIL), a Public Sector Undertaking of the Department of Atomic Energy, is responsible for the design, construction and operation of Nuclear Power Reactors in the country. The company is operating 14 (2 Boiling Water Reactors and 12 Pressurised Heavy Water Reactors) with a total capacity of 2720 MWe. During the last 7 years, NPCIL has shown improved performance in terms of power generation, capacity improvement and earnings.

2.26 The details of targeted and actual generation of the operating Atomic Power Stations during 2001-02 and 2002-03, as furnished by the Department in a written reply, are as under:

### **2.27 The unit-wise targets and actual generation in respect of the Nuclear Power Stations in respect of the financial years 2001-02 and 2002-03 and the targets for 2003-04 are as follows:**

UNITS	2001-02		2002-03		2003-04
	TARGET	ACTUAL	TARGET	ACTUAL@	TARGET
TAPS-1	830	1188	1104	1181	1125
TAPS-2	1040	1314	893	1169	1175
RAPS-2	1208	1498	1381	1446	1312
RAPP-3	1268	1434	1483	1442	1620
RAPS-4	1242	1615	1483	1693	1418

MAPS-1	950	1265	998	956	1259
MAPS-2	900	980	0	0	371
NAPS-1	1347	1765	1483	1550	1620
NAPS-2	1353	1570	1616	1686	1420
KAPS-1	1350	1717	1616	1727	1420
KAPS-2	1350	1854	1483	1603	1620
KAIGA-1	1370	1456	1479	1503	1422
KAIGA-2	1310	1543	1479	1523	1418
<b>TOTAL NPCIL</b>	<b>15518</b>	<b>19199</b>	<b>16498</b>	<b>17479</b>	<b>17200</b>
RAPS-1	854	282	0	116	0
<b>TOTAL</b>	<b>16372</b>	<b>19481</b>	<b>16498</b>	<b>17595</b>	<b>17200</b>

@ The actual generation for the year 2002-03 is up to 28.2.2003.

2.28 The targets have been met for all the units of NPCIL.

2.29 RAPS-1 is owned by DAE and operated by NPCIL on behalf of DAE. The unit, first PHWR in the country, commenced commercial operations in the year 1973. The target for the year 2001-02 could not be met in view of long shut down (26.9.2000 to 24.7.2001) for partial replacement of coolant channels and sealing of light water leaks from one of the end shields. The unit has been shut down from 30.4.2002 for detailed In Service Inspection and certain safety upgradations in accordance with directive of Atomic Energy Regulatory Board (AERB). Therefore, no targets have been fixed for this unit for the year 2002-03 and 2003-04.

2.30 MAPS-2 has been shut down from 9.1.2002 for En mass coolant channel replacement and no target was fixed for this unit for the year 2002-03. The unit is expected to come back on line during the year 2003 and accordingly, a target of 371 MUs has been fixed for the year 2003-04.

2.31 As regards the targets of the Department regarding generation of Nuclear Power during the 10<sup>th</sup> and 11<sup>th</sup> Plans and the steps being taken to meet those targets, the Department, in a written reply, have furnished the following information :

2.32 The present nuclear power generation capacity in the country is 2720 MWe.

2.33 The details of Nuclear Power Reactors, presently under construction, are as follows:

PROJECT	COMPLETION SCHEDULE
	First unit/ Second unit
TAPP-3&4 (2X 540 MWe)	Apr. 2006/ Jan. 2007
Kaiga –3&4 (2X 220 MWe)	Mar. 2007/ Sept. 2007
KKNPP-1&2 (2X 1000 MWe)	Dec. 2007/ Dec. 2008
RAPP -5 &6 (2X 220 MWe)	Aug. 2007/ Feb. 2008

2.34 During the 10<sup>th</sup> Plan, 1300 MWe capacity addition is targeted and likely to be achieved by completion of TAPP-3&4 (2X540 MWe) and Kaiga-3 (220 MWe).

2.35 During the 11<sup>th</sup> Plan, from among the projects presently under construction, 2660 MWe capacity addition by completion of Kaiga - 4 (220 MWe), KKNPP – 1&2 (2X1000 MWe) and RAPP 5&6 (2 X 220 MWe) is targeted and likely to be achieved progressively by December 2008. The construction work on these projects is going on as per approved schedule.

2.36 10<sup>th</sup> Plan also envisages commencement of construction during the later half of the 10<sup>th</sup> Plan, 2 X700 MWe Pressurised Heavy Water Reactors (PHWRs) and 2 X 1000 MWe Light Water Reactors. Out of these, 2X1000 MWe units and one unit of 700 MWe are targeted for completion in 11<sup>th</sup> Plan. In addition 800 MWe capacity is also expected to be added during the 11<sup>th</sup> Plan by completion of one 500 MWe PFBR and one 300 MWe AHWR. The target by the end of 11<sup>th</sup> Plan is to reach about 10000 MWe and this will be subject to the availability of funds.

2.37 Regarding the capacity factors of the Nuclear Power Reactors in the country, the Department have furnished the following information:

**NPCIL is presently operating 14 nuclear power reactors. These include 12 Pressurized Heavy Water Reactors (PHWRs) and 2 Boiling Water Reactors (BWRs). The performance of NPCIL plants has been steadily improving reaching an overall average Plant Load Factor of 89% for year 2002-03 up to February 2003.**

**This performance is comparable to performance of some the best operating Nuclear Power Reactors in the world. Some of the comparisons with other Nuclear Power Reactors in the world are as follows:**

- During the rolling 12 months period (1.10.2001 to 30.9.2002), KAPS-1 achieved the distinction of being the best performing unit amongst PHWR category. It was ranked first with a Gross Capacity Factor (GCF) of 98.4%. (\*)
- For the calendar year 2002, three NPCIL plants are amongst the best five PHWR plants in the world. KAPS-1 with a (GCF) of 98.4% is at number 2, NAPS-1 with a GCF of 97.0% is at number four and RAPS-4 with a GCF of 96.6% is at number five. (\*)
- At the end of 2002, average annual PHWR performance continued to show a gradual improvement, led by the units of NPCIL (India). Further, NPCIL PHWRs showed a major improvement in GCF in 2002, exceeding US Light Water Reactor performance by almost 1%. (\*)

\* As mentioned in Cognizant, a COG newsletter and COG web site. COG is an organisation of CANDU/PHWR plant operators and is based in Canada. COG has presently 32 operating PHWR plants as its members.

