

# *Annexures*

## Annexure I

## Details of operational Nuclear Power Plants in India

| Sl. No. | Plant   | Unit | Type               | Capacity (MW) | Date of Commercial Operation |
|---------|---|------|--------------------|---------------|------------------------------|
| 1.      | Tarapur Atomic Power Station (TAPS), Maharashtra  | I    | BWR <sup>38</sup>  | 160           | 28 October 1969              |
| 2.      | Tarapur Atomic Power Station (TAPS), Maharashtra  | II   | BWR                | 160           | 28 October 1969              |
| 3.      | Rajasthan Atomic Power Station (RAPS), Rajasthan  | I    | PHWR <sup>39</sup> | 100           | 16 December 1973             |
| 4.      | Rajasthan Atomic Power Station (RAPS), Rajasthan  | II   | PHWR               | 200           | 1 April 1981                 |
| 5.      | Madras Atomic Power Station (MAPS), Tamil Nadu    | I    | PHWR               | 220           | 27 January 1984              |
| 6.      | Madras Atomic Power Station (MAPS), Tamil Nadu    | II   | PHWR               | 220           | 21 March 1986                |
| 7.      | Narora Atomic Power Station (NAPS), Uttar Pradesh | I    | PHWR               | 220           | 1 January 1991               |
| 8.      | Narora Atomic Power Station (NAPS), Uttar Pradesh | II   | PHWR               | 220           | 1 July 1992                  |
| 9.      | Kakrapar Atomic Power Station (KAPS), Gujarat     | I    | PHWR               | 220           | 6 May 1993                   |
| 10.     | Kakrapar Atomic Power Station (KAPS), Gujarat     | II   | PHWR               | 220           | 1 September 1995             |
| 11.     | Kaiga Generating Station (KGS), Karnataka         | II   | PHWR               | 220           | 16 March 2000                |
| 12.     | Rajasthan Atomic Power Station (RAPS), Rajasthan  | III  | PHWR               | 220           | 1 June 2000                  |
| 13.     | Kaiga Generating Station (KGS), Karnataka         | I    | PHWR               | 220           | 16 November 2000             |
| 14.     | Rajasthan Atomic Power Station (RAPS), Rajasthan  | IV   | PHWR               | 220           | 23 December 2000             |
| 15.     | Tarapur Atomic Power Station (TAPS), Maharashtra  | IV   | PHWR               | 540           | 12 September 2005            |
| 16.     | Tarapur Atomic Power Station (TAPS), Maharashtra  | III  | PHWR               | 540           | 18 August 2006               |
| 17.     | Kaiga Generating Station (KGS), Karnataka         | III  | PHWR               | 220           | 6 May 2007                   |
| 18.     | Rajasthan Atomic Power Station (RAPS), Rajasthan  | V    | PHWR               | 220           | 4 February 2010              |
| 19.     | Rajasthan Atomic Power Station (RAPS), Rajasthan  | VI   | PHWR               | 220           | 31 March 2010                |

<sup>38</sup> Boiling Water Reactor (BWR) is a type of light water nuclear reactor used for the generation of electrical power

<sup>39</sup> Pressurized Heavy Water Reactor (PHWR) is a nuclear reactor, commonly using unenriched natural uranium as its fuel, that uses heavy water (deuterium oxide D<sub>2</sub>O) as its coolant and neutron moderator.

|     |   |    |                                    |       |                  |
|-----|---|----|------------------------------------|-------|------------------|
| 20. | Kaiga Generating Station (KGS),<br>Karnataka            | IV | PHWR                               | 220   | 20 January 2011  |
| 21. | Kudankulam Nuclear Power Station<br>(KKNPS), Tamil Nadu | I  | VVER <sup>40</sup> -<br>1000 (PWR) | 1,000 | 31 December 2014 |
| 22. | Kudankulam Nuclear Power Station<br>(KKNPS), Tamil Nadu | II | VVER -1000<br>(PWR)                | 1,000 | 31 March 2017    |

### Nuclear Power Projects under Construction in India

| Project                        | Capacity (MW) | Expected Commercial Operation                                   |
|--------------------------------|---------------|---|
| Rajasthan Atomic Power Project | 2 x 700       | Unit VII – Under construction<br>Unit VIII – Under construction |
| Kakrapar Atomic Power Project  | 2 x 700       | Unit III – Under construction<br>Unit IV – Under construction   |
| Kudankulam Nuclear Power Plant | 2x 1000       | Unit III- Under construction<br>Unit IV- Under construction     |

<sup>40</sup> Voda Voda Energo Reactor- a water cooled and water moderated reactor.

