NINTH REPORT

STANDING COMMITTEE ON ENERGY (1994-95)

(TENTH LOK SABHA)

DEPARTMENT OF ATOMIC ENERGY
DEMANDS FOR GRANTS (1994-95)

Presented to Lok Sabha on 19th April, 1994

Laid in Rajya Sabha on 19th April, 1994

LOK SABHA SECRETARIAT
NEW DELHI

April, 1994/Chaitra, 1916 (Saka)

CE No. 14

Price : Rs. 5.00

Published under Rule 382 of the Rules of Procedure and Conduct of Business in Lok Sabha (Seventh Edition) and Printed by the National Printers, West Patel Nagar, New Delhi.

CONTENTS

COMPOSITION OF THE STANDING COMMITTEE ON ENERGY (1994-95)

CHAIRMAN

Shri Jaswant Singh

MEMBERS

Lok Sabha

2. Shri Bhawani Lal Verma
3. Shri Murli Deora
4. Shri Motilal Singh
5. Shri Khelsai Singh
6. Shri Khelan Ram Jangde
7. Shri Parasram Bhardwaj
8. Shri S. Thota Subbha Rao
9. Shri. K.P. Reddaiah Yadav
10. Shri Shiv Charan Mathur
11. Dr. Krupasindhu Bhoi
12. Shri Dalbir Singh
13. Shri Vilas Muttemwar
14. Shri P.C. Chacko
15. Shri Virender Singh
16. Shri Arjun Singh Yadav
17. Shri Ajit Singh
18. Shri Laxminarain Tripathi
19. Prof. Rita Verma
20. Shri Ram Tahal Choudhary
21. Shri Shankersinh Vaghela
22. Shri Keshari Lal
23. Shri Rajesh Kumar
24. Shri Haradhan Roy
25. Shri Anil Basu
26. Shri Vijay Kumar Yadav
27. Dr. Venkateswara D. Rao
28. Shri Chitta Basu
29. Shri Mohan Singh (Ferozpur)
30. Shrimati Dil Kumari Bhandari

Rajya Sabha

31. Shri Parmeshwar Kumar Agarwalla
32. Shri M.M. Hashim
33. Shri Dipankar Mukherjee
34. Shrimati Ila Panda
35. Shri J.S. Raju
36. Shri Rajni Ranjan Sahu
37. Shri Viren J. Shah
38. Shri Matang Singh
39. Dr. Naunihal Singh
40. Shrimati Kamla Sinha

SECRETARIAT

1. Shri G.L. Batra — *Additional Secretary*
2. Shri G.R. Juneja — *Deputy Secretary*
3. Shri A.L. Martin — *Assistant Director*

INTRODUCTION

I, the Chairman of the Standing Committee on Energy (1994-95) having been authorised by the Committee to present the Report on their behalf, present this Ninth Report on the Demands for Grants (1994-95) relating to the Department of Atomic Energy.

2. The Standing Committee on Energy of 1993-94 had considered and adopted the Report at their sitting held on 5th April, 1994 and also held discussion with the officials of the Department of Atomic Energy on the same day. This Committee's term having ended on 7th April, 1994, it has been reappointed for 1994-95 on 8th April, 1994.

3. The Committee of 1994-95, at their first sitting, held on 18th April, 1994 authorised the Chairman to finalise the report adopted by the previous Committee and present them to Parliament.

4. The replies furnished by the Department of Atomic Energy on the points contained in this report and also on the points raised by the Committee during their discussion with the representatives of the Department of Atomic Energy on 5th April, 1994 have been appended to the Report.

5. A copy of verbatim proceedings of the discussion held by the Committee with the officials of the Department of Atomic Energy on 5th April, 1994 is also laid in the House alongwith the Report.

6. 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.

7. The Committee would also like to place on record their appreciation of the work done by the retiring members of the Committee of 1993-94. The composition of the Committee of 1993-94 is given in Appendix VI.

NEW DELHI;
April 18, 1994
Chaitra 28, 1916 *(Saka)*

JASWANT SINGH,
Chairman,
Standing Committee on Energy.

CHAPTER I

INTRODUCTORY

1. The Committee in their first report on the Demands for Grants of the Department of Atomic Energy pertaining to the year 1993-94 had emphasised the aspect of realistic budget estimates, and had then observed that over-estimates lead to a locking up of utilisable funds, thus in turn depriving other deserving projects/schemes of budgetary allocations. The Committee's scrunity of the current demands for grants and plan budget of the Department reveals that the budget estimates, under certain heads, continue to reflect the same shortfalls in utilisation/reduction at the stage of Revised Estimates. These are briefly analysed in the current report.

CHAPTER II

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

2. The following two Demands for Grants have been submitted to Parliament by the Department of Atomic Energy (DAE) for the year 1994-95:—

Demand No. 84

Relating to the Secretariat-Revenue and Capital Expenditure on Atomic Energy Research and Development and Industrial Projects } Rs. 1234.40 crs.

Demand No. 85

Relating to the Revenue and Capital expenditure on Nuclear Power } Rs. 734.63 crs.

3. The two Demands aggregating to Rs. 1969.03 crs. comprise of Rs. 530.00 crs. for plan schemes and Rs. 1439.03 crs. for non-plan expenditure. In addition, plan schemes to the extent of Rs. 1041.76 crs. are to be met from Internal and Extra Budgetary Resources. The headwise details of the Demands are shown in Appendix-I.

4. The Budget provisions of DAE in respect of the years 1992-93, 1993-94 and 1994-95 have been as under:

(Rs. in crores)

	1992-93				1993-94				1994-95	
	B.E.		Actual		B.E.		R.E.		B.E.	
	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan
Budgetary Support	412	1146	356	1043	493	1315	742	1331	530	1439
IEBR	'866	-	N.A.	-	827	-	183	-	1042	-
Total	1278	1146	N.A.	N.A.	1320	1315	925	1331	1572	1439

IEBR—Internal and Extra Budgetary resources.
N.A.—Not available.

5. It is observed that the Performance Budget of the Department has not brought out the figures regarding actual utilisation of Plan Budget provisions during 1992-93. In the absence of this information, the Committee are unable to comment on the Department's financial performance during 1992-93. The Committee expect that the Performance Budget in future should bring out the details regarding actual utilisation of budget provisions pertaining to the preceeding year to enable the Committee to scrutinise the information. Incidentally, the Performance Budget has shown three different

figures regarding actual plan expenditure in 1992-93 without showing sources of funds. At the first page the figure shown is Rs. 969.38 crores, and at page 32 the figure worked out is Rs. 948.57 crores and at page 33, the figure is Rs. 356.42 crores. The Committee hope that the Department will clarify the position in this regard. However, for the purpose of analysis, the figure of Rs. 969.38 crores is made use of in this report.

6. The Committee are concerned to note that the plan expenditure of the Department has been much less than what was budgeted for annually. During 1992-93, the plan expenditure was just around Rs. 969 crores as against the target of Rs. 1278 crores and in 1993-94 the anticipated expenditure is only Rs. 925 crores as against Rs. 1320 crores budgeted. The severe set back in plan activities of the Department is presumably due to non-realisation of internal and extra budgetary resources as originally envisaged. The Committee hope that the Department will look into the causes for this unsatisfactory plan performance and initiate appropriate remedial measures to implement its plan-programmes successfully.

Nuclear Power Programme

7. A statement showing the resource allocation for the Nuclear Power Programme is given in Appendix II.

8. The resource allocation position in respect of Nuclear Power Corporation and Nuclear Fuel Complex has been as under:—

(Rs. in crores)

	1992-93			1993-94		
	B.E.	Actual	(-) Shortfall/ (+) Excess	B.E.	R.E.	Difference
Nuclear Power Corporation	587	450	(-) 137	641	904	(+) 263
Nuclear Fuel Complex	225	196	(-) 29	268	198	(-) 70

9. The Committee are at a loss to understand the circumstances under which the Nuclear Power Corporation had to surrender from the Budgetary support as much as Rs. 137 crores during 1992-93 particularly when the plan expenditure suffered huge shortfall. Similarly, the huge shortfall in budget utilisation by Nuclear Fuel Complex, Hyderabad every year is disturbing. The Committee had earlier highlighted in their first report the under utilisation of budgetary provisions by the Nuclear Fuel Complex. It is hoped that the reasons for poor budgetary performance of the complex will be gone into in detail and realistic budget estimates made in future.

Atomic Minerals Division, Hyderabad

10. AMD is engaged in survey and prospecting for uranium, thorium, etc. for attaining self sufficiency in meeting the demands of the country's nuclear power programme. During the 8th five year plan period a target of identifying additional resources of 5000 tonnes of uranium has been set. A total expenditure of Rs. 31.89 crores is envisaged for AMD during 1994-95 as against RE of Rs. 32.07 for 1993-94. The physical targets and achievements for some selected items during the year 1993-94 and targets for 1994-95 are given below:

	1993-94		1994-95
	Target	Achievement	Target
Airborne Survey (sq. km.)	38500	*	35000
Departmental Drilling (M)	52300	34180	42300
Detailed Survey (sq. km.)	588	440	533
Geochemical Investigations (sq. km.)	11250	10520	11400

*This could not be taken up due to non-availability of aircraft during the flying season.

11. The Committee are surprised to learn from the Performance Budget of the Department that no airborne survey was undertaken by the Atomic Minerals Division on the ground of non-availability of aircraft though it had been targetted to survey 38500 sq.km. during 1993-94. The reason advanced for this failure is hardly convincing. The Committee also note that there were shortfalls in Departmental drilling and detailed survey to the extent of around 35% and 25% respectively in 1993-94. The Committee hope that AMD will analyse the reasons for the huge shortfalls in achieving the targets during 1993-94 and improve its performance in future.

Research and Development

12. The main research and development units of the Department are the Bhabha Atomic Research Centre, Bombay, Variable Energy Cyclotron Centre, Calcutta, Centre for Advanced Technology, Indore, Indira Gandhi Centre for Atomic Research, Kalpakkam, Atomic Minerals Division, Hyderabad and six aided institutions. The break-up of plan outlay for R&D during the 8th plan and its utilisation during the first three years of the plan are shown in Appendix-III.

13. It can be observed that the actual R&D expenditure during 1992-93 under plan schemes fell short of the anticipation by Rs. 17 crores. This reflects slow pace of R&D activity in general. As an illustration, the case of Indira Gandhi Centre for Atomic Research is dealt with in the succeding paragraph.

