

DEPARTMENT OF ATOMIC ENERGY**DEMAND NO. 4****Atomic Energy**

A. The Budget allocations, net of recoveries and receipts, are given below:

Major Head	Actual 2014-2015			Budget 2015-2016			Revised 2015-2016			<i>(In crores of Rupees)</i> Budget 2016-2017		
	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
Revenue	1337.27	3999.10	5336.37	1791.00	4069.31	5860.31	1704.00	4533.73	6237.73	1349.50	4444.53	5794.03
Capital	2685.97	986.62	3672.59	4109.00	942.69	5051.69	4196.00	949.81	5145.81	4850.50	1037.95	5888.45
Total	4023.24	4985.72	9008.96	5900.00	5012.00	10912.00	5900.00	5483.54	11383.54	6200.00	5482.48	11682.48
BE 2016-2017												
1. Secretariat-Economic Services	3451	...	...	...	...	...	...	...	...	...	47.50	47.50
2. Atomic Energy Regulatory Board	3401	...	...	...	...	...	...	...	...	2.50	56.00	58.50
	5401	...	...	...	...	...	...	...	...	47.50	0.01	47.51
	<i>Total</i>	...	...	...	...	...	...	...	...	50.00	56.01	106.01
3. Atomic Research Centre												
3.01 Research Centre, Mumbai (BARC)	2801	...	...	...	...	...	...	...	...	...	10.00	10.00
	2852	...	...	...	...	...	...	...	...	...	487.20	487.20
	3401	...	...	...	...	...	...	...	...	...	1432.65	1432.65
	4801	...	...	...	...	...	...	...	...	3.40	...	3.40
	4861	...	...	...	...	...	...	...	...	200.00	32.50	232.50
	5401	...	...	...	...	...	...	...	...	647.50	37.50	685.00
	<i>Total</i>	...	...	...	...	...	...	...	...	850.90	1999.85	2850.75
3.02 Research Centre, Kalpakkam (IGCAR)	3401	...	...	...	...	...	...	...	...	...	347.50	347.50
	4801	...	...	...	...	...	...	...	...	0.10	...	0.10
	4861	...	...	...	...	...	...	...	...	100.00	...	100.00
	5401	...	...	...	...	...	...	...	...	340.00	1.30	341.30
	<i>Total</i>	...	...	...	...	...	...	...	...	440.10	348.80	788.90
3.03 Research Centre, Indore (RRCAT)	3401	...	...	...	...	...	...	...	...	...	228.10	228.10
	5401	...	...	...	...	...	...	...	...	218.00	1.01	219.01
	<i>Total</i>	...	...	...	...	...	...	...	...	218.00	229.11	447.11
3.04 Research Centre, Kolkatta (VECC)	3401	...	...	...	...	...	...	...	...	...	94.92	94.92
	5401	...	...	...	...	...	...	...	...	95.00	5.00	100.00

(In crores of Rupees)