2.38 The gradual improvement in the performance of NPCIL plants over the years is due to the following factors:

- Reduction in number of unplanned outages due to better upkeeping of all essential equipment.
- Better outage management planning well in advance resulting in significantly lower outage duration especially in the annual shutdowns. For example, last annual shutdown in 2002 in KAPS was completed in less than 19 days. This could be made possible due to advance planning.

- Increased thrust on training to O&M persons
- Effective involvement of designers for the resolution of long standing issues
- Formation of special task forces to identify solution of generic problems and constitution of root cause committees in units for identifying the causes for significant events.
- Improved information exchange amongst all NPCIL plants by conducting meetings of Station Directors, Superintendents, station chemists, physicists, etc.
- Pro-active approach adopted by NPCIL management
- Improved relationship between management and workers and introduction of liberal incentive schemes for workers and officers have helped in their increased involvement to achieve higher efficiency/performance.
- Increased exposure to NPCIL persons to visit Nuclear Power Plants elsewhere in the world
- Access to timely availability of operating experience information of world-wide Nuclear Power Plants.
- Conducting WANO Peer Reviews of four NPCIL plants namely KAPS, NAPS, KGS and RAPS-3&4. These reviews were conducted by experts from various Nuclear Power Plants world-wide on the basis of best international practices in the world. This helped NPCIL in learning the best international practices in the world.

2.39 Elucidating further, the Secretary, DAE deposed before the Committee as under:-

“...today we have 14 reactors altogether which have been performing extremely well. Their capacity factor has been progressively going up and in the year 2002, we clocked the average capacity factor of around 89 per cent which is very high even when compared to world standards. In fact, in this year, the capacity factor clocked in by the Nuclear Power Corporation is the highest in the world. It is one per cent higher than the Light Water Reactors of USA. It is higher than the Heavy Water Reactors which are being operated in other places of the world. This has been recognised by the CANDU Owners Group which is an organisation of utilities. This is one part on which we are extremely satisfied. The activity to improve excellence will continue and we are still striving hard to see how much capacity factor we can increase. Kakrapar Unit- 1 was the highest performer among the Heavy Water Reactors world-wide with 98.4 per cent capacity factor”.

2.40 When asked as to whether the Department have any proposal to set up super atomic power stations of more than 1000 MWe capacity in the country in future, the Department, in a written reply, stated as under:

“In the early stages of Nuclear Power Programme, the unit size in the range of 200-220 MWe was adopted to be consistent with the unit sizes of conventional thermal power plants and from the considerations of stable and reliable operation of the units in existing electrical grid system. With the growth of electrical power systems, thermal power stations of 500 MWe and higher unit size are now in operation. To be consistent with the unit sizes in the national grid system, the designs of 540 MWe PHWR units have been developed and the first 2X540 MWe units are being set up at Tarapur, Maharashtra. Design work is in progress for increasing the PHWR unit rating from 540 MWe to 700 MWe for future PHWR units to be constructed. Unit size of 500 MWe has also been adopted for PFBR and initial FBRs. A beginning has been made with the introduction of 1000 MWe unit size of nuclear power reactor with the commencement of construction of 2X1000 MWe Russian VVERs at Kudankulam, Tamil Nadu in co-operation with the Russian Federation. These are Light Water Reactors (LWRs) of VVER type. Though a very few Nuclear Power Reactors of a maximum unit size of about 1500 MWe have been set up in the world, in our country, maximum unit capacity of about 1000 MWe is envisaged. In order to have a station capacity of more than 1000 MWe capacity, multiple units will need to be set up at one site subject to the feasibility of evacuating the power generated from Nuclear Power Station”.

**2.41 As regards the current share of nuclear power in the total power generation in the country and the likely share of nuclear power around the year 2020, the Department have given the following details:**



“Fourteen Nuclear Power Reactors are presently under operation in the country with a total installed capacity of 2720 MWe. In terms of installed capacity, the nuclear share is about 2.6%. During the financial year 2001-02, the electricity generated from Nuclear Power Stations was about 19,400 million units (Mus) which is about 3.7% of the total electricity generated in the country. During the current year (2002-03 upto February 2003) the generation has been about 17,478 Mus (constituting about 3.7% of the total generation in the country). The present nuclear share of electricity production in India is to be viewed in the context of the development phase requiring significant efforts and time that the country had to go through in the nuclear power sector, despite the “Technology Denial Regime” prevalent internationally in this field. While the present share of nuclear electricity is small, nuclear energy has the potential to meet a significant part of the future needs of electricity. With the completion of the projects under construction, progressively by December 2008, the total nuclear power capacity in the country will be 6680 MWe. Additional projects are contemplated to be taken up in future for construction so as to reach a total nuclear power capacity of about 10,000 MWe by the end of 11<sup>th</sup> Plan and about 20,000 MWe by the year 2020. The share of nuclear power is expected to increase to about 7% in this time frame. This will also depend on capacity addition in the non-nuclear sector in the intervening period”.

2.42 In this connection, the Secretary, DAE submitted during oral evidence as under:

“.....we must increase the share of nuclear power as fast as possible. In the last two years, we have made a lot of efforts and in addition to the Tarapur unit on which construction has going on for 3-4 years, we have six more units under construction today. Totally, there is a construction programme of eight reactors. The mandate is to enhance the share of nuclear power through the existing reactors as well as by bringing in newer ones”.