Indira Gandhi Centre for Atomic Research

14. The prime objective of the centre is to create a sound base to set up and operate Fast Breeder Nuclear Power plants indigenously. The plan outlay for Research and Development programme of this centre during the 8th plan and its utilisiation during the first three years of the plan is as under:

(Rs. in crores)

	8th Plan 1992-97	1992-93 B.E.	1992-93 Act	1993-94 B.E.	1993-94 R.E.	1994-95 B.E.
Continuing Schemes	25.07	7.08	5.18	5.05	6.66	5.69
New Schemes	49.53	1.13	0.21	4.95	3.44	6.31
	74.60	8.21	5.39	10.00	10.10	12.00

15. It can be observed from the above table that the R&D expenditure of the Indira Gandhi Centre for Atomic Research under plan schemes during the first three years of the plan amounts to only Rs. 27 crores as compared to an outlay of Rs. 75 crores during the 8th five year plan. The reasons for slow progress in R&D activity of the centre are not known. The Committee trust that the centre will step up its R&D activities and will achieve the desired results as planned.

Operating Performance

16. The physical performance of Atomic Power Stations in generating power has been as indicated below:—

(Million Units)

Atomic Power Station	1992-93 Target	1992-93 Anticipated	1993-94 Target	1993-94 Anticipated	1994-95 Target
Tarapur	2072	1649	1770	1770	1770
Rajasthan					
	Unit-I	-	271	402	161
393					
	Unit-II	1061	977	1000	830
1050					
Madras	1770	1794	1945	1900	1900
Narora	1941	1556	2420	702	2035
Kakrapar	-	-	965	750	1705

17. The Committee note that the Performance Budgets of the Department of Atomic Energy bring out physical performance of atomic power stations only with reference to anticipations and not as actually achieved on any particular year. It is not possible to make any meaningful assessment about the physical performance of atomic power stations in the absence of information regarding actual achievements. Even a scrutiny of anticipated

achievements reveals huge shortfalls in target realisations during the year 1992-93 and 1993-94 particulary in Narora and Unit-II of Rajasthan atomic power stations. Tarapur unit also fared badly during 1992-93. The Committee would like to know the reasons for this poor performance and the measures taken to improve the functioning of the units.

Major Power Projects

18. There are three major power projects which are under execution. The original estimated cost, revised cost, total expenditure incurred and expected year of commissioning in respect of these projects are given below:

(Rs. in crores)

		Original Cost	Revised Cost	Expenditure incurred	Commissioning
1.	Kakrapur Atomic Power Projects (2 units)	383	1335	1200	Unit-I May, 1993 Unit-II expected shortly.
2.	Rajsthan Atomic Power Projects (III & IV)	712	2107	788	1996-97
3.	Kaiga Atomic Power Projects (2 units)	731	2275	995	1996-97

19. It can be observed that there has been very great cost over runs, going upto as much as 300%. The extent of dealy, in the execution of these projects is not explained in detail. In the absence of that information in the Performance Budget, the Committee feel that the loss of benefits to the economy owing to time and cost over-run of projects cannot be overestimated. The Committee expect that efforts will be made to ensure timely completion of these projects within the revised costs.

Financial Performance

20. The net profit anticipated by Atomic Power Stations during 1992-93 against budget targets and the net profit budgeted for 1994-95 are shown below:

(Rs. in crores)

	1992-93		1993-94		1994-95
	Target	Anticipated	Target	Anticipated	Target
Tarapur	12.46	1.47	5.20	3.57	0.66
Rajasthan					
Unit-I	(-)57.46	(-)44.19	(-)43.25	(-)61.34	(-)59.85
Unit-II	(-)3.09	6.18	3.75	2.97	10.25
Madras	(-)1.18	(-)2.83	7.30	0.59	0.77
Narora	23.60	7.18	70.28	(–)109.02	28.86
Kakrapar	-	-	37.47	3.47	56.40

21. The financial performance of the Atomic Power Stations leaves much to be desired. While the profits anticipated by TAPS, MAPS and KAPS were far less than the original projections, the loss likely to be incurred by RAPS Unit-I is much higher than envisaged for the year 1993-94. In the case of Narora unit, whereas the loss in 1993-94 is attributed to the fire incident, the reasons for steep decline in its anticipated profit during 1992-93 are not explained. The Committee would stress that suitable measures should be adopted to reverse the trend of poor profitability/losses of Atomic Power Stations in order to generate internal resources for future needs.

NEW DELHI;
April 18, 1994
Chaitra 28, 1916 (Saka)

JASWANT SINGH,
Chairman,
Standing Committee on Energy.

APPENDIX I

Demands for Grants of the Department of Atomic Energy

(Rs. in Crores)

S. No.	Major Head	1992-93 Actuals		1993-94 B.E.		1993-94 R.E.		1994-95 B.E.		Remarks
		Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	
Demand No. 84										
Revenue Section										
1.	3451	-	3.65	-	4.66	-	4.66	-	5.13	This head comprises of items like salaries etc. of Sectt. & Atomic Energy Commission.
2.	2852	-	198.69	-	233.75	5.00	210.44	5.00	216.98	This head comprises of items like R&D, Bhabha Atomic Research Centre, Nuclear Fuel Complex, Heavy Water Board, Fuel Reprocessing Plants, Industry & Extension Programme and Support Services.
3.	3401	41.02	246.43	49.91	271.00	48.87	286.20	47.47	307.24	This head comprises of item like R&D, Bhabha Atomic Research Centre, Aided Institutions, Nuclear Power Programme support services, contribution to International Atomic Energy Agency.

Capital Section										
4.	4425	-	-	-	.07	-	.01	-	.01	This head comrises of items like investment in co-operative societies/canteens.
5.	4859	1.00	-	1.00	-	1.00	-	1.00	-	This head comrises of items like Electronics Corp. of India Ltd.-Investment.
6.	4861	118.48	302.25	193.67	364.00	180.10	350.47	198.00	374.84	This head comprises of items like Bhabha Atomic Research Centre, Nuclear Power Programme, Nuclear Fuel Canteen, Heavy Water Board, Power Projects, Fuel Reprocessing Industry & Extension Programme.
7.	5401	44.33	-	68.09	-	68.63	-	77.53	-	This head comprises of items like Bhabha Atomic Research Centre, Nuclear Power Programme, Support Services, Directions and Administrations.

S. No.	Major Head	1992-93 Actuals		1993-94 B.E.		1993-94 R.E.		1994-95 B.E.		Remarks
		Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	
8.	6859	1.00	-	1.00	-	1.00	5.00	1.00	-	This head comprises of item like loan to Electronics Corporation of India Ltd.
9.	6861	-	-	-	-	8.42	-	-	-	This head comprises of item like loans to Indian Rare Earths Ltd.
10.	7475	-	0.15	-	0.03	-	0.2	-	0.2	This head comprises of item like loans to cooperative societies.
Demand No. 85										
Revenue Section										
11.	2801	-	291.50	-	441.61	-	478.55	-	534.63	This head comprises of item like Power Projects, Waste Management.
Capital Section										
12.	4801	150.60	-	179.33	-	179.33	-	200.00	-	This head comprises of item like Power Projects.
13.	6801	-	-	-	-	250.00	-	-	-	This head comprises of item like loans for Power Projects.

Demand No. 84

Adjustment of Recoveries as reduction of expenditure

Revenue Section								
2852	-	(-) 0.18	-	(-) 1.80	(-) 5.00	(-) 1.18	(-) 5.00	(-) 1.43
3401	-	(-) 384.60	-	(-) 4.40	-	(-) 385.00	-	(-) 4.49
Capital Section								
4861	-	(-) 6.78	-	(-) 30.66	-	70.73	-	(-) 79.42
5401	-	-	-	(-) 0.01	-	(-) 0.01	-	(-) 0.01

APPENDIX II

Resources Allocation for Nuclear Power Programme

Demand No. 84 and 85, Major Heads 3401, 5401, 4861, 2852, 4801, 6801, 2801

(Rs. in Crores)

Programme	*1991-92*	*1992-93*			*1993-94*			*1994-95*
	Actual	*B.E.*	*Actual*	*(-) Short-fall/ (+) Excess*	*B.E.*	*R.E.*	*Difference between B.E. & R.E.*	*B.E.*
Atomic Mineral Division	27.26	32.37	25.95	(-) 6.42	33.32	32.07	(-) 12.5	31.89
Uranium Corp. of India Ltd.	51.00	32.00	32.00	-	43.00	73.00	(+) 30.00	55.70
Nuclear Fuel Complex	180.34	224.75	196.37	(-) 28.38	267.94	197.70	(-) 70.24	243.00
Heavy Water Projects	257.01	245.90	296.34	(+) 50.44	343.51	353.52	(+) 10.01	378.34
Nuclear Power Corp. of India Ltd.	415.35	587.35	449.52	(-) 137.83	641.31	904.49	(+) 263.18	723.94
Fuel Reprocessing	40.55	37.94	38.20	(+) 0.26	44.32	45.24	(+) 0.92	45.16
Waste Management	5.91	12.15	7.77	(-) 4.38	14.63	10.40	(-) 4.23	16.69
Total	977.41	1172.46	1046.16	(-) 126.30	1388.03	1616.42	(+) 228.39	1494.72

APPENDIX III

Plan Outlay for R&D for Continuing and New Schemes

(Rs. in Crores)

S.No.	Unit	VIII Plan 1992-97	Actuals 1992-93	Budget Estimates 1993-94	Anticipated 1993-94	Projected Outlay for 1994-95
1.	Bhabha Atomic Research Centre	115.96	10.55	18.00	22.89	21.23
2.	Variable Energy Cyclotorn Centre	21.36	1.39	2.00	2.22	3.50
3.	Centre for Advanced Technology	61.05	13.73	14.00	12.65	14.50
4.	Indira Gandhi Centre for Atomic Research	74.60	5.39	10.00	10.10	12.00
5.	Atomic Minerals Division	30.00	4.82	7.00	5.72	5.00
6.	Aided Institutions					
	i) Tata Institute of Fundamental Research	42.00	6.42	9.00	9.54	8.00
	ii) Tata Memorial Centre	40.00	3.72	6.00	6.00	6.00
	iii) Saha Institute of Nuclear Physics	9.00	1.90	2.00	2.20	2.00
	iv) Institute of Physics, Bhubneswar	8.00	1.01	1.75	1.45	1.75
7.	Housing & others	75.59	9.87	16.75	14.36	18.00
8.	Grants-in-aid	71.40	10.99	13.00	14.06	14.75
9.	National Programmes	51.04	14.30	18.50	16.31	18.27
	Total	600.00	84.09*	118.00	117.50	125.00

* The anticipated expenditure in 1992-93 for Research and Development was Rs. 101.11 crores.

APPENDIX IV

Replies to the Points contained in the Committee's Report furnished by the Department of Atomic Energy

Introductory Para of the Committee's Report

1. The Committee in their first report on the Demands for Grants of the Department of Atomic Energy pertaining to the year 1993-94 had emphasised the aspect of realistic budget estimates, and had then observed that over-estimates lead to a locking up of utilisable funds, thus in turn depriving other deserving projects/schemes of budgetary allocations. The Committee's scrutiny of current demands for grants and plan budget of the Department reveals that the budget estimates, under certain heads, continue to reflect the same shortfalls in utilisation/reduction at the stage of Revised Estimates. These are briefly analysed in the current report.