	Major Head	Actual 2014-2015			Budget 2015-2016			Revised 2015-2016			Budget 2016-2017		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
	<i>Total</i>	...	...	...	...	...	...	...	...	...	95.00	99.92	194.92
3.05	Research Centre, Hyderabad (AMD)	3401	...	...	...	...	...	...	...	...	...	235.39	235.39
		4861	...	...	...	...	...	...	...	...	36.00	...	36.00
		5401	...	...	...	...	...	...	...	...	119.00	1.80	120.80
	<i>Total</i>	...	...	...	...	...	...	...	...	...	155.00	237.19	392.19
	<i>Total- Atomic Research Centre</i>	...	...	...	...	...	...	...	...	...	1759.00	2914.87	4673.87
4.	Fuel Cycle Facilities (NRB)	2852	...	...	...	...	...	...	...	...	...	464.00	464.00
		4861	...	...	...	...	...	...	...	...	700.00	50.00	750.00
	<i>Total</i>	...	...	...	...	...	...	...	...	...	700.00	514.00	1214.00
5.	Service Units	3401	...	...	...	...	...	...	...	...	...	264.89	264.89
6.	Aided Institutes	3401	...	...	...	...	...	...	...	...	1272.00	1022.90	2294.90
7.	Housing Projects	5401	...	...	...	...	...	...	...	...	221.00	...	221.00
8.	<i>Nuclear Fuel Cycle</i>												
	8.01 Nuclear Fuel Complex												
	8.01.01 Nuclear Fuel Complex	2852	...	...	...	...	...	...	...	...	...	1874.55	1874.55
	8.01.02 Less Receipts	0852	...	...	...	...	...	...	...	...	...	-2680.10	-2680.10
	<i>Net</i>	...	...	...	...	...	...	...	...	...	...	-805.55	-805.55
	8.02 Nuclear Cycle Project NFC	4861	...	...	...	...	...	...	...	...	150.00	...	150.00
	8.03 Fuel Inventory												
	8.03.01 Fuel Inventory	2801	...	...	...	...	...	...	...	...	...	3117.62	3117.62
	8.03.02 Less Receipts	0801	...	...	...	...	...	...	...	...	...	-2800.00	-2800.00
	<i>Net</i>	...	...	...	...	...	...	...	...	...	...	317.62	317.62
	<i>Total- Nuclear Fuel Cycle</i>	...	...	...	...	...	...	...	...	...	150.00	-487.93	-337.93
9.	<i>Heavy Water</i>												
	9.01 Heavy Water Production Facility	2852	...	...	...	...	...	...	...	...	...	52.05	52.05
	9.02 Heavy Water Production Facility												
	9.02.01 Heavy Water Production Facility	4861	...	...	...	...	...	...	...	...	60.00	1009.53	1069.53
	9.02.02 Less-Loss of Heavy Water	4861	...	...	...	...	...	...	...	...	...	-100.70	-100.70
	<i>Net</i>	...	...	...	...	...	...	...	...	...	60.00	908.83	968.83
	9.03 Feedstock												
	9.03.01 Feedstock	4861	...	...	...	...	...	...	...	...	...	1105.00	1105.00
	9.03.02 Less - Heavy Water Production	4861	...	...	...	...	...	...	...	...	...	-1105.00	-1105.00
	<i>Net</i>	...	...	...	...	...	...	...	...	...	...	...	...
	9.04 Heavy Water Pool Management												

(In crores of Rupees)

	Major Head	Actual 2014-2015			Budget 2015-2016			Revised 2015-2016			Budget 2016-2017		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
9.04.01	Heavy Water Pool Management	2801	...	...	...	...	...	...	...	...	...	1200.00	1200.00
9.04.02	Less Receipts	0049	...	...	...	...	...	...	...	...	...	-1200.00	-1200.00
	<i>Net</i>		...	...	...	...	...	...	...	...	...	...	...
	<i>Total- Heavy Water</i>		...	...	...	...	...	...	...	...	60.00	960.88	1020.88
10.	Radiation & Isotopes Facility (BRIT)	2852	...	...	...	...	...	...	...	...	...	70.40	70.40
		4861	...	...	...	...	...	...	...	...	110.00	...	110.00
	<i>Total</i>		...	...	...	...	...	...	...	...	110.00	70.40	180.40
11.	International Atomic Energy Agency	3401	...	...	...	...	...	...	...	...	...	26.00	26.00
12.	DAE R&D Projects	3401	...	...	...	...	...	...	...	...	...	8.70	8.70
		5401	...	...	...	...	...	...	...	...	160.00	...	160.00
	<i>Total</i>		...	...	...	...	...	...	...	...	160.00	8.70	168.70
13.	DAE I&M Projects	2801	...	...	...	...	...	...	...	...	50.00	83.86	133.86
		2852	...	...	...	...	...	...	...	...	25.00	0.40	25.40
		4861	...	...	...	...	...	...	...	...	93.00	...	93.00
	<i>Total</i>		...	...	...	...	...	...	...	...	168.00	84.26	252.26
14.	DAE Power Project	4801	...	...	...	...	...	...	...	...	30.00	...	30.00
15.	Investment in Public Enterprises	4801	...	...	...	...	...	...	...	...	220.00	...	220.00
		4861	...	...	...	...	...	...	...	...	200.00	...	200.00
		6801	...	...	...	...	...	...	...	...	200.00	...	200.00
	<i>Total</i>		...	...	...	...	...	...	...	...	620.00	...	620.00
16.	Fuel Cycle Projects FRFCF	4861	...	...	...	...	...	...	...	...	900.00	...	900.00
RE 2015-2016													
17.	Secretariat-Economic Services	3451	...	39.19	39.19	...	43.00	43.00	...	43.00	43.00	...	...
18.	Atomic Energy Regulatory Board	3401	1.99	44.98	46.97	2.00	46.99	48.99	2.50	46.70	49.20	...	...
		5401	4.17	...	4.17	30.00	0.01	30.01	9.50	0.30	9.80	...	...
	<i>Total</i>		6.16	44.98	51.14	32.00	47.00	79.00	12.00	47.00	59.00	...	...
Atomic Energy Research and Industries													
19.	Bhabha Atomic Research Centre, Mumbai (BARC)	2852	...	411.51	411.51	...	437.35	437.35	...	447.05	447.05	...	...
		3401	...	1162.83	1162.83	...	1254.63	1254.63	...	1280.88	1280.88	...	...
		4861	139.02	28.35	167.37	250.00	26.92	276.92	205.25	30.50	235.75	...	...
		5401	949.67	15.83	965.50	1174.40	16.00	1190.40	1008.26	16.50	1024.76	...	...
	<i>Total</i>		1088.69	1618.52	2707.21	1424.40	1734.90	3159.30	1213.51	1774.93	2988.44	...	...
20.	Indira Gandhi Centre for Atomic Research, Kalpakkam (IGCAR)	3401	...	299.81	299.81	...	318.00	318.00	...	318.00	318.00	...	...
		4861	227.95	...	227.95	225.00	...	225.00	421.53	...	421.53	...	...