## Annexure II

(Reference: Para 4.1.1)  
Delay in achieving milestones

| Major Milestones   |            |            |               |               |                 |         |
|--|------------|------------|---------------|---------------|-----------------|---------|
| Activity   | Stipulated |            | Actual        |               | Delay (in days) |         |
|  | Unit I     | Unit II    | Unit I        | Unit II       | Unit I          | Unit II |
| First Pour of Concrete   | 31.03.2002 | 31.03.2002 | 31.03.2002    | 04.07.2002    | Nil             | 95      |
| Construction up to Reactor Building + 5.4 Slab                               | 30.09.2003 | 30.06.2004 | 30.09.2003    | 31.12.2003    | Nil             | Nil     |
| Construction of Primary Containment of Reactor Building Wall upto 43.9 metre | 31.10.2004 | 31.07.2005 | 21.05.2005    | 30.11.2005    | 202             | 122     |
| Construction of Turbine Building up to 36.5 meter Including Crane beam.      | 31.12.2004 | 31.12.2005 | 31.08.2005    | 31.01.2007    | 243             | 396     |
| Commissioning of 220 KV Gas Insulated Switchgears System                     | 31.01.2005 | 31.01.2005 | 14.11.2008    | 14.11.2008    | 1,384           | 1,384   |
| Commissioning of Polar Crane   | 31.03.2005 | 29.12.2005 | April 2007    | December 2007 | 730             | 701     |
| Construction of Emergency Power Supply and Control Building                  | 30.04.2005 | 30.04.2006 | 28.02.2006    | 30.09.2008    | 304             | 884     |
| Charging of Reserve Power Supply System (RPSS)                               | 31.05.2005 | 31.05.2005 | 01.01.2009    | 01.09.2011    | 1,311           | 2,284   |
| Pre-stressing of Reactor Building Inner Containment (IC) Dome                | 30.09.2005 | 30.06.2006 | 18.09.2009    | July-2009     | 1,449           | 1,096   |
| Commissioning of Demineralisation Plant                                      | 31.12.2005 | 31.12.2005 | April-2009    | April-2009    | 1,185           | 1,185   |
| Commissioning of Compressors   | 31.12.2005 | NA         | December 2010 | December 2010 | 1,795           | NA      |
| Erection of NSSS (Nuclear Steam Supply System) Equipment & pipelines         | 30.06.2006 | 30.06.2007 | 29.07.2008    | 18.04.2009    | 760             | 658     |
| Erection of Turbine Generator  | 30.06.2006 | 30.03.2007 | 30.09.2008    | 31.08.2010    | 824             | 1,251   |
| Reactor Checkup and Assembly for Stage Hydraulic Test                        | 30.09.2006 | 30.06.2007 | 31.08.2010    | 03.01.2014    | 1,431           | 2,378   |
| Hydro test & circular flushing of primary circuit                            | 31.10.2006 | 31.07.2007 | 27.12.2010    | 05.07.2014    | 1,518           | 2,531   |
| Containment pressure boundary test (Phase A-2 Commissioning)                 | 28.02.2007 | 30.11.2007 | 03.02.2011    | 10.02.2014    | 1,436           | 2,264   |
| Attainment of First Criticality and Low Power Tests (Phase-B2 commissioning) | 30.04.2007 | 31.01.2008 | 13.07.2013    | 10.07.2016    | 2,266           | 3,083   |
| Start of Commercial Operation  | 30.10.2007 | 30.10.2008 | 31.12.2014    | 31.03.2017    | 2,619           | 3,076   |

**(Reference: Para 4.1.2(a))**  
**Project Cost break up of Indian scope of work Cost head-wise**

(₹in crore)