Comments of the Department

It may be mentioned that on account of the principled position taken by the Government with regard to Nuclear matters at the international level, the Department faces problems of export restrictions from developed countries with regard to equipment and machinery. This makes it necessary to encourage indigenisation in hi-tech areas with possible delays in supply of equipment and components. It will be appreciated that in many cases, Research & Development activities involve use of certain material and equipment for the first time in the country. Apart from the fact that development of new technology is a time consuming process, it is also submitted that the level of manufacturing technology often requires upgradation so that indigenous material of appropriate quality is made available for the Project/Schemes. R&D activities also involve import of certain critical components, although, there are uncertainties with regard to supply from foreign sources on account of restrictions on imports by the developed countries.

Budget provisions are made with the expectation of overcoming the restrictions or successful indigenisation, but at times there results in shortfalls in expectations. Nevertheless, a review of the expenditure during the last three years indicated in the statement below, show a remarkable improvement on the expenditure side. While the percentage of utilisation was 85% in 1991-92, it was 90% in 1992-93 and in 1993-94 it is 97.1% of the approved budget.

(Rs. in Crores)

	1991-92			1992-93			1993-94		
	Budget	Actuals	Per-centage Utili-sation	Budget	Actuals	Per-centage Utili-sation	Budget	Approx. Expdr.	Per-centage Utili-sation
1. Plan	412.14	354.42	86.00	412.00	356.42	86.51	743.00*	723.64	97.40
2. Non-Plan	1108.79	935.51	84.37	1145.53	1042.21	91.02	1315.12	1275.74	97.00
Total	1520.93	1289.93	84.81	1557.53	1399.63	89.83	2058.12	1999.38	97.15

* Includes Supplementary Grant of Rs. 250 crs.

The observation of the Committee regarding the need for realistic budgeting, systematic implementation of Plan Schemes and utilisation of budgeted funds are however, noted.

Observations of the Committee (Paras 2 & 3)

Para 2: The following two Demands for Grants have been submitted to Parliament by the Department of Atomic Energy (DAE) for the year 1994-95.

Demand No. 84

Relating to the Secretariat—Revenue and Capital Expenditure on Atomic Energy Research and Development and Industrial Projects. Rs. 1234.40 crs.

Demand No. 85

Relating to the Revenue and Capital expenditure on Nuclear Power. Rs. 734.63 crs.

Para 3: The two Demands aggregating to Rs. 1969.03 crs. comprise of Rs. 530.00 crs. for plan schemes and Rs. 1439.03 crs. for non-plan expenditure. In addition, plan schemes to the extent of Rs. 1041.76 crs. are to be met from Internal and Extra Budgetary Resources. The head-wise details of the Demands are shown in Appendix I.

Comments of the Department (Paras 2 & 3)

Factual statement—No comments needed.

Observations of the Committee

Para 4: The Budget provisions of DAE in respect of the years 1992-93, 1993- 94 and 1994-95 have been as under :

(Rs. in crores)

	1992-93				1993-94				1994-95	
	B.E.		Actual		B.E.		R.E.		B.E.	
	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan
Budgetary Support	412	1146	356	1043	493	1315	742	1331	530	1439
I.E.B.R.	866	--	N.A.	--	827	--	183	--	1042	--
Total	1278	1146	356	1043	1320	1315	925	1331	1572	1439

I.E.B.R. – Internal and Extra Budgetary resources.
N.A. – Not available.

Comments of the Department (Para 4)

An updated statement indicating Budgetary Support as well as the Internal and Extra Budgetary Resources is given below.

(Rs. in crores)

	1992-93				1993-94				1994-95			
	B.E.		Actual		B.E.		R.E.		Actuals (Tentative)		B.E.	
	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan	Plan	Non-Plan
Budgetary Support	412	1146	356	1043	493	1315	742	1331	724	1276	530	1439
I.E.B.R.	866	-	613	-	827	-	183	-	729	-	1042	-
Total	1278	1146	969	1043	1320	1315	925	1331	1453	1276	1572	1439

I.E.B.R. – Internal and Extra Budgetary resources.

Observations of the Committee

Para 5: It is observed that the Performance Budget of the Department has not brought out the figures regarding actual utilisation of Plan Budget provisions during 1992-93. In the absence of this information, the Committee are unable to comment on the Department's financial performance during 1992-93. The Committee expect that the Performance Budget in future should bring out the details regarding actual utilisation of budget provisions pertaining to the preceding year to enable the Committee to scrutinise the information. Incidentally, the Performance Budget has shown three different figures regarding actual plan

expenditure in 1992-93 without showing sources of funds. At the first page the figures shown is Rs. 969.38 crores, and at page 32 the figure worked out is Rs. 948.57 crores and at p. 33, the figure is Rs. 356.42 crores. The Committee hope that the Department will clarify the position in this regard. However, for the purpose of analysis, the figure of Rs. 969.38 crores is made use of in this report.

Comments of the Department (Para 5)

The observations of the Committee are noted for future compliance. Incidentally, the Revised Estimates for the year and the Budget Estimates for the ensuing year are assessed after taking into account the expenditure incurred during the first half of the year as well as the actuals of the preceding year. The form prescribed by the Ministry of Finance calling for Budget proposals also provides column only for furnishing the actuals of the previous year. Therefore, in the Performance Budget also approved provisions of the previous year were not being indicated.

As regards the discrepencies pointed by the Committee relating to the actual plan expenditure of 1992-93 shown on pages 1, 32 and 33, it may be mentioned that the figures indicated in Table IV on page 33 relate to the Budgetary Support only (without IEBR), while the figures shown on page-1 and Table-III in Chapter-IV include IEBR also. The total plan expenditure of Rs. 969.38 crores shown on page-1 of performance budget and adopted by the Committee for the purpose of analysis as well as the total expenditure of Rs. 356.42 crores out of the Budgetary Support (without IEBR), shown in Table-IV on page-33 are correct. However, due to some typographical error the total expenditure during 1992-93 in Table-III on page-32 was shown as Rs. 948.57 crores and needs to be corrected as Rs. 969.38 crores. The error is regretted.

Observations of the Committee

Para 6: The Committee are concerned to note that plan expenditure of the Department has been much less than what was budgeted for annually. During 1992-93, the plan expenditure was just around Rs. 969 crores as against the target of Rs. 1278 crores and in 1993-94 the anticipated expenditure is only Rs. 925 crores as against Rs. 1320 crores budgeted. The severe set back in plan activities of the Department is presumably due to non-realisation of internal and extra budgetary resources as originally envisaged. The Committee of that the Department will look into the causes for this unsatisfactory plan performance and initiate appropriate remedial measures to implement its plan-programmes successfully.

Comments of the Department (Para 6)

As correctly pointed out by the Committee, the reason for wide gap between the approved plan outlay and the expenditure during 1992-93 and 1993-94 is

mainly the inability of PSUs to raise Internal and Extra Budgetary Resources as originally envisaged. In this connection it may be mentioned that, while finalising the plan budget, the Budgetary Support in respect of PSUs of the Department, when reduced, in order to retain the Plan Outlay, the IEBR was raised to unrealistic levels. Subsequently, invariably the PSUs will not be able to raise the enhanced IEBR. An analysis of the Sector-wise plan expenditure would show that under R&D and I&M Sectors the anticipated expenditure during 1993-94 is almost close to the plan outlay originally envisaged. Only in the Power Sector there is wide gap between the projected outlay and anticipated plan expenditure during 1993-94, the main reason being that the market borrowings, as envisaged originally, could not materialise due to unfavourable market conditions. Inspite of the best efforts, NPCIL could mobilise only Rs. 86 crores of bond money against an approval to raise Rs. 550 crores. Further, the actual realisation from sale of power was inadequate due to defaults on the part of State Electricity Boards.

Observations of the Committee

Nuclear Power Programme

Para 7: A statement showing the resource allocation for the Nuclear Power Programme is given in Appendix-III.

Comments of the Department (Para 7)

Factual statement: No comments needed.

Observations of the Committee

Paras 8 & 9

Para 8: The resource allocation position in respect of Nuclear Power Corporation and Nuclear Fuel Complex has been as under :

(Rs. in crores)

	1992-93			1993-94		
	B.E.	Actual	(-) Shortfall/ (+) Excess	B.E.	R.E.	Difference
Nuclear Power Corporation	587	450	(-) 137	641	904	(+) 263
Nuclear Fuel Complex	225	196	(-) 29	268	198	(-) 70

Para 9: The Committee are at a loss to understand the circumstances under which the Nuclear Power Corporation had to surrender from the Budgetary support as much as Rs. 137 crores during 1992-93 particularly when the plan expenditure suffered huge shortfall. Similarly the huge shortfall in budget utilisation by Nuclear Fuel Complex, Hyderabad every year is disturbing. The

Committee had earlier highlighted in their first report the under-utilisation of budgetary provisions by the Nuclear Fuel Complex. It is hoped that the reasons for poor budgetary performance of the complex will be gone in detail and realistic budget estimates made in future.

Comments of the Department (Paras 8 & 9)

The surrender of Rs. 137 crores during 1992-93 pointed out by the Committee, does not relate to Nuclear Power Corporation. The programmes indicated under Serial No. 2.5 of Table I of page 23 under heading Nuclear Power Corporation includes certain other items of expenditure other than the investment in and loans to NPCIL.

The shortfall of Rs. 137 crores during 1992-93 was mainly under the following items. The reasons for shortfalls are also indicated against each item.

	(Rs. in crores)	Reasons for shortfall
(a) Fuel Inventory	100	Non-receipt of enriched uranium from abroad, as well as less supply of PHWR fuel.
(b) Procurement of heavy water	35	As the production of heavy water by Departmental plants has improved considerably, it was decided not to import heavy water.
(c) Nuclear Power Board	12	The amount meant for settlement of dues on permanent absorption of DAE employees on foreign service with NPCIL could not be utilised because of non finalisation of terms and conditions of service which require negotiations with the employees.
(d) Prototype Fast Breeder Reactor	3	Due to slippage of delivery schedule of certain major equipments.

The above surrender marginally set off by excess expenditure towards investment in NPCIL and interest on heavy water held in stock etc. resulted in a net saving of Rs. 137 crores.

As regards Revised Estimates 93-94 additional provision of Rs. 263 crores is mainly on account of a loan of Rs. 250 crores to NPCIL for which supplementary grant has been obtained and increase in interest charges on heavy water held in stock due to upward revision of interest rate from 10% to 10.3% marginally counter-balanced by reduction in operational expenses in RAPS I.

Further, the shortfall in utilisation of funds by NFC during 1992-93 as compared to Budget Estimates is on two counts about Rs. 19 crores on the production (revenue) side and about Rs. 10 crores on the project (capital) side. On

the production side there was shortfall in achieving the targets originally fixed consequent on the delay in completion of expansion/augmentation programmes which in turn was due to late receipt of imported machinery/equipment. The shortfall in production resulted in corresponding shortfall in utilisation of funds to the extent of Rs. 19 crores. The requirement of fuel by NPCIL was also less than what was originally envisaged.