(In crores of Rupees)

Major Head	Actual 2014-2015			Budget 2015-2016			Revised 2015-2016			Budget 2016-2017			
	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	
	5401	157.04	1.00	158.04	275.00	1.00	276.00	255.00	1.00	256.00	...	...	...
	<i>Total</i>	<i>384.99</i>	<i>300.81</i>	<i>685.80</i>	<i>500.00</i>	<i>319.00</i>	<i>819.00</i>	<i>676.53</i>	<i>319.00</i>	<i>995.53</i>	...	...	...
21. Nuclear Recycle Board	2852	...	246.33	246.33	...	352.00	352.00	...	334.66	334.66	...	...	...
	4861	145.53	49.88	195.41	220.00	50.00	270.00	237.00	50.00	287.00	...	...	...
	<i>Total</i>	<i>145.53</i>	<i>296.21</i>	<i>441.74</i>	<i>220.00</i>	<i>402.00</i>	<i>622.00</i>	<i>237.00</i>	<i>384.66</i>	<i>621.66</i>	...	...	...
22. Safety Authority Strategic Activities	3401	...	...	...	...	3.00	3.00	...	0.15	0.15	...	...	...
23. Raja Ramanna Centre for Advanced Technology, Indore (RRCAT)	3401	...	174.79	174.79	...	180.00	180.00	...	196.00	196.00	...	...	...
	5401	167.61	0.50	168.11	170.00	1.00	171.00	169.70	1.00	170.70	...	...	...
	<i>Total</i>	<i>167.61</i>	<i>175.29</i>	<i>342.90</i>	<i>170.00</i>	<i>181.00</i>	<i>351.00</i>	<i>169.70</i>	<i>197.00</i>	<i>366.70</i>	...	...	...
24. Variable Energy Cyclotron Centre, Kolkata (VECC)	3401	...	78.77	78.77	...	83.00	83.00	...	88.00	88.00	...	...	...
	5401	68.61	4.99	73.60	120.00	5.00	125.00	90.00	5.00	95.00	...	...	...
	<i>Total</i>	<i>68.61</i>	<i>83.76</i>	<i>152.37</i>	<i>120.00</i>	<i>88.00</i>	<i>208.00</i>	<i>90.00</i>	<i>93.00</i>	<i>183.00</i>	...	...	...
25. Directorate of Purchase and Stores, Mumbai	3401	...	48.87	48.87	...	48.00	48.00	...	47.60	47.60	...	...	...
26. General Services Organisation, Kalpakkam	3401	...	78.66	78.66	...	78.00	78.00	...	83.50	83.50	...	...	...
27. <i>Autonomous Bodies</i>													
27.01 Tata Institute of Fundamental Research, Mumbai	3401	205.00	306.00	511.00	350.00	316.00	666.00	300.00	294.77	594.77	...	...	...
27.02 Tata Memorial Centre, Mumbai	3401	174.00	217.00	391.00	315.00	225.00	540.00	276.50	219.00	495.50	...	...	...
27.03 Saha Institute of Nuclear Physics, Kolkata	3401	30.00	75.00	105.00	35.00	84.00	119.00	35.00	81.80	116.80	...	...	...
27.04 Institute of Physics, Bhubaneswar	3401	9.00	22.00	31.00	10.00	26.00	36.00	10.00	26.66	36.66	...	...	...
27.05 National Institute of Science, Education and Research (NISER)	3401	18.83	33.00	51.83	50.00	41.00	91.00	30.00	41.00	71.00	...	...	...
27.06 Harish-Chandra Research Institute, Allahabad	3401	8.40	23.00	31.40	15.00	24.00	39.00	9.00	25.14	34.14	...	...	...
27.07 Institute of Mathematical Sciences, Chennai	3401	12.63	33.00	45.63	15.00	34.00	49.00	15.00	34.00	49.00	...	...	...
27.08 Institute for Plasma Research, Gandhinagar	3401	540.00	77.00	617.00	550.00	80.00	630.00	713.00	87.00	800.00	...	...	...
27.09 Atomic Energy Education Society, Mumbai	3401	6.00	60.00	66.00	10.00	62.00	72.00	10.00	62.35	72.35	...	...	...
27.10 Homi Bhabha National Institute (HBNI)	3401	...	...	...	...	4.00	4.00	...	1.30	1.30	...	...	...
<i>Total- Autonomous Bodies</i>		<i>1003.86</i>	<i>846.00</i>	<i>1849.86</i>	<i>1350.00</i>	<i>896.00</i>	<i>2246.00</i>	<i>1398.50</i>	<i>873.02</i>	<i>2271.52</i>	...	...	...
28. Assistance to Universities, etc. (Grants to Other Institutions)	3401	130.42	...	130.42	200.00	...	200.00	153.00	...	153.00	...	...	...
29. Directorate of Construction, Services and Estate Management (DCS&EM), Mumbai	3401	...	97.56	97.56	...	102.48	102.48	...	107.25	107.25	...	...	...