**2.43 The Committee are happy to note that the Department have exceeded the generation targets in respect of the various Nuclear Power Stations in the country during 2001-02 and 2002-03. As against the targets of 16,372 million units and 16,498 million units during 2001-02 and 2002-03, the actual generation was 19,481 million units and 17,595 million units (upto 28.2.2003) respectively. The Committee are further pleased to note that during 2001-02, all the Nuclear Power Stations except the Rajasthan Atomic Power Station – 1 (RAPS-1) have exceeded the generation targets. RAPS-1 could not achieve the**

set target as it had to be shut down from 26.9.2000 to 24.7.2001 for partial replacement of coolant channels and sealing of light water leaks. As regards the year 2002-03, the Committee find that all the Nuclear Power Stations barring the Rajasthan Atomic Power Stations-3 (RAPS-3) and the Madras Atomic Power Station – 1 (MAPS-1) have exceeded the set generation targets even before the completion of the financial year. Only RAPS-3 and MAPS-1 are short of the set targets by 41 million units and 42 million units respectively as on 28.2.2003. The Committee are a bit surprised to note that while the old generating stations have exceeded the set targets, a relatively new station like RAPS-3 has fallen behind. They would like to be apprised of the reasons for the same. The Committee also feel that there is a need to fix realistic targets in the field of power generation. For example, the actual generation in the year 2001-02 was 19,481 million units and the target fixed for the year 2002-03 was only 16,498 million units. Similarly, the actual productions in the current year upto 28<sup>th</sup> February, 2003 has already reached 17,595 million units but the target for the year 2003-04 has been fixed at 17,200 million units only which is much lower than the actual production in the year 2001-02. The Committee would like to know the reasons for the same.

- 2.44 The Committee are pleased to note that during the period from 1.10.2001 to 30.9.2002, the Kakrapar Atomic Power Station- 1 (KAPS-1) achieved the rare distinction of being the best performing unit in the world in the Pressurised Heavy Water Reactor (PHWR) category with a Gross Capacity Factor of 98.4 per cent. They are also happy to note that for the calendar year 2002, three Nuclear Power Plants of our country viz. KAPS-1, the Narora Atomic Power Station-1(NAPS-1) and the Rajasthan Atomic Power Station-4 (RAPS-4) were amongst the best five PHWR plants in the world with Gross Capacity Factors of 98.4 per cent, 97 per cent and 96.6 per cent respectively. More pleasing is the fact that PHWR Plants of our country showed a major improvement in the Gross Capacity Factor in the year 2002, exceeding the Light Water Reactor performance of the United States by almost 1 per cent. The Committee feel that all this

was possible only because of the hard work and dedication of the scientists of the Department. They hope that the Department would continue to work diligently and achieve many more milestones in future. The Committee also expect that the other Nuclear Power Projects in the country will follow suit and excel like KAPS-1, NAPS-1 and RAPS-4.

**2.45 The Committee note that 14 Nuclear Power Reactors are currently operating in the country with a total installed capacity of 2720 MWe and that in terms of installed capacity, the nuclear share comes to about 2.6 per cent. They further note that in terms of electricity generated from the Nuclear Power Stations during 2001-02 and 2002-03, the share of nuclear power in the total electricity generation in the country was about 3.7 per cent. The Committee have been informed that in case the nuclear power capacity reaches 10,000 MWe by the end of the 11<sup>th</sup> Five Year Plan and 20,000 MWe by the year 2020, the share of nuclear power is likely to increase to about 7 per cent depending upon the capacity addition in the non-nuclear sector. The Committee view that the present share of nuclear power in the total electricity generation is too low and that serious and dedicated efforts need to be made by the Department to increase this share to a significant extent. Considering the low share of nuclear power, the Committee recommend that the Department should consider the feasibility of setting up 1500 MWe capacity Nuclear Power Reactors in the country, some of which have already been set up in the world. This will go a long way in increasing the share of nuclear power. The Committee appreciate the difficulties the Department had to encounter following the ‘Technology Denial Regime’. They also understand that significant efforts and time are required to achieve total self-dependence in the Nuclear Power Sector. However, the Committee have full faith in the capability of the scientists working in the Department who, they hope, will leave no stone unturned to significantly increase the share of nuclear power within a reasonable period.**

**C. Gestation period of Nuclear Power Projects**

2.46 When asked about the present gestation period of Nuclear Power Projects in the country, the Department, in a written reply, have given the following details :

“Kaiga-3&4 (2X220 MWe) and RAPP-5&6 (2X220 MWe) projects, presently under construction, are sanctioned with a reduced gestation period (commencement of commercial operation from first pour of concrete) of five years for the first unit and six months thereafter for the second unit. The work on these projects is going on as per schedule. These projects are of standardised design of 220 MWe”.

2.47 Regarding the steps being taken to reduce the gestation period of Nuclear Power Projects in the country, the Department have stated that the Nuclear Power Corporation of India Limited (NPCIL) is putting in the following efforts to reduce the gestation periods of Nuclear Power Projects:

- Use of standardised designs.
- Completion of design and engineering before commencement of the construction of the project.
- Timely manufacture of equipments/components in the context of the significant experience gained by the industry.
- Advance procurement of long-delivery equipment.
- Adopting appropriate large size supply-cum-erection packages.
- Use of mechanised construction methods.
- Strengthening Project Management Techniques for effective monitoring and control and by taking timely corrective actions.

2.48 The Department have further stated that the efforts to reduce gestation period are continuing in NPCIL. While five years for a standardised unit is now considered as an achievable gestation period, an additional period of about six to nine months is necessary for the first of its kind reactors. The long-term target in NPCIL is to achieve a gestation

period of five years or lower for the first unit and to reduce the time gap between commencement of commercial operation of two units.