On the capital side, the financial sanction for the new projects could be issued (after obtaining requisite clearances from various agencies) only by August 1992. Consequently certain items of work could not be started as originally planned and this resulted in a shortfall in expenditure to the extent of about Rs. 10 crores.

During 1993-94, there was a shortfall in production due to certain technical/ process difficulties and accordingly the demand for funds on the revenue side was reduced to the extent of Rs. 28 crores. On the capital side, due to slow-down of the nuclear power programme as a result of financial crunch, implementation of the three newly sanctioned projects (New Uranium Oxide Fuel Project, New Uranium Fuel Assembly Plant & New Zircaloy Fabrication Plant) was rephased and only about 50% of the capacities are being added in the first phase. This has resulted in a reduction in the requirement of funds to the extent of about Rs. 42 crores.

The first phase of the projects will be in advanced stage of completion during 94-95 and higher outlays have been sought for this in BE 94-95.

Observations of the Committee (Paras 10 & 11)

Atomic Minerals Division, Hyderabad

Para 10: AMD is engaged in survey and prospecting for uranium, thorium etc. for attaining self sufficiency in meeting the demands of the country's nuclear power programme. During the 8th five year plan period target of identifying additional resources of 5000 tons of uranium has been set. A total expenditure of Rs. 31.89 crores is envisaged for AMD during 1994-95 as against RE of Rs. 32.07 crs. for 1993-94. The physical targets and achievements for some selected items during the year 1993-94 and targets for 1994-95 are given below:

	1993-94		1994-95
	Target	Achievement	Target
Airborne Survey (Sq. km.)	38500	*	35000
Departmental Drilling (M)	52300	34180	42300
Detailed Survey (Sq. km.)	588	440	533
Geochemical Investigations (Sq. km.)	11250	10520	11400

* This could not be taken up due to non-availability of aircraft during the flying season.

Para 11: The Committee are surprised to learn from the Performance Budget of the Department that no airborne survey was undertaken by the Atomic

Minerals Division on the ground of non-availability of aircraft though it had been targeted to survey 38500 Sq. km. during 1993-94. The reason advanced for this failure is hardly convincing. The Committee also note that there were shortfalls in Departmental drilling and detailed survey to the extent of around 35% and 25% respectively in 1993-94. The Committee hope that AMD will analyse the reasons for the huge shortfalls in achieving the targets during 1993-94 and improve its performance in future.

Comments of the Department (Paras 10 & 11)

At the time of furnishing information by Atomic Minerals Division for preparation of Performance Budget, there were uncertainties regarding availability of air-craft for Airborne Survey. Subsequently they succeeded in getting air-craft and an area of 39500 sq. km. has been surveyed achieving, before close of the financial year, the set target.

As regards drilling operation, due to shifting of operation to areas in Andhra Pradesh/Rajasthan where comparatively higher grade of ores were located, some short fall in drilling operation and taken place. However, shifting rigs to richer area has compensated the loss by drilling in richer ore areas. Further, while in the Geo-chemical Investigations the Unit has almost achieved the target, there has been a marginal short fall in detailed survey due to difficult terrain region in Himalayas and logistic problems in the areas where detailed survey is conducted.

Observations of the Committee (Paras 12, 13, 14 & 15)

Research and Development

Para 12: The main research and development units of the Department are the Bhabha Atomic Research Centre, Bombay, Variable Energy Cyclotron Centre, Calcutta, Centre for Advanced Technology, Indore, Indira Gandhi Centre for Atomic research, Kalpakkam, Atomic Minerals Division, Hyderabad and six aided institutions. The break-up of plan outlay for R&D during the 8th plan and its utilisation during the first three years of the plan are shown in Appendix II.

Para 13: It can be observed that the actual R&D expenditure during 1992-93 under plan schemes fell short of the anticipation by Rs. 17 crores. This reflects slow pace of R&D activity in general. As an illustration, the case of Indira Gandhi Centre for Atomic Research is dealt with in the succeeding paragraph.

Indira Gandhi Centre for Atomic Research

Para 14: The prime objective of the centre is to create a sound base to set up and operate Fast Breeder Nuclear Power plants indigenously. The plan outlay for

Research and Development programme of this centre during the 8th plan and its utilisation during the first three years of the plan is as under :

(Rs. in crores)

	8th Plan	1992-93		1993-94		1994-95
	92-97	B.E.	Act	B.E.	R.E.	B.E.
Continuing Schemes	25.07	7.08	5.18	5.05	6.66	5.69
New Schemes	49.53	1.13	0.21	4.95	3.44	6.31
	74.60	8.21	5.39	10.00	10.10	12.00

Para 15: It can be observed from the above table that the R&D expenditure of the Indira Gandhi Centre for Atomic Research under plan schemes during the first three years of the plan amounts to only Rs. 27 crores as compared to an outlay of Rs. 75 crores during the 8th five year plan. The reasons for slow progress in R&D activity of the centre are not known. The Committee trust that the centre will step up its R&D activities and will achieve the desired results as planned.

Comments of the Department (Paras 12, 13, 14 & 15)

The financial performance of the Research and Development Sector has considerably improved during the year 1993-94. As against the approved outlay of Rs. 118 crores, the expenditure is of the order of Rs. 115 crores (approx).

The shortfall in expenditure during 1992-93 under Research and Development Sector is in respect of the following Units:

	(Rs. in crores)
BARC	3.76
IGCAR	2.82
AMD	2.18
TIFR	1.93
HOUSING	3.49
OTHERS	2.82
	17.00

The main reason for shortfall is slippage in delivery schedules of equipment, delay in taking up housing projects at various places, slow progress of construction work etc.

As regards slow progress in R&D activities of IGCAR, it may be mentioned that out of the total VIII Plan outlay of Rs. 25 crores for Continuing Schemes of IGCAR, the anticipated expenditure at the end of the first three years of the plan period is approximately Rs. 15.53 crores *i.e.* an average expenditure of Rs. 5 crores per year. This appears to be in proportion to the approved outlay for continuing schemes.

With regard to new schemes it is submitted that as the VIII Five Year Plan proposals were finalised only in the middle of 1992, it took some time thereafter for plan projects to be undertaken under the VIII Plan for finalisation and getting sanctioned with the result expenditure could not be progressed during the initial years of the VIII Plan. It is expected that progress of the works will gather momentum during the remaining years of the VIII Plan.

Observations of the Committee (Paras 16 & 17)

Operating Performance

Para 16: The physical performance of Atomic Power Stations in generating power has been as indicated below:

Atomic Power Station	1992-93		1993-94		1993-94
	Target	Anticipated	Target	Anticipated	Target
Tarapur	2072	1649	1770	1770	1770
Rajasthan.					
Unit-I	--	271	402	161	393
Unit-II	1061	977	1000	830	1050
Madras	1770	1794	1945	1900	1900
Narora	1941	1556	2420	702	2035
Kakrapar	--	--	965	750	1705

Para 17: The Committee note that the Performance Budgets of the Department of Atomic Energy bring out physical performance of atomic power stations only with reference to anticipations and not as actually achieved on any particular year. It is not possible to make any meaningful assessment about the physical performance of atomic power stations in the absence of information regarding actual achievement. Even a scrutiny of anticipated achievements reveals huge shortfalls in target realisations during the year 1992-93 and 1993-94 particularly in Narora and Unit-II of Rajasthan Atomic Power Stations. Tarapur unit also fared badly during 1992-93. The Committee would like to know the reasons for this poor performance and the measures taken to improve the functioning of the units.

Comments of the Department (Paras 16 & 17)

Details of generation actually achieved in 1992-93 and 1993-94 (up to February 94 actual & March 94 provisional) are given in Tables—1&2 respectively. Explanations with regard to shortfalls have been given in the "Remarks" column. The observation in regard to incorporating actual generation data in the performance budget document is noted for compliance in future. Achievement data for the year prior to the year of performance budget under consideration can only be "anticipated" values as the performance budget is prepared in December, and actual achievement figure can be indicated in April

during review by the Standing Committee of the Parliament. However, actual achievement for the preceding year will be indicated for comparison.

During 1992-93, based on actual achievements, shortfalls in generation from Tarapur station, Rajasthan Unit-2, and Narora station were marginal amounting to 6.6%, 12.8% and 8.9% respectively as compared to the targets. Reasons for shortfalls have been explained in the Table-1.

During 1993-94, based on actual generation (actual up to February 1994 & provisional for March 1994), Tarapur station, and Rajasthan Unit-2 exceeded the targets. The reasons for shortfalls in generation from Madras, Narora and Kakrapar stations have been explained in the Table-2.

The performance of Rajasthan Unit-1 was affected in both the years due to a minor but difficult leak of heavy water from Over Pressure Relief Device mounted on the calandria. Operation of the Unit in a modified mode on account of the above leak required detailed analysis and regulatory review and renewals. A long-term solution for repair is being worked out. It requires time due to the inaccessibility of the area and the need for special tooling.

During these years, the frequency of the electrical grid varied much beyond the permitted operating limits of turbo-generators especially in Madras and Narora resulting in separation/trip of the unit from the grid during periods off—normal grid frequency conditions. Operation of the turbo-generators beyond permitted range can lead to turbine blade failures as had happened at Narora and Madras. The grid frequency situation continues to be unsatisfactory.

All efforts are being made for improving the generating performance by strengthening the preventive and predictive maintenance, outage planning, and condition monitoring of equipment.

TABLE 1

Physical Performance of Atomic Power Stations 1992-93
[Generation in Million Units (MUs)]

Atomic Power Station	1992-93 Target	Anticipated	Actual	Remarks
Tarapur-1&2	2072	1649	1935	Marginal shortfall of 6.6% mainly due to an unforeseen outage for about two months to solve emergency condenser tube leak and low condenser vacuum in Unit-2.
Rajasthan-2	1061	977	925	Marginal shortfall of 12.8% mainly due to planned maintenance outage extending from 2 to about 3.5 months for enhanced inservice inspection of coolant channels & chemical decontamination.
Madras-1&2	1770	1794	1978	Achievement exceeded target.
Narora-1&2	1941	1556	1768*	Marginal shortfall of 8.9% mainly due to an outage of about 4 months in the year for generator rotor replacement & repair of lacing rod failure in the Unit-2 turbine. Unit-2 targets are based commercial generation from April 1992 as compared to actual July 1992.
Total	6844		6606	
Rajasthan-	--	271	133	Performance affected due to a long outage of about six months due to a minor but difficult (from accessibility) leak of moderator heavy water into calandria vault from the Over Pressure Relief Device (OPRD) mounted on calandria.