| Cost Heads  | Original sanction<br>(December 2001) | Revised<br>(August 2014) | Increase/<br>decrease |
|---|--------------------------------------|--------------------------|-----------------------|
| Site preparation, facilities and infrastructure (Material & construction)   | 34.65                                | 76.04                    | 41.39                 |
| Main plant civil building (Material & construction), cooling water intake and outfall system (Material & construction), breakwater dykes, shore reinforcement   | 1,553.80                             | 1,728.77                 | 174.97                |
| Nuclear system auxiliaries, Turbine Generator auxiliaries, miscellaneous mechanical erection, transportation and transportation insurance, water desalination plant   | 439.84                               | 1,283.67                 | 843.83                |
| Electrical systems (supply & installation)  | 108.97                               | 292.49                   | 183.52                |
| Controls and Instrumentation installation   | 52.84                                | 160.76                   | 107.92                |
| Access roads, field office, social buildings, warehouses and workshops, equipment for warehouses, workshops, substation, office equipment, communication equipment etc.   | 108.61                               | 43.15                    | (-)65.46              |
| Engineering/design/Quality Assurance /project management services, expenses on transportation including strengthening of Tuticorin port and roads, construction power, maintenance charges for office buildings, warehouses, workshops and miscellaneous expenditure, staff training technology transfer and other services | 124.80                               | 221.94                   | 97.14                 |
| Commissioning expenses (commissioning power and consumables)  | 58.67                                | 769.28                   | 710.61                |
| Site Improvement (Housing, Hostels, Central Industrial Security Force (CISF) colony, Roads, drainage, Hospital, schools etc., Communication and computer facilities   | 154.02                               | 170.38                   | 16.36                 |
| Maintenance   | 125.64                               | 429.40                   | 303.76                |
| Contingencies and Insurance   | 160.25                               | 214.45                   | 54.20                 |
| Employee's salaries, overheads, CISF salary, Foreign allowances, Moscow office expenses, expenditure on DPR review meeting, Mumbai office, Public awareness and welfare activities  | 723.95                               | 1,851.50                 | 1,127.55              |
| Working capital margin  | 237.00                               | 237.00                   | 0                     |
| Expenses on Russian man power (services and income tax)   | 26.97                                | 43.00                    | 16.03                 |
| Fukushima related tank & piping   | 0                                    | 25.00                    | 25.00                 |
| Tax on Russian contracts  | 0                                    | 187.00                   | 187.00                |
| <b>Total</b>  | <b>3,910.01</b>                      | <b>7,733.83</b>          | <b>3,823.82</b>       |

## Annexure IV

(Reference: Para No. 4.3.4)

## Details of execution of additional item of works due to improper planning

| Sl. No.      | Work order / Date        | Name of the contractor                             | Name of the work  | Contract awarded cost (₹ in crore) | Extra work executed beyond 125% of the awarded cost (₹ in crore) | Percentage of extra cost against the original cost |
|--------------|--------------------------|--|---|------------------------------------|--|--|
| 1.           | 200045 dated: 25/02/2002 | M/s HCC Ltd, Mumbai                                | Construction of Reactor Buildings and Reactor auxiliary & main control room buildings for KKNPP Units I and II (C-III).   | 272.99                             | 27.95  | 10   |
| 2.           | 400040 / 18.12.2004      | M/s L & T Ltd                                      | Handling, Transportation, Pre-fabrication, welding, erection, inspection & testing of piping, instrument tubing and erection of associated equipment along with accessories for Nuclear Steam Supply Systems and Nuclear Auxiliary Systems for KKNPP Units I and II (M -2 Package).               | 68.25                              | 68.32  | 100  |
| 3.           | 400041 / 24.12.2004      | M/s L & T Ltd, Chennai                             | Handling, Transportation, Pre-fabrication, welding, erection, inspection, testing of indoor and outdoor and equipment of common service systems for KKNPP Units I and II (M -5 Package).  | 43.04                              | 12.54  | 29   |
| 4.           | 400046 / 30.12.2004      | M/s PES Engineering Pvt. Ltd, Hyderabad            | Handling, Transportation, Pre-fabrication, welding, Anti – Corrosive Painting, Insulation, Erection, Inspection & Testing ducting / piping, Instrument tubing and Associated Equipment along with accessories for Ventilation & Air conditioning systems for KKNPP Units I and II (M - 7 Package) | 30.80                              | 17.61  | 57   |
| 5.           | 600007 / 02.03.2005      | M/s ECIL   | Main Plant control and instrumentation works of KKNPP Units I and II (I-1 Package)  | 32.00                              | 30.45  | 95   |
| 6.           | 400144 / 17.12.2009      | M/s PSL Ltd, Chennai                               | Coating of pipeline with Coponhycote for UMA-1 and 2  | 1.27                               | 0.57   | 45   |
| 7.           | 600030 / 04.02.2013      | M/s L & T  | Handling, Cleaning, fabrication, erection, welding and NDT and pneumatic / hydro testing of Process impulse piping jobs for Unit II Reactor and Auxiliary Buildings – regarding.  | 5.69                               | 1.29   | 23   |
| 8.           | 800521 / 12.07.2013      | M/s TatagariTerro Technologies Pvt. Ltd, Hyderabad | Operation and maintenance activities of Auxiliary Operating plant at plant site   | 1.36                               | 0.27   | 20   |
| <b>Total</b> |                          |  |   | <b>455.40</b>                      | <b>159.00</b>  |  |