**2.49 The Committee are happy to note that the Kaiga Atomic Power Project- 3&4 and Rajasthan Atomic Power Project – 5&6 have been sanctioned with a reduced gestation period of five years for the first unit and six months thereafter for the second unit. They have also been informed that the Nuclear Power Corporation of India Limited (NPCIL) has a long-term target to further reduce this gestation period. The efforts of the Department / NPCIL to achieve a shorter gestation period for Nuclear Power Projects are indeed laudable which will go a long way in eliminating the cost overruns on the projects. As a matter of fact, the Committee had already recommended on earlier occasions that the gestation period of Nuclear Power Projects should be reduced to about five years. They are happy to see the resolve of the Department/ NPCIL to achieve the said goal. The Committee hope that the two above-mentioned Projects would be completed within the sanctioned periods.**

**D. Selection of sites**

2.50 The Department of Atomic Energy have given the following details regarding the progress made in the identification and selection of new sites for setting up Atomic Power Stations:

Sites for nuclear power plants are finally approved based on comprehensive process. Site Selection Committee (SSC) of the Department of Atomic Energy explores sites in different regions of the country and makes assessment in order to create a panel of sites for setting up of future Nuclear Power Plants whenever required. Sites are required to go through a mandatory review process of clearances by Atomic Energy Regulatory

Board (AERB) from safety angle and Union Ministry of Environment and Forests (MoEF) from environmental angle before projects can be set up.

2.51 Based on the assessment so far done by SSC, from among the sites in Southern and Western Electricity Regions and also existing sites where Nuclear Power Plants are in operation/ under construction, the following sites have been identified; this is the first stage of the process:

Southern Electricity Region:

Kovvada (Distt. Srikakulam)	Andhra Pradesh	New coastal site. Involves displacement of 3500 persons
Kaiga (Distt. Uttar Kannad)	Karnataka	Existing inland site. Two units, in operation and two units under construction
Kalpakkam (Distt. Kancheevaram)	Tamil Nadu	Existing coastal site. Two units in operation. One unit (500 MWe PFBR) proposed for construction
Kudankulam (Distt. Tirunelveli)	Tamil Nadu	Existing coastal site. Two units under construction

Western Electricity Region:

Kakrapar (Distt. Surat)	Gujarat	Existing inland site. Two units in operation
Bargi (Distt. Mandla)	Madhya Pradesh	New inland site. Involves displacement of 1605 persons. Site near coal fields (175 Km)

Jaitapur (Distt. Ratnagiri)	Maharashtra	New coastal site
Tarapur (Distt. Thane)	Maharashtra	Existing coastal site. Two units in operation and two units under construction
Northern Electricity Region:		
Rawatbhata (Distt. Chittorgarh)	Rajasthan	Existing inland site. Four units in operation and two units under construction
Narora (Distt.) Bulandshahar)	Uttar Pradesh	Existing inland site. Two units in operation

2.52 The work relating to Northern and Eastern Electricity Regions is still in progress.

2.53 Existing sites have the potential to accommodate additional units subject to fulfilling certain requirements. Sites for Nuclear Power Plants have been explored from time to time since 1960s and sites in various regions have been well covered and as such, sites previously investigated by the Site Selection Committee generally formed the basis for updating the data and fresh assessment. Among the sites previously investigated in detail, Nagarjunasagar site in Andhra Pradesh could not be pursued due to its proximity to tiger sanctuary and consequent reservations from environmental angle; Ujani site in Sholapur district of Maharashtra could not be pursued due to a proposal to declare 50 km. stretch upstream of Ujani dam, as a bird sanctuary and also the problem of displacement and rehabilitation of population already once displaced and rehabilitated due to Ujani reservoir; Rajapur site in Shivpuri district of Madhya Pradesh could not be pursued due to non-availability of cooling water; Matatila site in Lalitpur district of Uttar Pradesh could not be pursued due to inability to spare cooling water.

2.54 Priorities in regard to identified sites will be based on techno-economic considerations and social factors like population displacement and land acquisition. Also

mandatory regulatory clearances are necessary. No decision has so far been taken by the Government on sites.

2.55 Elucidating further, the Secretary, DAE stated during oral evidence as under:-

“The site selection process is fairly comprehensive and lengthy. The question of identifying sites in the east has been engaging our attention for quite some time. In fact, we had a few proposals from the Government of West Bengal. We had looked at sites there but there are difficulties in terms of siting parameters, particularly with regard to siting conditions like proximity to cyclone and earthquake prone areas, etc. So, we have requested the West Bengal Government to identify some more sites, which could be looked at. Our people had also discussions with the West Bengal Government and we are pursuing this matter. But, at this moment, it is true that we have not been able to reach any definitive conclusion. The question of proximity with coalfield and the competitive economics of power will certainly be there and to that extent even that factor will come in. But, at this moment, as I said, we are working on identifying these sites. Now, the same thing we are doing in other parts of the country. For example, there are certain regions where the seismic activity is much higher; so we are unable to access that region and there are some parts which have proximity with the international border, particularly on the West side. So, we have to be a little away from that. Like that some factors are there which we have to keep in mind. What we are trying to do is while the work is on for identifying new sites and certainly we would want to open the sites, but on the existing sites also there is capacity and in terms of economics also it is more useful for setting up of the power plants because the infrastructure is already there

2.56 The Department of Atomic Energy have also stated that they plan to augment the capacity of the existing Atomic Power Stations by installing more units wherever feasible. Such an approach enables utilisation of the full potential of the existing sites by availing the infrastructure already developed at these sites. In addition, there will be no need for additional land acquisition or displacement of population. However, additional water availability is required for setting up more units at the existing sites.

**2.57 Kakrapar in Gujarat , Rawatbhata in Rajasthan, Kalpakkam and Kudankulam in Tamil Nadu, Kaiga in Karnataka, Narora in UP and Tarapur in Maharashtra are the existing sites where Nuclear Power Plants are in operation/under construction. These sites have the potential for accommodating additional units subject to certain requirements like additional water availability being met.**



2.58 Beyond the eight nuclear power reactors [2X540 MWe at Tarapur, Maharashtra (TAPP-3&4), 2X220 MWe at Kaiga, Karnataka (Kaiga-3&4), 2X1000 MWe at Kudankulam, Tamil Nadu (KKNP-1&2) and 2X220 MWe at Rawatbhata (RAPP-5&6)] presently under construction and a 500 MWe Prototype Fast Breeder Reactor (PFBR) proposed for construction at Kalpakkam, Tamil Nadu, no decision has so far been taken by the Government for setting up additional units. Construction of any additional units, beyond the reactors mentioned above, is planned only towards later half of 10<sup>th</sup> Plan subject to availability of funds.