* Includes 89 MUs of infirm power from Unit-2 from 1/4 to 1/7/92

TABLE 2

Physical Performance of Atomic Power Stations 1993-94
[Generation in Million Units (MUs)]

Atomic Power Station	1993-94 Target	Anticipated	Actual@	Remarks
Tarapur-1&2	1770	1770	1823	Achievement exceeded target. Slight reduction in achievement as compared to 1992-93 due to extension of Unit-2 refuelling outage for extra maintenance jobs.
Rajasthan-2	1000	830	1092	Achievement exceeded the target. Better performance as compared to 1992-93.
Madras-1&2	1945	1900	1387	Performance affected due to a long outage of about 7 months for turbine LP rotor modifications consequent on the Narora fire incident. Inservice inspection of coolant channels & chemical decontamination were also carried out.
Narora-1&2	2420	702	334	Unit-1 out of service for the entire year after the fire incident. Unit-2 came back on line only in Nov. 93 after rehabilitation work & modifications based on lessons learnt from Narora fire incident.
Kakrapar-1	965	750	656*	Unit commenced commercial generation in May 93 as against April 93. Initial regulatory power limitation (75%), outage for turbine inspection & modification from lessons of Narora fire incident.
Total	8100		5292	
Rajasthan-1	402	161	163	Continuation of the problem with the OPRD.

@ Based on actuals up to Feb. 94 & provisional figures for Mar. 94 Includes 35 MUs of infirm power from Apr. 1 to May 5, 1993.

Observations of the Committee (Paras 18 & 19)

Major Power Projects

Para 18: There are three major power projects which are under execution. The original estimated cost, revised cost, total expenditure incurred and expected year of commissioning in respect of these projects are given below :

(Rs. in crores)

		Original Cost	Revised Cost	Expenditure incurred	Commissioning
1.	Kakrapar Atomic Power Projects (2 units)	381	1335	1200	Unit-I May, 1993 Unit-II expected shortly.
2.	Rajasthan Atomic Power Projects (III & IV)	712	2107	788	1996-97
3.	Kaiga Atomic Power Projects (2 units)	731	2275	995	1996-97

Observations of the Committee

Para 19: It can be observed that there has been very great cost over-runs, going upto as much as 300%. The extent of delay, in the execution of those projects in respect of these projects is not explained in detail. In the absence of that information in the Performance Budget, the Committee feel that the loss of benefits to the economy owing to time and cost over-run of projects cannot be overestimated. The Committee expect that efforts will be made to ensure timely completion of these projects within the revised costs.

Comments of the Department (Paras 18 & 19)

I. Cost Overrun

The cost over-runs in all the projects referred to were mainly attributed to the following factors apart from taxes and duties, FE rate variation and effect of devaluation etc. The effects of these factors for each of the project is summarised in the Table below.

(a) Change in Scope of Work

The scope of work in each of the project has increased due to the evolving safety requirements and continued technology evolution to conform to prevalent safety standards.

(b) Escalation

While preparing the oroginal cost estimate, a provision of only 4% per year was provided towards escalation with a project implementation time of about 8 years. Hence the total provision for future escalation was of the order of only 15% of the total cost estimate. The quantum of escalation provided did not fully compensate the actual escalations that have occured in subsequent years. Time overuns also contributed to some extent increased escalation.

(c) Interest During Construction (IDC)

Subsequent to the formation of Nuclear Power Corporation in 1987, it became necessary to include the Interest during construction (IDC) to the capital cost of the project. IDC was estimated on the assumption of 2:1 debt equity ratio.

Based on the above the project-wise data is given below :

(Rs. in crores)

	Original estimated cost	Change in Scope of work	Cost increase due to escalation	IDC	Other reasons	Revised estimated cost
Kakrapar Project (2 units)	382.52	183.52	359.62	310	99.34	1335
Rajasthan Project Units 3&4	711.56	137.37	386.75	657	214.32	2107
Kaiga Project (2 units)	730.72	144.91	430.70	685	283.67	2275

All efforts are being made to complete the project as per the revised estimated costs.

II. Time Overruns

(a) Kakrapar Atomic Power Project

When the project was sanctioned, the original schedule of completion was December 1990 (Unit-1) and December 1991 (Unit-2). Inspite of the increase in quantum of work due to the changes in the designs in KAPP based on the experiences during construction and commissioning of NAPP, implementation of recommendations arising out of Three Mile Island (TMI) accident in USA and delays in supply of certain piping hardware, instrumentation items and piping and electrical works contractors not able to meet the schedule, the first unit was commissioned in September 1992 and the time in setting up of this unit is significantly less as compared to the earlier projects as it has been completed within a period of 8 years from the date of the first pour of concrete for the Reactor Building raft.

Unit-2 is in advanced stages of commissioning and the expected date of criticality is May 1994 and every effort is being put to achieve this date.

(b) Rajasthan Atomic Power Project–3&4

At the time of sanction, the date of commissioning of Unit-3 was May 1995 and for Unit-4 was November 1995.

The main plant civil works contract could be awarded only in July 1988 as against the target of November 1987. After the main plant civil works commenced, due to evolving regulatory requirements, a new set of guidelines had to be followed which needed significant analysis and evaluation of the design. Therefore there was delay in taking up the foundation raft concreting work of the project. This delayed the civil works in the beginning. Added to this, delays were also on account of non-availability of diesel and other required inputs during the Gulf crisis of 1990 apart from cash flow problems of the main plant civil contractor. The above resulted in shifting of the original targeted dates by 18 months in the project schedule and the present completion dates for criticality are scheduled to be November 1996 (Unit-3) and May 1997 (Unit-4).

(c) Kaiga Project 1 & 2

At the time of the sanction for Kaiga Project, the completion dates were June 1995 for Unit-1 and December 1995 for Unit-2. After the main plant civil works were taken up, there was delay in commencing Reactor Building foundation raft concreting due to the same reason as mentioned for Rajasthan units 3&4 referred above. The foundation raft work continued in phases. This resulted in an accumulated delay of 12 months for further works of the Project in comparison to original schedule.

All out efforts are being made to contain this delay by changes in the erection logics and using better construction techniques. The revised scheduled completion of these two units are June 1996 and December 1996 for Units 1 and 2 respectively.

Observations of the Committee (Paras 20 & 21)

Financial Performance

Para 20: The net profit anticipated by Atomic Power Stations during 1992-93 against budget targets and the net profit budgeted for 1994-95 are shown below :

(Rs. in crores)

Atomic Power Station	1992-93		1993-94		1993-94
	Target	Anticipated	Target	Anticipated	Target
Tarapur	12.46	1.47	5.20	3.70	0.66
Rajasthan					
Unit-I	(-) 57.46	(-) 44.19	(-) 13.25	(-) 61.34	(-) 59.85
Unit-II	(-) 3.09	6.18	3.75	2.97	10.25
Madras	(-) 1.18	(-) 2.83	7.30	0.59	0.77
Narora	23.60	7.18	70.28	(-) 109.02	28.86
Kakrapar	--	--	37.47	3.47	56.40

Para 21: The financial performance of the atomic power stations leaves much to be desired. While the profits anticipated by TAPS, MAPS and KAPS were far less than the original projections, the loss likely to be incurred by RAPS Unit-1 is much higher than envisaged for the year 1993-94. In the case of Narora unit, whereas the loss in 1993-94 is attributed to the fire incident, the reasons for steep decline in its anticipated profit during 1992-93 are not explained. The Committee would stress that suitable measures should be adopted to reverse the trend of poor profitability/losses of Atomic Power Stations in order to generate internal resources for future needs.

Comments of the Department (Paras 20 & 21)

The Statements of Profit & Loss for the years 1992-93 and 1993-94 are given in Table-3 and Table-4 respectively. Reasons for variations in the net profit compared to the target for 1992-93 and 1993-94 are given in the "Remarks" column of the respective statements.

It may be highlighted that all the Atomic Power Stations of Nuclear Power Corporation except Rajasthan Unit-II had far exceeded the profit targets during the year 1992-93. Even Narora had exceeded the anticipated profit during 1992-93 due to higher generation achieved by the units during the year. Rajasthan Unit- II had suffered a loss of Rs. 3.46 crores during 1992-93 mainly due to lower generation on account of longer outage of the unit for inservice inspection of coolant channels. Rajasthan Unit- I (owned by the Department of Atomic Energy) had suffered losses due to the lower generation level achieved during 1992-93 for reasons stated in para "Operating Performance". The techno-economic viability of operating Rajasthan Unit- I is under evaluation.

During the year 1993-94, Tarapur Unit I & II had exceeded the targeted profit by Rs. 9.91 crores whereas there is a reduction in the profit for Rajasthan Unit- II by Rs. 3.21 crores mainly because of the delay in tariff revision for want of CEA clearance. Madras Unit I & II, Narora Unit I & II and Kakrapar Unit-I suffered losses during 1993-94 due to lower generation achieved for reasons stated in para "Operating Performance"

TABLE 3

Statement of Profit & Loss
(Profit/Loss in Crores)

Station	1992-93			Remarks
	Target	Anticipated	Actuals	
TAPS	12.46	1.47	16.62	Profit exceeded the target. Reasons for variation are: (i) Accounting of Delayed Payment Charges–Rs. 3.05 Crores. (ii)Savings in O & M Expenses.
RAPS-II	-3.09	6.18	-3.46	The loss was due to : (i) Lower generation as compared to the target due to the reasons given in Table 1. (ii)Proposed Tariff Revision not effected during 1992-93.
MAPS	-1.18	-2.83	16.15	Profit exceeded the target. Reasons for variation are : (i) Higher generation as compared to the target. (ii)Savings in O & M Expenses.
NAPS	23.60	7.18	56.66	Profit exceeded the target. Reasons for variation are : (i) Higher generation from NAPS II after commencement of commercial operation. (ii)Accounting of Delayed Payment Charges–Rs. 27.42 Crores.
Total	31.79	12.00	85.97	
RAPS I	-57.46	-44.19	-55.91	Marginal reduction in loss was mainly due to the savings made in O & M Expenses during 1992-93.

TABLE 4

Statement of Profit & Loss
(Profit/Loss in Crores)

Station	1993-94			Remarks
	Target	Anticipated	Actuals provisional	
TAPS	5.20	3.57	15.11	Profit exceeded the target. Reasons for variation are : (i) Higher generation as compared to the target. (ii) Accounting of Delayed Payment Charges Rs. 5.32 Crores. (iii) Tariff revision effected during 1993-94.
RAPS II	3.75	2.97	0.54	Reduction in profit was mainly because the proposed Tariff revision was not effected during 1993-94.
MAPS	7.30	0.59	-29.52	The loss was due to : Lower generation as compared to the target due to the reasons given in Table-2.
NAPS	70.28	-109.02	-93.36	The loss was due to : Lower generation as compared to the target due to the reasons given in Table-2.
KAPS	7.49	3.47	-25.81	The loss was due to : Lower generation as compared to the target due to the reasons given in Table-2.
Total	124.02	-98.42	-133.04	
RAPS I	-43.25	-61.34	-25.95	Reduction in loss was mainly due to the accounting adjustments carried out during 1993-94 for the excess O & M expenses claimed in previous years.