(In crores of Rupees)

	Major Head	Actual 2014-2015			Budget 2015-2016			Revised 2015-2016			Budget 2016-2017		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
30. Housing Projects													
30.01 Projects under DCS&EM	5401	94.79	...	94.79	130.00	...	130.00	107.00	...	107.00	...	...	...
30.02 Other Housing Projects	5401	28.56	...	28.56	57.60	...	57.60	86.40	...	86.40	...	...	...
Total- Housing Projects		123.35	...	123.35	187.60	...	187.60	193.40	...	193.40	...	...	...
31. Atomic Minerals Directorate for Exploration and Research, Hyderabad (AMDER)	3401	...	192.38	192.38	...	201.00	201.00	...	203.40	203.40	...	...	...
	4861	30.67	...	30.67	35.00	...	35.00	36.50	...	36.50	...	...	...
	5401	57.61	1.20	58.81	60.00	1.00	61.00	77.00	1.60	78.60	...	...	...
Total		88.28	193.58	281.86	95.00	202.00	297.00	113.50	205.00	318.50	...	...	...
Nuclear Fuel													
32. Nuclear Fuel Complex (NFC)													
32.01 Fuel Fabrication Facilities													
32.01.01 Fuel Fabrication Facilities - Gross	2852	...	1488.12	1488.12	...	1436.61	1436.61	...	1461.94	1461.94	...	...	...
32.01.02 Less Receipts	0852	...	-1816.83	-1816.83	...	-2593.03	-2593.03	...	-2130.58	-2130.58	...	...	...
Net		...	-328.71	-328.71	...	-1156.42	-1156.42	...	-668.64	-668.64	...	...	...
32.02 Common Facilities	2852	...	131.73	131.73	...	157.83	157.83	...	150.00	150.00	...	...	...
32.03 Stainless Steel Tubes Plant	2852	...	28.30	28.30	...	88.05	88.05	...	35.05	35.05	...	...	...
32.04 Capital Outlay on NFC	4861	56.98	...	56.98	70.00	...	70.00	133.00	...	133.00	...	...	...
Total- Nuclear Fuel Complex (NFC)		56.98	-168.68	-111.70	70.00	-910.54	-840.54	133.00	-483.59	-350.59	...	...	...
Heavy Water													
33. Heavy Water Board													
33.01 Maintenance of Housing Colonies for Heavy Water Plants	2852	...	8.99	8.99	...	10.00	10.00	...	10.00	10.00	...	...	...
33.02 Central Office (Other Heavy Water Plants)	4861	59.02	25.42	84.44	90.00	27.73	117.73	80.00	27.73	107.73	...	...	...
Total- Heavy Water Board		59.02	34.41	93.43	90.00	37.73	127.73	80.00	37.73	117.73	...	...	...
34. Heavy Water Production													
34.01 Heavy Water Plant, Baroda	4861	...	32.16	32.16	...	33.49	33.49	...	33.02	33.02	...	...	...
34.02 Heavy Water Plant, Kota	4861	...	171.20	171.20	...	171.95	171.95	...	164.83	164.83	...	...	...
34.03 Heavy Water Plant, Tuticorin	4861	...	21.35	21.35	...	22.33	22.33	...	22.88	22.88	...	...	...
34.04 Heavy Water Plant, Talcher	4861	...	9.27	9.27	...	10.41	10.41	...	11.01	11.01	...	...	...
34.05 Heavy Water Plant, Thal	4861	...	183.84	183.84	...	176.97	176.97	...	186.06	186.06	...	...	...
34.06 Heavy Water Plant, Hazira	4861	...	172.25	172.25	...	156.37	156.37	...	167.09	167.09	...	...	...
34.07 Heavy Water Plant, Manuguru	4861	...	340.81	340.81	...	342.75	342.75	...	336.99	336.99	...	...	...
34.08 Less-Loss of Heavy Water	4861	...	-71.56	-71.56	...	-100.24	-100.24	...	-105.70	-105.70	...	...	...