2.59 The Committee note that the Site Selection Committee of the Department has identified some sites in the Southern, Western and Northern Electricity Regions for setting up of Nuclear Power Plants in the country in future. Most of these sites are the ones where Nuclear Power Plants are in operation/under construction. These sites are required to be cleared by the Atomic Energy Regulatory Board (AERB) from safety angle and the Ministry of Environment and Forests from environment angle before plants can be set up there. The Committee desire that the Department should obtain the requisite clearances expeditiously so that new units can be taken up at the earliest. The Committee further note that the work relating to selection of sites in the Northern and Eastern Electricity Regions has not yet been completed. Expressing their displeasure over this fact, the Committee direct the Department to finish this job expeditiously and apprise them of the outcome within six months from the presentation of this Report.

2.60. The Committee feel that there is an urgent need to explore new sites in different parts of the country where there are no plants operating at present. The areas which do not have any thermal or hydel power potentials should be given priority. No doubt that due care should be paid to seismic activity and international borders while selecting new sites for the plants but these need not be overemphasised. For example, we are already having plants in Maharashtra where a lot of seismic activity has been seen in the recent past like Koyna and Latur earthquakes. Similarly, if plants are set up near international borders, the neighbouring countries will be as much exposed to the dangers of nuclear mishap as our country. In Europe, some of the countries operating nuclear plants are much smaller in size than India and they have not bothered about their international borders. The Committee feel that there is a need to study the logic of those countries in depth.

2.61 The Committee note that the Department have a plan to augment the capacity of the existing Atomic Power Stations by installing more units at these sites wherever feasible. Such an arrangement, besides ensuring utilisation of the full potential of the existing sites by availing the existing infrastructure, will also avoid problems like additional land acquisition and population displacement. However, setting up of additional units at the existing sites would require additional water availability. The Committee do not feel that the Department would find it difficult to arrange additional water at most of the existing sites. They hope that the Department have analysed the problem of availability of additional water at the existing sites. The Committee feel that the Department can also explore the question of replacing the existing small and old units of 220 MWe with those of higher capacity, say of 700 MWe or 1000 MWe taking into consideration the economics of the whole process. This would enable the Department to better utilise the existing sites and infrastructure available there. The Committee would like to be apprised of the factual position in this regard.

**E. Private Sector/Joint Venture Participation and DAE Schemes**

2.62 Regarding allowing the private sector/ joint venture participation in the Nuclear Power Sector, the Department, in a written reply, have stated as under:

“NPCIL has been exploring the possibilities of forming joint ventures with SEBs/ PSUs /Reputed Corporates for setting up Nuclear Power Stations. However, no concrete proposal has emerged so far. Amendment to Atomic energy Act 1962 will be necessary to enable any joint venture formation/ private participation. This is being pursued”.

2.63 When asked about MNCs/ Private Sector Organisations which have set up atomic/ super atomic power plants in the world, the Department furnished the following information in a written reply:

“Some of the international companies involved in the supply of Nuclear Power Reactors/ major equipment and components for Nuclear Power Stations are as under:

- ABB ATOM (SWEDEN)
- ATOMIC ENERGY OF CANADA LIMITED (CANADA)
- BABCOCK & WILCOX (USA)
- FRAMATOME (FRANCE)
- GENERAL ELECTRIC (USA)
- PNC (JAPAN)

- SIEMENS – KWU (GERMANY)
- WESTINGHOUSE (USA)
- SKODA (CZECH REPUBLIC)”

**2.64** The Department have informed the Committee that two schemes viz. “Technology Offer Centre” and “Fire Training and Research Centre” were taken up in the 9<sup>th</sup> Plan. However, these schemes were dropped as their related activities are being pursued in a decentralised manner.

**2.65** The Committee have been informed that a number of international companies in USA, Germany, Canada, France, Japan, etc. are involved in the supply of Nuclear Power Reactors/ major equipments for Nuclear Power Stations. The Committee have further been informed that the Nuclear Power Corporation of India Limited (NPCIL) has been exploring the possibilities of forming Joint Ventures with State Electricity Boards / Public Sector Undertakings / Reputed Corporates for setting up Nuclear Power Stations and that no concrete proposal has emerged in this regard so far. This would necessitate some amendments to the Atomic Energy Act, 1962. The Committee, on an earlier occasion, had recommended that the Department should expedite the process of amendment to the Atomic Energy Act, 1962. They reiterate their earlier recommendation as they feel that Joint / Private Sector involvement would lead to flow of the much- needed resources to the Nuclear Power Sector. The Committee feel that the Department can also explore the possibility of setting up dedicated plants for big consumers and States, etc. who may be willing to share the costs of such plants. The Department can operate and maintain the plants on behalf of their clients.

**2.66 The Committee are unhappy to note that two schemes viz. ‘Technology Offer Centre’ and ‘Fire Training and Research Centre’ which were taken up in the 9<sup>th</sup> Five Year Plan, have since been dropped and their related activities are being pursued in a decentralised manner. The Committee are at a loss to understand the rationale behind this decision. They would like to know the factors that led to such a decision as also the reasons for not taking into account such factors at the initial stage. Some expenditure must have been incurred on these schemes and some vital man-hours devoted thereto which seem to have gone wasted. The Committee would like to be apprised of the details in this regard.**

**F Nuclear Fuel Complex**

2.67 The Nuclear Fuel Complex (NFC) at Hyderabad has been established to provide fuel and zircaloy products required for generation of nuclear power by various Nuclear Power Reactors in the country. Fabrication of enriched uranium fuel for the Boiling Water Reactor (BWRs) at Tarapur and the thorium oxide bankets for the Fast Breeder Test Reactor (FBTR) at Kalpakkam is also carried out at NFC. The operating plants of NFC include production of ceramic grade uranium oxide, zircaloy components, sintered pellets and fuel assemblies.