APPENDIX V

Replies to the Points Raised by the Committee During the Discussion held with the Representatives of Department of Atomic Energy

1. Efforts made to acquire self-Reliance in the field of Fuel, Heavy Water and components for Reactors

The need for generation of nuclear power to support the power demands of the country has been well recognised from the early days. Late Dr. Homi Bhabha, with active support and appreciation of Late Pandit Jawaharlal Nehru, launched a three stage programme for developing nuclear power in the country. The programme is unique and basically formulated to exploit available natural resources of the Uranium and Thorium of the country. The salient steps are; use of Pressurised Heavy Water Reactors (PHWRs), to use available natural Uranium and produce power and Plutonium, use of Plutonium in the second generation of reactors namely Fast Breeder Reactors and generate Power, Plutonium from U- 238, or U-233 from Thorium, subsequently, utilisation of advanced reactors to utilise Thorium U-233 fuel. The choice of PHWRs was also based on considerations leading to self-reliance. Infrastructure in the form of trained manpower, well equipped multi-disciplinary research centre such as BARC etc., was created as a strong base for realising self-reliance in all aspects of nuclear reactor technology and its fuel cycle and non-electricity applications of nuclear energy in fields of Agriculture, Medicine and Industry, apart from pursuing research in hi-technology and areas of frontier science. Today this vision and planning has resulted in our acquiring capability in design, construction and operation of nuclear power reactors, heavy water plants, nuclear fuel cycle facilities such as Industrial plants for fabrication of various types of fuel, fuel reprocessing etc. In addition, based on our operating experience and research, we are in a position to incorporate improvements which bring our reactor to international standards with respect to safety. Further, today DAE, with its constant interaction with Indian industry, is able to raise their standards in construction and fabrication to meet the required high quality standards and reliability. These achievements, which are by any standards are significant and place India on par with developed countries, have taken sufficient time and considerable efforts. This was one of the main factors for the delays caused in execution of the project. It is to be mentioned that certain items like special pumps or material, which are needed in small quantities or one of its kind are being imported. Technology control regimes, followed by members of London Club countries, recently, because of our non-signatory to NPT, introduce severe constraints. However, solutions for these are also being found and tackled and means to surmount the obstacles are found.

A few examples of efforts to acquire self-reliance in the field of fuel, heavy water, components for nuclear reactor are illustrated.

1.1 Nuclear Fuel

For a self-reliant nuclear power programme, competence in designing and fabricating of fuel assemblies and related hardware items like zircaloy, coolant

tubes, calandria tubes, channels and seamless fuel tubes are essential pre-requisites. Even in the early sixties we acquired self-reliance and confidence first in an area of fabrication of fuel. First half charge of Uranium metal fuel rods required for CIRCUS Reactor was successfully produced by BARC, meeting quality standards. The Department has taken steps with adequate foresight to plan for the fabrication of metallic uranium fuel elements for the research reactors e.g. CIRCUS and DHRUVA, (at BARC, Trombay) and this was followed by the fabrication of Uranium Oxide Fuel assemblies for the power reactors.

The Nuclear Fuel Complex, established in 1972 at Hyderabad, has been manufacturing Uranium Oxide Fuel assemblies for the Heavy Water Reactors since 1974, starting with the processing of zircon sand supplied by Indian Rare Earths Ltd., and uranium concentrates supplied by the Uranium Corporation of India Ltd. The Nuclear Fuel Complex has also been making the Fuel for Tarapur reactors, starting from the imported enriched UF6 raw material. After building the requisite capability to manufacture the zircaloy seam-less fuel tubes and coolant tubes, calandria tubes, garter springs, and other related hardware items like tie-plates, and the finished fuel assemblies, the Department focused the attention on the development and building of basic production equipment for the programme. The capability to design and fabricate the requisite production equipment for the chemical plants namely for the processing of zircon sands to reactor grade zirconium sponge and for the processing of uranium concentrates to sinterable uranium dioxide powder, with special materials of construction like AISI 310S and Inconel 600, were built during the early 70's itself.

The Nuclear Fuel Complex has so far manufactured indigenously 1,00,000 Nos. of PHWR Fuel bundles, (equivalent to 1500 tonnes) and also more than 500 tonnes of Zircaloy hardware, starting with the above indigenous raw materials.

Initially for the manufacture of fuel assemblies, and zircaloy hardware many manufacturing equipment like Electron-beam welding units, high vaccum annealing, furnaces, cold reducing pilger mills, high temperature sintering furnaces, and special resistance welding equipment were imported. During the mid 80's the Nuclear Fuel Complex experienced severe constraints in the import of the above strategic equipment for the power programme due to the embargo restrictions imposed by the US Government and other London Club countries like U.K. and Germany.

During the last 5 years, the Nuclear Fuel Complex has developed the capability with the support of the local industry to design and fabricate vacuum annealing furnaces, pilger mills, sintering furnaces and special purpose welding machines for the manufacture of fuel assemblies. It is note-worthy to mention that the new projects relating to the expansion of fuel plants are based on the above indigenous equipment presently under various stage of manufacture. As the development of these indigenous equipment and transfer of the know-how to the private industry took sometime, there has been an element of time over-run in the completion of the Projects. However, the cost of indigenous equipment as developed above has been found to be relatively cheaper (partly because of devaluation). As such, the Projects which are now being executed by the Nuclear Fuel Complex will not incur any cost over-run.

As regards the non-utilisation of the allocated funds by the Nuclear Fuel Complex during the period 1992-94, it should be mentioned that this has happened primarily because of the revision of the nuclear power target. To meet the revised target, the sanctioned projects for the manufacture of fuel assemblies and zircaloy fuel tubes are now proposed to be in two phases, due to the modular concept contemplated in the original design. Thus the exercise of phasing the project carried out during the above period, has resulted in the non-utilisation of the allocated funds. During the next two years, Phase-I of these projects will be implemented on schedule and the power programme will not suffer for want of fuel and zircalloy.

With a view to achieve self-reliance in respect of the nuclear fuel for the operation of Tarapur reactors, necessary know-how has been developed by the Bhabha Atomic Research Centre at its Tarapur facilities, and with the assistance of Nuclear Fuel Complex, already proto-type MOX Fuel, starting with indigenous raw materials have been manufactured.

It is to be mentioned that India is the first country in the world to use mixed carbide of uranium and plutonium for the full core of Fast Breeder Test Reactor. This fuel has to be developed, as the fuel originally intended to be used namely the one using 85% enriched uranium, was not available from France. This fuel has performed well during the operation of reactor. To develop thorium fuel cycle, facilities have been set up in Trombay and Kalpakkam for separation of uranium-233 from thorium, irradiated in the research and power reactors and the fuel, bearing uranium-233 has been fabricated and tested.

1.2 Heavy Water

(a) Today India can not only meet requirements of operating reactors, but also is in a position to export to other countries with suitable *international agreements.* The country has eight Heavy Water Plants with an overall capacity of 645.5 MT per annum as given below :

H.W. Plant	Effective Annual Capacity (MT)	Process	Date of Commercial Operation
Nangal	8	Hydrogen Liquefaction and Distillation	August 1961
Baroda	45	Ammonia-Hydrogen (Monotherm)	August 1980
Tuticorin	49	-do-	August 1978
Thal	110	-do-	April 1987
Hazira	110	-do-	Feb. 1991
Talcher	62.5	Ammonia-Hydrogen (Bitherm)	April 1985
Kota	85	Hydrogen-Sulphide -Water	April 1985
Manuguru	185	-do-	March 1991 (1st Stream) Dec. 1991 (2nd Stream)

(b) The Heavy Water Plant at Kota and the one at Manuguru—which is incidentally the largest of our production facility-have been based on indigenously developed hydrogen-sulphide-water exchange process and has proved to be very successful. The plants at Baroda and Tuticorin were set up with the help of Gelpra, a foreign consortium, who had developed the ammonia hydrogen exchange process. Subsequent plants at Thal and Hazira have been set up on our own, based on the experience gained in this technology. The Plant at Talcher is based on a technology developed by a German Company. The ammonia-hydrogen exchange plants are linked to the various fertilizer plants from where synthesis gas is drawn as a feed to the Heavy Water Plants. These plants are dependent on continuous uninterrupted availability of inputs from the fertilizer plants with which they are integrated and also on uninterrupted power supply from the grids. The process is such that any interruptions in supply of input or power will adversely affect the production because of the long equilibrium time required. As compared to this the H2S - H2O based plants are independent.

(c) The production of Heavy Water is commensurate with the feed inputs to the plants. Over the years all these plants, except the Heavy Water Plant at Talcher, have achieved marked improvement in their level of production due to modifications in various operative procedures and equipment. The capacity utilisation of all the plants except Talcher plant and their stream factors have improved substantially. The operation of plant at Talcher, has not been satisfactory on account of the non-availability of the inputs in the right quantity, quality and in uninterrupted manner from the FCI Plant to which it is coupled. FCI's Talcher Plant is bogged down because of financial and technological problems and they have been registered as a sick unit with BIFR.

(d) During the years 1991-92, 1992-93 and 1993-94 the production has been 89.3%, 89.5% and 93.2% respectively of the overall targets. After commissioning of the new production facilities in 1991, the production profile has been improving consistently and the increase in production of 14.8% and 11.9% have been achieved during the year 1992-93 and 1993-94 respectively over that of the preceding years.

(e) India is one of the few countries in the world which has harnessed and mastered more than one technology for production of Heavy Water. We are in a position to set up plants based on both the technologies on our own.

(f) The production of Heavy Water at current levels is not only sufficient to meet the requirements of the nuclear power stations under construction but also some large surpluses would accure in the period upto which the requirements for the new projects come up. In view of this efforts are being made to make an in-road in the overseas markets. As a matter of fact a contract for supply of Heavy Water to South Korea is about to be finalised. Plans had been formulated for setting up of 2 Nos. of ammonia based plants and expansion of Manuguru Plant. However, the same has been kept in abeyance due to slowing down of the nuclear power programme. Time for setting up of new plants will have to be reviewed based on the pace of the nuclear power programme and the fact that it would take about 4 to 5 years to set up a Heavy Water Plant.