(In crores of Rupees)

Major Head	Actual 2014-2015			Budget 2015-2016			Revised 2015-2016			Budget 2016-2017		
	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
<i>Net</i>	...	859.32	859.32	...	814.03	814.03	...	816.18	816.18	...	...	...
Total-Heavy Water	59.02	893.73	952.75	90.00	851.76	941.76	80.00	853.91	933.91	...	...	...
35. <i>Feedstock</i>												
35.01 Gross	4861	1058.82	1058.82	...	1155.00	1155.00	...	1040.00	1040.00	...	...	...
35.02 Less - Heavy Water Production	4861	-1058.82	-1058.82	...	-1155.00	-1155.00	...	-1040.00	-1040.00	...	...	...
<i>Net</i>	...	...	...	...	...	...	...	...	...	...	...	...
36. Board for Radiation and Isotope Technology (BRIT)	2852	63.97	63.97	...	67.00	67.00	...	67.00	67.00	...	...	...
	4861	8.49	0.13	8.62	50.00	...	50.00	35.25	...	35.25	...	...
<i>Total</i>	<i>8.49</i>	<i>64.10</i>	<i>72.59</i>	<i>50.00</i>	<i>67.00</i>	<i>117.00</i>	<i>35.25</i>	<i>67.00</i>	<i>102.25</i>	...	...	...
37. <i>Other Programmes</i>												
37.01 Management Services Group	2852	0.26	0.26	...	0.40	0.40	...	0.40	0.40	...	...	...
37.02 O&M of Thorium Plant, Trombay	2852	...	...	...	...	...	...	...	...	...	...	...
37.03 International Atomic Energy Agency	3401	18.31	18.31	...	21.00	21.00	...	28.00	28.00	...	...	...
<i>Total- Other Programmes</i>	...	<i>18.57</i>	<i>18.57</i>	...	<i>21.40</i>	<i>21.40</i>	...	<i>28.40</i>	<i>28.40</i>	...	...	...
38. <i>DAE Projects</i>												
38.01 R&D Projects	3401	9.00	9.00	...	6.00	6.00	...	7.71	7.71	...	...	...
	5401	18.75	...	18.75	250.00	...	250.00	117.36	...	117.36	...	...
<i>Total</i>	<i>18.75</i>	<i>9.00</i>	<i>27.75</i>	<i>250.00</i>	<i>6.00</i>	<i>256.00</i>	<i>117.36</i>	<i>7.71</i>	<i>125.07</i>	...	...	...
38.02 I&M Projects	2852	30.00	36.06	66.06	30.00	20.00	50.00	30.00	23.00	53.00	...	...
	4861	1.00	...	1.00	11.00	...	11.00	5.00	...	5.00	...	...
<i>Total</i>	<i>31.00</i>	<i>36.06</i>	<i>67.06</i>	<i>41.00</i>	<i>20.00</i>	<i>61.00</i>	<i>35.00</i>	<i>23.00</i>	<i>58.00</i>	...	...	...
<i>Total- DAE Projects</i>	<i>49.75</i>	<i>45.06</i>	<i>94.81</i>	<i>291.00</i>	<i>26.00</i>	<i>317.00</i>	<i>152.36</i>	<i>30.71</i>	<i>183.07</i>	...	...	...
39. Investment in Public Enterprises - Uranium Corporation of India Limited	4861	79.00	...	79.00	200.00	...	200.00	32.00	...	32.00	...	...
Total-Atomic Energy Research and Industries	3454.58	4592.04	8046.62	4968.00	4110.00	9078.00	4677.75	4581.54	9259.29	...	...	...
40. Rajasthan Atomic Power Station	2801	46.96	46.96	...	20.00	20.00	...	20.00	20.00	...	...	...
41. <i>Fuel Inventory</i>												
41.01 Gross	2801	146.00	2381.30	2527.30	89.00	2814.65	2903.65	...	3023.89	3023.89	...	...
41.02 Less- Receipts	0801	...	-2123.74	-2123.74	...	-2027.65	-2027.65	...	-2236.89	-2236.89	...	...
<i>Net</i>	<i>146.00</i>	<i>257.56</i>	<i>403.56</i>	<i>89.00</i>	<i>787.00</i>	<i>876.00</i>	<i>...</i>	<i>787.00</i>	<i>787.00</i>	...	...	...
42. Bhabha Atomic Research Centre, Mumbai (Waste Management Facilities at Tarapur and Kalpakkam)	2801	4.99	4.99	...	5.00	5.00	...	5.00	5.00	...	...	...
	4801	...	...	...	1.00	...	1.00	1.00	...	1.00	...	...
<i>Total</i>	<i>...</i>	<i>4.99</i>	<i>4.99</i>	<i>1.00</i>	<i>5.00</i>	<i>6.00</i>	<i>1.00</i>	<i>5.00</i>	<i>6.00</i>	...	...	...
43. Indira Gandhi Centre for Atomic Research, Kalpakkam (Prototype Fast Breeder Test Reactor)												