2.68 The details of budgetary allocations made to the Nuclear Fuel Complex (NFC) and the actual expenditure incurred during 2000-01 and 2001-02 alongwith the reasons for variations are as under:

*(Rs. in crore)*

SECTOR	2000-2001			2001-2002		
	B.E	ACTUALS	VARIATION	B.E	ACTUALS	VARIATION
REVENUE SECTION	453.53	438.43	-15.10	461.10	424.95	-36.15
CAPITAL SECTION	20.00	3.72	-16.28	12.00	7.97	-4.03

**Reasons for variation (Revenue Section)**

**2000-2001**

Saving is mainly due to non-revision of MDU rate by DAE as budget was proposed based on the anticipated increased rate as intimated by UCIL (Rs.9.42 crore), reduction in increased power tariff by M/S APTRANSCO(Rs.2.20 crore) and savings under salaries(due to LTC ban) and other establishment charges(Rs.3.47 crore) in which the savings under the head Grant-in-Aid to AEES of Rs.0.95 crore also included.

## **2001-2002**

Saving is mainly due to non-revision of MDU rate by UCIL/DAE as budget was proposed based on the anticipated increased rate as intimated by UCIL and short supply of MDU by M/s UCIL (Rs.15.54 crore), Non- materialisation of Zirconium sponge,Zr.Nb. Strip and Zr- 4 Sheets and Zr- 4 Blanks (Rs.10.73 crore) reduction in increased power tariff by M/S APTRANSCO and low power tariff offered by M/s APGPCL (Rs.4.66 crore),short closure of purchase files for procurement of SS Rounds and pipes as it was felt that the quoted price was very high in the case of SS Pipes and non- receipt of competitive offer for SS Rounds(Rs. 3.54 crore) and savings under salaries and other establishment charges(Rs.1.75 crore).

## **Reasons for variation (Capital Section)**

Delay in procurement of some of the major equipment, cancellation of orders placed initially and then re-tendering for certain items, non-supply of certain imported items due to embargo, indigenous development of substitutes, etc.

2.69 BE and RE for the year 2002-2003 and BE for 2003-2004 in respect of NFC are as given below :-

SECTION	2002-2003		2003-2004
	B.E	R.E	B.E
REVENUE SECTION	593.71	593.27	401.86
CAPITAL SECTION	12.00	13.02	22.00

2.70 The Department have given the following details regarding the on-going schemes of NFC:

( Rs. in lakh)

Sl.No	Name of the Project	Cost		Completion Schedule		Reasons for delay/Slippage
		Estimated	Present	Original	Present	
1.	Pilot Plant for Development of Pyro-Chemical Process	180.00	338.00	3/2003 (Revised)	3/2003 (Revised)	The project is being completed.
2.	Modernisation and Replacement Scheme for the Existing Plants	1950.00	1950.00	3/1996	3/2003	Modernisation is a continuous process and the project has already been completed.
3.	Titanium Sponge Project (New Zirconium Oxide and Sponge Project, Palayakayal)	9065.00	18512.00	..	..	The project entitled "New Zirconium Oxide & Zirconium Sponge Plant" has been cleared by AEC & is being sent for Cabinet approval.
4.	Dovetailing of 37 Element Fuel Bundle for TAPS.	3000.00	3000.00	11/2003	3/2007	Most of the equipment are either special purpose or custom built and are import substitutes. The production activities will start in the financial year 2003-04.
5.	Replacement and Augmentation Of ZSP	955.00	955.00	3/2002	12/2003	The building is complete and the equipment are in the final stage of procurement and erection and the facility would be ready by December 2003.
6.	Advanced Materials Processing and Characterization facilities	980.00	980.00	3/2002	12/2003	Most of the equipment have been procured and set up.
7.	Residential Training School Complex	308.00	308.00	3/2003	8/2003	The main building is ready and the annex would be ready by August 2003.

**2.71** The Committee are unhappy to note that the Nuclear Fuel Complex (NFC) has failed to fully utilise the Capital budgetary allocation during 2000-01 and 2001-02. As against the Capital allocation of Rs. 20.00 crore during 2000-01, the actual utilisation was a meagre Rs. 3.72 crore which is less than 20 per cent of the allocation. Similarly, during 2001-02, the actual expenditure was Rs. 7.97 crore which is substantially lower than the Capital allocation of Rs. 12.00 crore. The shortfall in Capital expenditure has been attributed to delay in procurement of some major equipments, cancellation of orders placed initially and re-tendering for certain items, non-supply of certain

imported items due to embargo, indigenous development of substitutes, etc. Barring the non-supply of some imported items, the Committee are not inclined to accept other reasons as convincing ones. The Committee have noted that the Nuclear Fuel Complex has been surrendering Capital funds year after year on one pretext or the other. They direct the organisation to be careful in future and utilise the Capital allocations to the fullest extent.

2.72 The Committee note that out of the seven on-going schemes of the Nuclear Fuel Complex, there have been substantial cost overruns on two schemes viz. Pilot Plant for Development of Pyro-Chemical Process and Titanium Sponge Project. While the cost overrun on the former has been a little less than 100 per cent, the same on the latter has been more than 100 per cent. The Committee also find that five of these seven schemes are running behind schedule. The time overruns on such schemes range from 5 months to 7 years. The Committee are surprised to note that the scheme with a time overrun of 7 years (Modernisation and Replacement Scheme for the Existing Plants) has not seen any cost overrun. This scheme was initially scheduled to be completed in March, 1996 at a cost of Rs. 19.50 crore and the same has been completed in the year 2003 at the same cost. The Committee are not inclined to accept this contention. They feel that either the total expenditure has not been taken into account or some items of work on the scheme which were initially envisaged to be done, have been ignored or the initial estimates were faulty. The Committee would like to have a clarification on this point. Delay in obtaining equipments and clearances for certain schemes seems to have led to time and cost overruns. The Committee feel that some of these delays could have been avoided if the organisation had made concerted and dedicated efforts. They would like the organisation to be careful in future to avoid such delays.

## **G. Heavy Water Board**

2.73 The Heavy Water Board (HWB) manages the operation and maintenance of Heavy Water Plants in the country which have been set up to meet the heavy water requirements of Indian Nuclear Power and Research Reactors. Production capacity of heavy water in the country is sufficient to meet the present domestic demand.