1.3 Components for Nuclear Power Reactors (NPC)

The indigenous content of components of nuclear power reactor has been progressively increased. Most of the components were imported in the case of Tarapur station as per the turn-key supply arrangements. When construction of Rajasthan station commenced, the objective outlined was to progressively indigenise the manufacture. In respect of Rajasthan Unit-1, while most of the critical components were imported, indigenisation in conventional electrical plant equipment like transformer, switch gear etc., commenced. The commencement of construction of the second unit of Rajasthan led to a major step towards indigenous manufacture of critical nuclear components. The indigenous content increased from 55% in Unit-1 to 75% in Unit-2. In the subsequent units at Madras, this trend continued to increase to a level of around 90%. In the case of Narora and subsequent 220 MWe units, more or less same level of indigenisation has been maintained. Due to significant design improvements and changes in component designs in Narora Plant design, the process of indigenous manufacturing technology development carried out for Rajasthan-2 and Madras-1&2 had again to be gone through. In selected areas like coolant channel components. (End-fittings) and fuelling machine heads. BARC undertook manufacturing development and also production and testing. Augmentation of shops of the indigenous industries by machine tools and improved quality control equipment were necessary in the early stages for manufacture of nuclear components. In respect of certain critical components, technical know-how under suitable technical assistance Agreements were obtained initially to serve as a guide to develop satisfactory indigenous manufacture. For conventional equipment, the effort was one of fitting in with conventional thermal power plant industry with appropriate modifications, upgrades and scale-ups as necessary. With the experience gained in the manufacture of 220 MWe unit components, Indian Industry has also taken up successfully manufacture of large size components for 500 MWe units and some of them have been completed as part of advance actions. Manufacture of critical nuclear components like calandria, end-shields, Steam generators, fuelling machines etc., has been successfully carried out. A progressive trend of reduction in manufacturing time cycles has emerged with the accumulated experience. The indigenous content of the project has been progressively increased to the present level of about 85 to 90% by going through the process of learning and R&D. Import is mainly restricted to special materials and proprietary components not in the manufacturing range of Indian Industry due to economical reasons.

2. Hiring of aircraft by AMD for airborne survey

Since 1955 Atomic Minerals Division of the Department of Atomic Energy has been carrying out low altitude airborne gamma ray surveys in the country for atomic minerals. The area covered so far are 2,02,400 sq kms. by total count surveys during 1956 to 73 and 4,60,830 sq. kms. by gamma ray spectrometric and magnetic survey during 1973 to 1994. The Atomic Minerals Division has developed the necessary infrastructure for airborne survey such as gamma rays

spectrometric system, trained manpower for maintaining the system, hardware and software for data processing and grown geologists for interpretation of data. Airborne surveys are conducted every year by hiring a survey aircraft. In the past, aircraft has been hired also from (1) Indian Airforce (2) Department of Science and Technology (3) National Remote Sensing agencies and (4) M/s. Air Survey Company Limited.

The hiring of aircraft on annual basis is a time consuming process and at times, leads to partial or complete loss of the flying season (November to February). The optimally used limited flying season can cover about 40,000 line km. Keeping the long term plans and available expertise in the department the following two options for effective coverage could be considered. The Parliament Committee which met the representative of the Department on 5.4.1994 has suggested that (1) Department of Atomic Energy could acquire an aircraft for exclusive use of the Department for airborne survey and other requirements; and alternatively (2) Hire services of Air Taxis on long-term lease of aircraft.

The pros and cons of both the options were considered. In case an aircraft is bought by the Department of Atomic Energy, while there is certainty of availability of aircraft for airborne survey, the problems attached to owning an aircraft are many. These relate to under utilisation of air-craft, and its associated operation and maintenance, problems related to maintenance such as holding inventory of spares etc.

The other alternative of hiring an aircraft on long-term lease seem to have less constraints and many advantages including availability of aircraft throughout the flying season, as the air-company will have the responsibility of providing alternate aircraft if the aircraft assigned initially for the work of the Department is not available during any particular time.

The Department, therefore, welcomes their suggestion and proposes to enter immediately into an agreement on long lease of aircraft for airborne survey and other requirements of the Department.

3. The full break up of Revised Estimated Cost of Kakrapar (1&2), Kaiga (1&2) and Rajasthan (3&4) Units.

Break-up of cost overrun

The original sanctioned costs and revised estimated costs along with the break-up of cost over runs are given in Table-3. The reasons for cost overruns are :

(i) Change in scope of work mainly due to evolving safety requirements and continued technology evolution to conform to prevalent safety standards (ii) Increased escalation due to higher escalation as compared to the rates assumed in the original cost estimates and also due to time overrun (iii) other reasons including increase in taxes and duties, foreign exchange rate variation, effect of devaluation etc. and (iv) interest during construction (The original cost estimates

were sanctioned by Government prior to the formation of the Nuclear Power Corporation and as such the cost estimates as sanctioned did not include interest during construction, though interest during construction is taken into in the calculation of tariff for generation. Consequent to the formation of the Nuclear Power Corporation, interest during construction is also included in the capital cost estimate. The estimated interest during construction is based on financing the project with a debt equity ratio of 2:1 and prevalent interest rates including 18% p.a. in recent years.)

Enclosed Table 3 gives the break up of increase of cost estimate on the basis as referred above.

TABLE 3

Break up of the Project Cost Over-runs

	Original estimated cost	Change in Scope of work	Cost increase due to escalation (Rs. in crores)	IDC	Other reasons	Revised estimated cost
Kakrapar Project (2 Units)	382.52	183.52	359.62	310	99.34	1335
Rajasthan Project (Units 3&4)	711.56	137.37	386.75	657	214.32	2107
Kaiga Project (2 Units)	730.72	144.91	430.70	685	283.67	2275

Typical Break up of the Revised estimated cost Kaiga 1&2

In respect of break up of the total revised estimated cost, the typical break up is furnished in Table-4 in respect of Kaiga 1&2 project. The classification is mainly based on the broad heads like site and improvements, buildings and structures, reactor boiler and auxiliaries, turbine generator and auxiliaries, electrical power systems, instrumentation and control, common processes and services, construction plant facilities required for the construction of the project and housing & estate management. In addition, the other indirect costs are typically Engineering, Field Management and Superintendence, Customs duty etc. The break up is given in percentage of the total base cost including escalation for completion and excluding interest during construction. The interest during construction forms about 43% of the escalated based cost for completion.

TABLE 4

Break up of Revised Estimated Cost for Kaiga (1&2)

(Rs. in Lakhs)

Sr. No.	Major Head of Expenditure	Revised Cost	Percentage of Base Cost
1.	Site & Improvements	2677.90	1.69
2.	Buildings & Structures	24647.45	15.50
3.	Reactor Boiler & Auxiliaries	30445.47	19.15
4.	Turbine Generator & Auxiliaries	18453.97	11.61
5.	Electrical Power System	15283.01	9.61
6.	Instrumentation & Control	13807.64	8.68
7.	Common Processes & Services	10372.13	6.52
8.	Construction Plant Facility	7638.40	4.80
9.	Housing & Estate Management	8125.79	5.11
10.	Indirect Cost [incl. engineering, field management & suptce, commissioning, heavy water & fuel lease, working capital, customs duty etc., net of revenue from infirm power]	27548.24	17.33
	Total	159000.00	100.0%
	Interest during Construction	68500.00	
	G. Total	227500.00	

4. Comparative Costs of Nuclear Power Reactors in Developed Countries

The comparison of capital costs is normally made with respect to base construction cost on a constant money value at a particular time. The international capital costs in developed countries differ from country to country based on designs, type & size of the unit, regulatory & siting requirements, size of the programme, industrial infrastructure, foreign exchange component, foreign exchange rate for the currency of the individual country. Interest during construction is a variable factor and depends on interest rates and financing pattern, construction time, and differs from country to country. As per available literature the base construction costs excluding interest during construction in US dollar of 1-7-1991 are given in Table-1 for a few countries *i.e.* Canada, Finland, France, Germany, Japan, Korea Republic, U.K. and USA. This ranges from US $ 1231/KWe. These costs are for unit sizes in the range of about 600 to 1400 MWe. The base cost of Indian nuclear power plants of 220 MWe/500 MWe unit sizes at 1993 constant rupee value is in the range of about Rs. 3.4 to 3.85 Crores per MWe. Corresponding cost based on 1991 constant rupee value would be about Rs. 3 Crores/MWe.

TABLE 1

Comparative Capital Cost for Nuclear Power Projects
(International Data)

Country	Plant Type	Capacity MWe	Total Capacity MWe	Base Cost US $/KWe #
Canada	PHWR	4 x 881	3524	1783
Finland	BWR	1 x 1000	1000	1625
France	PWR	4 x 1400	5600	1231
Germany	PWR	1 x 1258	1258	2400
Japan	LWR	4 x 1350	5400	2154
Korea Republic	PHWR	2 x 658	1316	1544
U.K.	PWR	1 x 1245	1245	2512
U.S.A.	ELWR	1 x 1200	1200	1484

- US $ of 1-7-1991
Source : OECD study "Projected cost of generating electricity", Update-1992.
Note : Indian base cost corresponding to the above based on 220 MWe is US $ 1312/KWe.

4.1 Comparative Analysis of Construction Period for completion of Nuclear Power Reactors in Developed Countries

The International Atomic Energy Agency (IAEA) publishes information of average construction time span from time to time in their publication "Nuclear Power Reactors in the World-Reference data series No. 2". In the April 1993 edition of the above publication, average construction time span data in respect of various countries have been furnished. The construction time by IAEA is measured from the first pouring of concrete to the connection of the unit to the grid. The average construction time span for nuclear power reactors varies from country to country depending on a host of factors such as type of reactor, unit size, size of the programme and the time frame during which the units were constructed. The data in respect of the units connected to the grid in time frames of 1973-78, 1979-84, 1985-90, 1991 and 1992 are furnished in Table No. 2 in respect of a few developed countries *i.e.* Canada, Finland, France, Germany, Japan, Korea Republic, U.K. U.S.A. During the above time frames, the world average construction times are as follows:

Period	No. of Reactors Connected to Grid	Average Construction period per unit
1973-78	118	68 months
1979-84	127	89 months
1985-90	117	101 months
1991	4	74 months
1992	6	95 months

In respect of India in the past when the Madras Atomic Power Station (MAPS) and the Narora Atomic Power Station (NAPS) were constructed totally based on the indigenous efforts, the construction period from the first pour of concrete to the grid connection was in the average range of 150 to 160 months. This was essentially due to the technology development phase which India had to go through. However, with the accumulated experience, the Kakrapar Unit-1 was constructed in a period of about 96 months from first pour of concrete to the unit's connection to the grid. Efforts are in progress in achieving further improvement in construction times for future units to be built.

TABLE 2

Average Construction Time Span
(International Data)

Country	Year of grid connection									
	1973to 1978		1979 to 1984		1985 to 1990		1991		1992	
	No.	Months	No.	Months	No.	Months	No.	Months	No.	Months
Canada	5	67	7	92	5	98	-	-	1	99
Finland	2	62	2	77	-	-	-	-	-	-
France	5	64	29	65	19	84	1	92	1	90
Germany	11	60	8	96	7	112	-	-	-	-
Japan	16	55	10	49	10	50	1	44	2	57
Korea Republic	1	67	2	70	6	73	-	-	-	-
U.K.	5	105	5	179	5	126	-	-	-	-
U.S.A.	44	78	19	126	29	147	-	-	-	-

No. : Gives number of Reactors connected to grid during the period.
Months : Construction time span (Average per unit).