(In crores of Rupees)

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		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	
43.01	Gross	4801	...	...	50.00	...	50.00	0.25	...	0.25	...	...	...
43.02	Less: Recoveries	4801	...	...	...	...	...	...	...	...	...	...	...
	<i>Net</i>		...	...	50.00	...	50.00	0.25	...	0.25	...	...	...
44.	Neighborhood Development Project (in Kudankulam)	2801	25.00	...	25.00	120.00	...	120.00	120.00	...	120.00	...	...
45.	<i>Investment in Public Enterprises</i>													
45.01	Nuclear Power Corporation of India Limited (NPCIL)-EAP	6801	19.00	...	19.00	22.00	...	22.00	...	...	...	...	...
45.02	Nuclear Power Corporation of India Limited (NPCIL)	4801	72.50	...	72.50	178.00	...	178.00	389.00	...	389.00	...	...
45.03	Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI)	4801	...	...	...	40.00	...	40.00	...	...	...	...	...
45.04	Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI)	6801	300.00	...	300.00	400.00	...	400.00	700.00	...	700.00	...	...
	<i>Total- Investment in Public Enterprises</i>		391.50	...	391.50	640.00	...	640.00	1089.00	...	1089.00	...	...
46.	<i>Heavy Water Pool Management</i>													
46.01	Gross	2801	...	1120.00	1120.00	...	1120.00	1120.00	...	1200.00	1200.00	...	...
46.02	Less Receipts	0049	...	-1120.00	-1120.00	...	-1120.00	-1120.00	...	-1200.00	-1200.00	...	...
	<i>Net</i>		...	...	...	...	...	...	...	...	...	...	...
Grand Total			4023.24	4985.72	9008.96	5900.00	5012.00	10912.00	5900.00	5483.54	11383.54	6200.00	5482.48	11682.48
	Head of Dev		Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
B. Investment in Public Enterprises														
15.01	Electronics Corporation of India Limited	12859	...	27.50	27.50	...	25.00	25.00	...	25.00	25.00	...	17.00	17.00
15.02	Uranium Corporation of India Limited	12861	79.00	13.50	92.50	200.00	220.78	420.78	32.00	242.78	274.78	200.00	133.50	333.50
15.03	Indian Rare Earths Limited	12861	...	26.65	26.65	...	65.14	65.14	...	34.21	34.21	...	53.98	53.98
15.04	Nuclear Power Corporation of India Limited (NPCIL)	12801	91.50	6092.35	6183.85	200.00	8895.00	9095.00	389.00	8757.00	9146.00	400.00	9222.00	9622.00
15.05	Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI)	12801	300.00	...	300.00	440.00	...	440.00	700.00	...	700.00	20.00	135.40	155.40
Total			470.50	6160.00	6630.50	840.00	9205.92	10045.92	1121.00	9058.99	10179.99	620.00	9561.88	10181.88
C. Plan Outlay														
1.	Telecommunication and Electronic Industries	12859	...	27.50	27.50	...	25.00	25.00	...	25.00	25.00	...	17.00	17.00
2.	Atomic Energy Industries	12861	777.66	40.15	817.81	1181.00	285.92	1466.92	1215.53	276.99	1492.52	2574.00	187.48	2761.48
3.	Atomic Energy Research	13401	2683.08	...	2683.08	3819.00	...	3819.00	3474.22	...	3474.22	3122.50	...	3122.50
4.	Power	12801	562.50	6092.35	6654.85	900.00	8895.00	9795.00	1210.25	8757.00	9967.25	503.50	9357.40	9860.90
Total			4023.24	6160.00	10183.24	5900.00	9205.92	15105.92	5900.00	9058.99	14958.99	6200.00	9561.88	15761.88

NOTE: The provisions relating to Nuclear Power Schemes have been merged with this Demand.