2.74 Plan & Non-Plan Budget Estimates and Actuals for the year 2000-2001 in respect of HWB is as under:

*(Rs in crore)*

	BE 2000-2001	Actuals 2000-2001	Variation
Plan	12.28	9.27	3.01
Non-Plan	472.27	445.72	26.55

**(i) The saving of Rs.3.01 crore under Plan is mainly due to difficulties in procurement of certain imported equipment required for major modifications of HWP Baroda(Phase I & II) as the “Overseas Supplier” did not honour the purchase order for critical component/equipment on account of embargo on export. However, the same was re-engineered by HWB and procured through alternate source.**

**(ii) The saving of Rs.26.55 crore under Non-plan is due to (i) reduction in specific energy consumption on account of improved performance of the operating plants on account of implementing certain minor modifications,(ii) receipt of better quality of coal from M/s SCCL resulted in less consumption of coal and consequential reduction in expenditure (iii)reduction in rate of steam & electricity charges by RAPS @ Rs.1.75/kwh as against Rs.2.06/2.09/kwh estimated at BE stage,(iv) sudden shut down of HWP(Hazira) for 85 days which was not anticipated at BE stage due to technical problems/earthquake which resulted in less consumption of power & utilities (v) reduction in price of Naptha from Rs.14,000/- per MT to Rs.12,057/- MT supplied by M/s Indian Oil Corporation during the financial year,(vi)non-release of water cess arrear payment to M/s Gujarat State Fertilizers Corporation(GSFC) pending settlement of dispute about recovery of the amount deducted by GSFC on account of loss of Ammonia.**

2.75 Plan & Non-Plan Budget Estimates and Actuals for the year 2001-02 in respect of HWB is as under:



*(Rs in crore)*

	BE 2001-2002	Actuals 2001-2002	Variation
Plan	21.00	25.78	4.78
Non-Plan	462.40	429.57	32.83

2.76 The excess under Plan Scheme is mainly due to inclusion and implementation of a few additional schemes with a view to improving performance of the operating Heavy Water Plants and these have reduced the specific energy consumption which in turn resulted in substantial reduction in Non-Plan expenditure, enhanced on-stream hours of the plants, etc. and consequent reduction in cost of production of heavy water. With the incorporation of additional schemes, HWB has also been able to achieve cumulative reduction of 25% in specific energy consumption during the last 3 years which resulted in a saving of about Rs.190 crore compared to the unit energy cost of 2001-02.

2.77 The saving of Rs.32.83 crore in Non-plan expenditure is mainly due to reduction in energy consumption on account of measures adopted in HWPs. As against the budgetary provision of Rs.290.86 crore towards energy cost the actual expenditure for the year 2001-2002 has been considerably lower due to reduction in coal consumption. As against the estimated quantity of 6.54 lakh MT of coal the actual consumption works out to 5.44 lakh MT during the year 2001-2002. Also coal consumption was on account of receipt of better quality of coal besides improvement in combustion control technology of Captive Power Plant at HWP, Manuguru. Some saving was also on account of (i) sudden strike by workers from 12.2.2002 to 5.3.2002 where the plant remained under shut down,(ii) extended shut down of HWP, Tuticorin for 94 days as against 76 days originally envisaged on account of delayed restart of the SPIC's NH3 Plant and (iii) reduced on-stream hours on account of unexpected MSEB power failures occurring 22 times during the year at RCF, Thal.

2.78 BE and RE for the year 2002-2003 as well as BE 2003-04 in respect of HWB is as under:

*(Rs in crore)*

	BE 02-03	RE 02-03	BE 03-04
--	----------	----------	----------

Plan	34.00	29.67	15.34
Non-Plan	465.18	433.96	526.83

2.79 The Plant-wise achievement as a percentage of physical target for the years 2000-2001 & 2001-02 is as under:

Plant	2000-2001	2001-2002
Manuguru	109.6	111.70
Kota	140.8	129.10
Hazira	97.10	133.40
Thal	118.7	104.3
Tuticorin	111.6	98.8
Total	113.7	116

2.80 The Department have informed that there was no export of heavy water during the year 2001-2002. However, 10 million tonnes of heavy water was exported to South Korea during the year 2002-2003 realising a net amount of Rs.7.10 crore.

**2.81 The Committee are unhappy to note that the Heavy Water Board has not been able to utilise about 25 per cent of the Plan budgetary allocation during the year 2000-01. As against the Plan allocation of Rs. 12.28 crore, the actual utilisation by the organisation was only Rs. 9.27 crore during the year, thereby resulting in a shortfall of Rs. 3.01 crore. On the other hand, during the year 2001-02, the organisation has incurred Rs. 4.78 crore over and above the Plan budgetary allocation of Rs. 21.00 crore. The Committee also find that Plan BE of Rs. 34.00 crore has been scaled down to Rs. 29.67 crore at RE stage during the year 2002-03. Thus, in none of the last three years, the organisation has been able to make realistic budget estimates. The excess expenditure during 2001-02 has been stated to be owing to inclusion and implementation of some additional schemes in order to improve the performance of the operating Heavy Water Plants. The shortfall in Plan expenditure during 2000-01 has been attributed to difficulties in procurement of certain imported equipments. The Committee understand the difficulties of the organisation in obtaining imported equipments. They recommend that the organisation should explore more and more domestic sources for getting equipments and machinery. The Committee also recommend that the organisation should make realistic and accurate budget estimates in future.**

2.82 The Committee are pleased to note that 10 million tonnes of heavy water was exported to South Korea during 2002-03 realising a net amount of Rs. 7.10 crore. The Committee are also happy to note that most of the Heavy Water Plants achieved over 100 per cent physical targets during the years 2000-01 and 2001-02. This speaks volumes of the functioning of the Heavy Water Board. However, the Committee find that two such plants viz. Hazira and Tuticorin have gone below 100 per cent in 2000-01 and 2001-02 respectively. The Committee would like to be apprised of the reasons for the same.