5. Rate of Growth of Nuclear Power

A question was raised whether there is a slowing down of Nuclear Power Programme all over the world because of safety reasons. The approach to Nuclear Power Stations has been different for different nations depending upon the number of Power Stations already in opeation and also their *abundance in possible* fuel and other natural resources. In advanced countries such as USA, Sweden etc., there has alrady been a higher percentage of growth of power generation and hence recent growth of Nuclear Power has been rather slow. According to the data provided by IAEA, at the end of 1992 there were 424 Nuclear Power Stations connected to electrictity supply networks. The total installed nuclear power generating capcity 3.8 lakhs MWe with the annual incremental capacity of about 1.2%. In addition, there are also about 72 Power Reactors under construction with the total generating capacity of 59,720 MWe. The development of Nuclear Power upto the turn of the century is fairly well known since the Units to be commissioned by 2000 are already under

construction. Taking into consideration the aspects related to construction of and licensing procedures the world wide increase of nuclear capacity may range from 10 to 15%. Most of the additional nuclear capacity is likely to be brought into operation in Asia and in Eastern Central Europe. In Western Europe, North America, the development will be very limited for nuclear power as well as for other based load electricity generating plants since the demand for electricity will not grow significantly. The number of reactors that are shut down are very few. Most of them have been Research Reactors and Prototype and they were closed mainly because of aging or obsolete technology, or due to political reasons. These numbers, comprared to the reactors in operation, as well as those under construction, are not significant.

6. Financial Problems of NPCIL and Tariff Fixation

(a) Financial Problems

The NPCIL was formed in September 1987 to implement the programme of installing 10,000 MWe of nuclear power capacity by the year 2000. At the time of formation of the Corporation, the agreed pattern of funding of new projects was indicated *vide* para 4 and 5 of DAE OM No. 8/3(!)/86—PP-I dated September, 4, 1987. It stated as follows: "The funding of future projects including works in progress and interest during construction would be in the form of 50% as Government equity and 50% as loan. The equity portion of budgetary support amounting to 50% of project cost would be released first."

However, due to financial constraints, the Government could not adhere to this commitment and there had been a drastic reduction in the budgetary support year after year. As a result, NPCIL was forced to borrow funds from the open market at higher interest rates. The following table shows the funds raised by NPCIL through market borrowing till 31.3.1994.

(Rs. in crores)

Year	Equity from Govt.	Market Borrowings
1988-89	211	200
1989-90	230	360
1990-91	185	400
1991-92	131	712
1992-93	143	86
1993-94	163	658

The interest burden on the borrowings made so far works out to about Rs. 370 crores for the year 1994-95, in addition to the interest payable on the borrowings that would be made in 1994-95. Apart form the interest payments, repayment of loan raised in the year 1987-88 would also start from the year 1994-95 onwards. The cash flow problem is further aggravated by the recalcitrant attitude of the State Electricity Boards who are irregular in the payment of energy bills. By the

end of March 1994, an amount of Rs. 478 crores has remained as arrears to be collected from State Electricity Boards. Large borrowings at higher interest rates, low budgetary support coupled with longer gestation periods for completion of projects would lead the Corporation into a debt trap unless Government steps in with higher equity support. Due to the dwindling budgetary support from the Government for ongoing projects of NPCIL, the Corporation has been forced to adopt a debt equity ratio of 2:1 for its ongoing projects as against 1:1 envisaged earlier. This higher debt equity ratio would result in increase in the unit energy price of electricity from the stations.

(b) Problems pertaining to revision of tariff for power supplied by Atomic Power Stations of the Nuclear Power Corporation of India Ltd.

As per Section 22 (1) (b) of the Atomic Energy Act, 1962, the Government of India shall have the authority in consultation with the Central Electricity Authority to fix tariff for and regulate the supply of electricity from Atomic Power Stations in consultation with the Central Electricity Authority.

As per the Section, proposals for the fixation or revision of tariff for power supplied from any Atomic Power Station is first formulated by the Nuclear Power Corporation of India Ltd., and referred to the Central Electricity Authority. Although, the provisions of the Atomic Energy Act specifically refers to consultation of the Central Electricity Authority, in practice, this has been interpreted as "prior approval".

As per present procedure, the Central Electricity Authority vets the proposals and discusses it with the beneficiary State Electricity Boards. The NPCIL has first to satisfy the Central Electricity Authority as regards the various elements of the tariff, which in itself is a long procedure as the Central Electricity Authority insists the detailed examination of the book of accounts of NPCIL.

After the CEA is fully satisfied, the proposal is then circulated to the various Electricity Boards. At this stage, each of the Electricity Boards has an opportunity to question the calculations. It may be pointed out here that in effect, a tariff revision entails obtaining prior approval from the various beneficiary Electricity Boards, inspite of the fact that there is obviously a conflict of interest between NPCIL and the Electricity Boards. The Central Electricity Authority plays the role of a mediator in bringing together the various Electricity Boards and the NPCIL. This is obviously, a long drawn out affair. The Electricity Boards would not only oppose the proposals but would also try to peg down the proposed increase to the very minimum.

After obtaining the clearance of the CEA, the proposal is forwarded to the Department of Atomic Energy which notifies the tariff after which the NPCIL is permitted to bill the SEBs on the basis of the revision. Invariably Electricity Boards do not agree on retrospective revisions on the ground that it would be difficult for them to pass on the additional cost on electricity already supplied to their consumers. In the process, NPCIL is often forced to agree to revise tariff prospectively and the delay in processing tariff fixation causes substantial losses to NPCIL.

APPENDIX VI

COMPOSITION OF THE STANDING COMMITTEE ON ENERGY 1993-94

CHAIRMAN

Shri Jaswant Singh

MEMBERS

Lok Sabha

2. Shri Bhawani Lal Verma
3. Shri Murli Deora
4. Shri Motilal Singh
5. Shri Khelsai Singh
6. Shri Khelan Ram Jangde
7. Shri Parasram Bhardwaj
8. Shri S. Thota Subbha Rao
9. Shri Shiv Charan Mathur
10. Shri K.P. Reddaiah Yadav
11. Dr. Krupasindhu Bhoi
12. Shri Dalbir Singh
13. Shri Vilas Muttemwar
14. Shri P.C. Chacko
15. Shri Virender Singh
16. Shri Laxminarain Tripathi
17. Prof. Rita Verma
18. Shri Ram Tahal Choudhary
19. Shri Shanker Sinh Vaghela
20. Shri Keshri Lal
21. Shri Rajesh Kumar
22. Shri Arjun Singh Yadav
23. Shri Ajit Singh
24. Shri Haradhan Roy
25. Shri Anil Basu
26. Shri Vijay Kumar Yadav
27. Dr. Venkateswara D. Rao
28. Shri Chitta Basu
29. Shri Mohan Singh (Ferozpur)
30. Shrimati Dil Kumari Bhandari

Rajya Sabha

31. Shri Parmeshwar Kumar Agarwalla
*32. Shri Sunil Basu Ray
33. Shri M.M. Hashim
***34. Shri Manmohan Mathur
35. Shrimati Ila Panda
36. Shri J.S. Raju
***37. Shri Dayanand Sahay
38. Shri Rajni Ranjan Sahu
39. Shri Viren J. Shah
40. Shri Matang Singh
***41. Shrimati Kamla Sinha
**42. Shri Yashwant Sinha
43. Dr. Naunihal Singh

---

* Ceased to be a Member of the Committee consequent on his retirement from Rajya Sabha *w.e.f.* 9.7.1993.

** Ceased to be a Member of the Committee consequent on his resignation from Rajya Sabha *w.e.f.* 14.11.1993.

*** Ceased to be a Member of the Committee consequent on his/her retirement from Rajya Sabha *w.e.f.* 2.4.1994.

APPENDIX VII

MINUTES OF TENTH SITTING OF STANDING COMMITTEE ON ENERGY HELD ON TUESDAY, THE 5TH APRIL, 1994

The Committee sat from 11.00 hrs. to 13.00 hrs.

PRESENT

Shri Jaswant Singh — *Chairman*

MEMBERS

2. Shri Bhawani Lal Verma
3. Shri Khelsai Singh
4. Shri Khelan Ram Jangde
5. Shri Shiv Charan Mathur
6. Shri K.P. Reddaiah Yadav
7. Shri P.C. Chacko
8. Shri Virender Singh
9. Shri Laxminarain Tripathi
10. Prof. Rita Verma
11. Shri Ram Tahal Choudhary
12. Shri Shanker Sinh Vaghela
13. Shri Keshari Lal
14. Shri Haradhan Roy
15. Shri Anil Basu
16. Shri M.M. Hashim
17. Smt. Ila Panda
18. Shri J.S. Raju
19. Shri Viren J. Shah
20. Dr. Naunihal Singh

SECRETARIAT

1. Shri G.R. Juneja — *Deputy Secretary*
2. Shri A.L. Martin — *Assistant Director*

2. The Committee took up for consideration and adopted the draft report on Demands for Grants (1994-95) of Department of Atomic Energy. The Committee

also authorised the Chairman to finalise the report on receipt of replies from the Department of Atomic Energy and present the same to Parliament.

3. The Committee then held a detailed discussion with the representatives of the Department of Atomic Energy on the draft report on Demands for Grants (1994-95) of the Department. A list of representatives of the Department of Atomic Energy who were present during the discussion is given in Annexure. A copy of the verbatim proceedings of the discussion is kept on record.

The Committee then adjourned.

ANNEXURE TO THE MINUTES OF THE SITTING OF THE COMMITTEE HELD ON 5-4-1994

LIST OF REPRESENTATIVES OF THE DEPARTMENT OF ATOMIC ENERGY

S.No.	*Name*	*Designation*
1.	Dr. R. Chidambaram	Chairman, AEC and Secretary, DAE
2.	Shri A.N. Prasad	Director, BARC
3.	Shri B.R. Prabhakara	Additional Secretary
4.	Dr. P. Rooriguez	Director, IGCAR, Madras
5.	Shri C.K. Koshy	Director, Finance, NPCIL
6.	Shri K.K. Dwivedy	Director, Atomic Mineral Division
7.	Shri G.R. Balasubramanian	Technical Advisor
8.	Shri S.K. Chatterjee	Managing Director, NPCIL
9.	Shri K.K. Sinha	Chief Executive, NFC
10.	Shri V. Ranganathan	Jt. Secretary
11.	Shri R.B. Budhiraja	Jt. Secretary
12.	Shri Anil Razdan	Jt. Secretary
13.	Shri K.B.S. Chopra	Chief Controller of Accounts
14.	Shri P.C. Thomas	Budget & Planning Officer.