1. **Secretariat-Economic Services:** DAE Secretariat is the apex body administering the constituent units, PSUs and aided institutions spread all over the country carrying out the various activities of the Department. There are six R&D Units, including Global Centre for Nuclear Energy Partnership (GCNEP) Haryana, three industrial units, three service organizations and five PSUs apart from nine aided institutions in the Department of Atomic Energy. DAE also has a Branch Secretariat in New Delhi.

2. **Atomic Energy Regulatory Board:** Atomic Energy Regulatory Board (AERB) enforces radiological safety stipulations. It is assisted by Safety Review Committee for Operating Plants (SARCOP), Safety Review Committee (SRC) for applications for radiation and other committees in carrying out its mandate in prescribing radiological, nuclear and industrial safety regulations.

3.1. **Research Centre, Mumbai (BARC):** Bhabha Atomic Research Centre (BARC), a multidisciplinary organisation, pursues comprehensive Research and Development (R&D) programmes for harnessing nuclear energy and also its utility for the benefit of the society. These R&D efforts are concentrated in the fields of nuclear sciences, engineering & technology, basic sciences and allied fields and geared up for exploitation of atomic energy for power generation and application of radiation technology in the areas of agriculture, health care and industry. BARC gives R&D support to all other units of DAE and provide necessary support for national security. Nuclear Recycle Board (NRB) has been created as a separate accounting units to meet the operational requirements of the Fuel Reprocessing plants at Tarapur and Kalpakkam with its Head Quarters at Mumbai.

3.02. **Research Centre, Kalpakkam (IGCAR):** Indira Gandhi Centre for Atomic Research (IGCAR) is engaged in design and development of liquid sodium cooled fast breeder reactors in the country, as a part of the Nuclear Power Programme Stage 2, backed by fuel fabrication and reprocessing. Fast Breeder Test Reactor (FBTR), a prelude to the FBR programme, has been in operation with indigenously developed Uranium-Plutonium carbide fuel. The Centre has R&D activities, encompassing hydraulic studies and reactor engineering studies of reactor components, sodium instrumentation, material development and characterization. The centre has undertaken various strategically important projects to develop mature fast breeder fuel cycle technologies with international standards.

3.03. **Research Centre, Indore (RRCAT):** Raja Ramanna Centre for Advanced Technology (RRCAT), Indore, is engaged in development of technology and applications of particle accelerators and lasers, besides carrying out substantial activities in cryogenics and materials research.

3.04. **Research Centre, Kolkatta (VECC):** The Variable Energy Cyclotron Centre (VECC) at Kolkatta is operating the nation's largest and the first indigenously built Cyclotron and has been delivered first time in India energetic Neon 20 and Argon 40 beams. A series of experimental run were accomplished for a national facility Indian Gamma Ray Array (INGA) by a large nuclear physics community. Radio-active Ion Beam Project (RIB phase II) started experiment with 187 keV after installation of LINAC I.

3.05. **Research Centre, Hyderabad (AMD):** Atomic Minerals Directorate for Exploration & Research (AMD) carries out survey, prospecting and exploration of atomic minerals required for the

nuclear power programme of the country. The activities include assessment, analysis, evaluation, characterisation and categorisation of atomic minerals, design and fabrication of radiometric instruments and development of ore extraction flow sheets.

4. **Fuel Cycle Facilities (NRB):** NRB was a part of Bhabha Atomic Research Centre and has been created to carry out activities relating to Nuclear Fuel reprocessing.

5. **Service Units:** Includes : (i) Directorate of Purchase & Stores DPS, Mumbai: The objective of Directorate of Purchase & Stores is to ensure availability of quality material at right time, at right place and right price. (ii) Directorate of Construction, Services and Estate Management DCSEM, Mumbai: Directorate is also responsible for operation, maintenance and up-gradation of residential flats, shops, public buildings and estate management including allotment and the security for the DAE Estate in Mumbai. (iii) General Services Organisation GSO, Kalpakkam: General Services Organisation (GSO), Kalpakkam is one of the service organisations providing services such as residential accommodation, health services at Kalpakkam