#### H. Applied Uses of Nuclear Energy

2.83 The Department have informed the Committee that a number of developments have taken place in the field of nuclear agriculture during last three years. In the areas of oilseeds and pulse crops, namely, groundnut, mustard, sunflower, pigeonpea (Arhar), greengram, blackgram, soybeans, cowpea (Chowli) several new selections having superior traits have been developed. They are yield tested in either State Agricultural Universities or ICAR leading to development of varieties. The details of number of varieties tested are as follows:

Crop	Agricultural University	ICAR
Mustard	3	--
Groundnut	4	4
Urad	2	3
Mung	4	6
Pigeonpea	---	4
Soybeans	3	3
Cowpea	1	1
<b>TOTAL</b>	<b>17</b>	<b>21</b>

2.84 The Department have also informed that the following groundnut varieties have been developed:-

- 1) TPG-41 is identified for release for all India by ICAR. However, TPG-41 has been pre-released by Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra.

- 2) **TPG-42 is recommended for pre-release by Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra.**

**2.85 The percentage increase in the yield over the normal variety is as follows:**

<b>Variety</b>	<b>Pod</b>	<b>Seed</b>
<b>TPG-41</b>	<b>14.2%</b>	<b>23.3%</b>
<b>TPG-42</b>	<b>22.3%</b>	<b>31.0%</b>

**2.86 Demonstration trials of TPG-41 are being conducted in the farmers' fields in collaboration with Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra.**

**2.87 In this connection, it may also be interesting to note that**

- 1) **Trombay groundnut variety, TAG-24 was released for summer cultivation for Zone-II and Zone-VIII of University of Agricultural Sciences, Dharwad, Karnataka.**
- 2) **National indent for breeder seed of Trombay crop varieties is 40% for Urad and 30% for groundnut.**
- 3) **TAG-24 is identified as national check variety for Rabi/Summer cultivation by ICAR.**
- 4) **Progressive farmers have exploited yield potential of Trombay groundnut varieties by harvesting more than 10,000 kg/ha under irrigated summer situation.**

**2.88 The Committee are pleased to note that as many as 38 improved crop varieties have been tested in various Agricultural Universities/Indian Council of Agricultural Research (ICAR) during the last three years. These varieties relate to mustard, groundnut, urad, mung, pigeonpea, Soybean and cowpea. The Committee are also happy to note that 2 high-yielding groundnut varieties viz. TPG- 41 and TPG-42 have also been developed during the said period. While the former has been identified for release all over India by ICAR, the latter has been recommended for pre-release by an agricultural institution. The percentage increase of these seeds over the normal variety is 23.3 per cent and 31 per cent**

respectively. The Committee, while appreciating the efforts of the scientists of the Department engaged in such R&D activities, recommend that the Department should take special measures to disseminate the relevant information relating to such improved crop varieties to the farmers and encourage them to make use of the same. The Committee would also like to know the reasons as to why TPG-41 has been pre-released by Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra when the Department had decided it to be released for all India by ICAR.

**NEW DELHI;**  
**28<sup>th</sup> March, 2003**  
**7 Chaitra, 1925 (Saka)**  
**Energy.**

**SONTOSH MOHAN DEV,**  
**Chairman,**  
**Standing Committee on**

PART II  
APPENDIX

(Vide para 2.4. of the Report)

**MAJOR HEAD-WISE ACTUAL REVENUE AND CAPITAL EXPENDITURE FOR  
2001-02, BE AND RE FOR 2002-03 AND BE FOR 2003-04 OF DAE**

(Rs. in crore)

Sl. No.	Major Heads	2001-02 Actuals		2002-03 BE		2002-03 RE		2003-04 BE		Remarks
		Plan	N-Plan	Plan	N-Plan	Plan	N-Plan	Plan	N-Plan	
1	2	3	4	5	6	7	8	9	10	11

**Demand No. 5  
Revenue Section**

1	3451	-	9.04	-	9.97	-	10.58	-	11.59	This Head comprises items like salaries, etc of the Secretariat and the Atomic Energy Commission
2.	2852	39.98	584.84	36.49	770.46	7.49	769.21	5.00	591.97	This Head comprise items like R&D expenditure of the Bhabha Atomic Research Centre, Nuclear Fuel Reprocessing Plants, Industry and Extension Programme and Support Services.
3.	3401	164.82	695.89	203.55	765.30	194.10	800.34	175.50	840.71	This Head comprises items like R&D expenditure of BARC, Aided Institutions, IGCAR, CAT and contribution to International Atomic Energy Agency.

**Capital Section**

4.	4859	-	-	3.51	-	3.52	-	5.00	-	This Head comprises items like R&D investment in the Electronics Corporation of India Limited.
5.	4861	197.52	428.40	330.00	468.95	249.66	433.30	326.00	521.50	This Head comprises items like BARC, NFC, Heavy Water Board, Fuel Reprocessing Industry and Extension Programme.
6.	5401	254.88	-	331.45	-	240.23	-	288.50	-	This Head comprises items like BARC, IGCAR, VECC, CAT, etc.

**Demand No. 6**  
**Revenue Section**

7.	2801	-	1556.17	-	1665.60	-	1505.69	-	1466.58	This Head comprises items like Power Project Fuel Inventory and Waste Management.
----	------	---	---------	---	---------	---	---------	---	---------	---

**Capital Section**

8	4801	908.44	-	1408.00	-	1533.00	-	1300.00	-	This head comprises items like Investment in Power Projects and FBTR.
9.	6801	30.12	-	187.00	-	187.00	-	700.00	-	This Head comprises items like loans to Power Projects.

**Demand No. 5**  
**Adjustment of Revenue as reduction of expenditure**

**Revenue Section**

10.	2852	-	(-) 2.91	-	(-)3.00	-	(-)6.00	-	(-)6.00	.
11.	3401	-	(-)10.01	-	(-)11.10	-	(-)9.05	-	(-)11.85	

**Capital Section**

12.	4861	-	(-)103.05	-	(-)143.62	-	(-)123.00	-	(-)112.41	
-----	------	---	-----------	---	-----------	---	-----------	---	-----------	--