6. **Aided Institutes:** Tata Institute of Fundamental Research (TIFR), Mumbai, Tata Memorial Centre (TMC), Mumbai, Saha Institute of Nuclear Physics (SINP), Kolkata, Institute of Physics (IOP), Bhubaneswar, National Institute of Science Education and Research (NISER), Bhubaneswar, Harish-Chandra Research Institute (HRI), Allahabad, Institute of Mathematical Sciences (IMSc), Chennai, Institute for Plasma Research (IPR), Ahmedabad, Homi Bhabha National Institute, Mumbai and Atomic Energy Education Society (AEES), Mumbai. Academic programmes run by BARC, IGCAR, RRCAT, VECC, SINP, IPR, IOP, NISER, IMSc, HRI and TMC come under the fold of Homi Bhabha National Institute (HBNI), a deemed University. TIFR is also a deemed university. DAE through Board of Research in Nuclear Sciences (BRNS), National Board for Higher Mathematics (NBHM) and Homi Bhabha National Institute (HBNI) promotes research in nuclear and allied fields and mathematics, respectively. In addition to this, DAE has created Nuclear Control and Planning Wing (NCPW). Under this wing following Divisions have been formed : Safeguards, Safety and Security Division; International Collaboration and Planning Division; External Relations Division; Nuclear Law Division.

7. **Housing Projects:** Housing projects looks after the construction activities of the Department including housing for its employees. This Directorate is also responsible for operation, maintenance and up-gradation of residential flats, shops, public buildings and estate management including allotment. In addition, Directorate executes construction works for constituent units.

8. **Nuclear Fuel Complex:** Nuclear Fuel Complex (NFC) is responsible for manufacturing zirconium alloy clad, natural and enriched uranium oxide fuel assemblies for all the Pressurised Heavy Water Reactors (PHWRs) and the Boiling Water Reactors (BWRs) zirconium alloy structural components for these reactors including Calandria and Pressure Tubes for PHWRs and Square Channels for BWRs. In addition, NFC produces Seamless Stainless Steel and Special Alloy Tubes of international standards for Nuclear and Non-Nuclear applications and Special and High Purity Materials for strategic use.

9. **Heavy Water:** HWB operates two Heavy Water Plants (HWPs) located at Kota and Manuguru based on Hydrogen Sulphide-Water Exchange Process and two plants at Thal and Hazira based on Ammonia-Hydrogen Exchange Process. Energy consumption being the major cost component of Heavy Water (HW) production, its continual reduction is a thrust area of HWB. By adopting process intensification and optimization techniques and implementing appropriate energy saving schemes,

substantial reduction in specific energy has been achieved, which is exemplified during 2012-13 by achieving lowest ever specific energy consumption.

10. **Radiation & Isotopes Facility (BRIT):** Board of Radiation and Isotope Technology (BRIT) is responsible for :- Production and supply of a variety of radioisotope products including radiopharmaceutical and associated products, radio immunoassay kits, radiochemicals, radiolabeled compounds and nucleotides and also sealed radiation sources such as Cobalt-60, Iridium-192, Caesium-137 etc. Radiation technology equipment such as gamma radiography cameras, blood irradiators and laboratory gamma irradiators, promoting radiation processing technology for use in healthcare, food processing and agriculture and rendering radiation processing services for medical products, spices, condiments and other products, propagating radiation technology and providing facilitation services to private entrepreneurs to set up commercial gamma radiation processing plants.

11. **International Atomic Energy Agency:** India has been a member of the Board of Governors of the International Atomic Energy Agency (IAEA) since its inception, making available the services of the departmental scientists for expert assignments besides participation in international symposia and other fellowship exchange programmes. The provision under IAEA takes care of the contribution made by the Department to the international body.

12. **DAE R&D Projects:** The Department undertakes a few projects which are jointly executed by the constituent units in R&D sectors or by Public Sector Units on behalf of the Department.

13. **DAE I & M PROJECTS:** The Department undertakes a few projects which are jointly executed by the constituent units in I&M sectors or by Public Sector Units on behalf of the Department.

14. **DAE Power PROJECTS:** The Department undertakes a few projects which are jointly executed by the constituent units in Power sectors or by Public Sector Units on behalf of the Department.

15. **INVESTMENT IN PUBLIC ENTERPRISES:** The provision includes investment in Uranium Corporation of India Ltd. (UCIL), Electronics Corporation of India Ltd. (ECIL), Indian Rare Earths Ltd. (IREL), Nuclear Power Corporation of India Limited (NPCIL) and Bhartiya Nabhikiya Vidyut Nigam Ltd. (BHAVINI).

16. **Fuel Cycle Projects FRFCF:** Fuel Cycle Projects FRFCF of IGCAR is an integrated facility to close the fuel cycle of the prototype Fast Breeder Reactor (PFBR)