

Executive Summary

Introduction

Development of energy resources plays a vital role in the growth of an economy. An accelerated growth of power sector is imperative for the overall growth of the country. In order to accelerate economic growth of the country, Government of India (GOI) laid emphasis on efficient and rapid growth of power sector with large private investment. The Planning Commission also increased (June 2008) targets for capacity addition in generation of power in XI Plan compared to targets fixed for X plan so that the objective of National Electricity Policy 2005 to provide access to electricity for all households was achieved. To achieve these ambitious power generation targets, availability of commensurate power equipment manufacturing capacity in the country was equally important.

Bharat Heavy Electricals Limited (BHEL), a Maharatna Central Public Sector Enterprise (CPSE) under the administrative control of Department of Heavy Industry, Ministry Heavy Industries and Public Enterprises (Ministry), is one of the largest engineering and manufacturing enterprises in India in energy-related/infrastructure sector. At the end of March 2013, BHEL had supplied utility power generating sets equivalent to 1,15,500 MW which accounts for 57 *per cent* of the overall installed power generation capacity in India. Central Electricity Authority (CEA) in their latest report of May 2013 acknowledged technical superiority of equipment manufactured by BHEL as compared to some other competitors from abroad. BHEL implemented three capacity expansion programmes in phases¹ to meet projected power equipment requirements during X, XI and XII Plans respectively. In this backdrop, performance audit of power equipment manufacturing capacity expansion and utilization of BHEL was taken up to assess the adequacy and results of efforts of BHEL in capacity expansion and its utilization for meeting the power generating capacity addition requirement in the country.

(Para 1.1)

Audit Scope and Sample

The performance audit examined the process of conceptualization to execution of 17 schemes (valuing ₹.4156.17crore) out of 22 schemes (valuing ₹.4737.41 crore) undertaken by BHEL during Phases–II and III during 2007-12 for raising the power

¹ *To augment power equipment manufacturing capacity from 6,000 MW per annum to 10,000 MW per annum (Phase-I for X Plan), From 10,000 MW per annum to 15,000 MW per annum (Phase-II for XI Plan) and From 15,000 MW per annum to 20,000 MW per annum (Phase-III for XII Plan).*

equipment manufacturing capacity from 10,000 MW per year to 20,000 MW per year. The extent of capacity utilisation achieved by BHEL was examined in respect of delivery of 10 major power equipments (contributing 62.67 *per cent* or ₹. 1.05 lakh crore of the total turnover of ₹. 1.67 lakh crore during the period 1 April 2007 to 31 March 2012 of BHEL).

(Para 2.1)

Major Audit Findings

Significant audit findings are discussed below:

(i) Preparedness for capacity expansion in XI and XII plans

While CEA had identified power generation capacity addition requirements of 67,439 MW for XI Plan in the country in November 2003 itself, the Task Force to recommend capacity augmentation was constituted by BHEL only in July 2006. BHEL decided during January 2007 to September 2008 to increase its manufacturing capacity from 10,000 MW per annum to 15,000 MW (Phase-II) to be completed by December 2009. BHEL declared completion of Phase-II capacity addition programme in March 2011.

Thus, the manufacturing capacity expansion, which was required to be planned and completed in the initial years of XI Plan, was declared to have been completed by BHEL only towards the end of the Plan.

{ Para 3.1.(i)}

Apart from the need for better preparedness, capacity augmentation in different segments was also required to match Plan requirements. Against the projected requirements of 8,200 MW and 31,860 MW for the country in supercritical thermal segment during XI and XII Plans, the capacity augmentation planned by BHEL was only 5,280 MW and 18,000 MW respectively. However, in the case of subcritical thermal segment, against projected XII Plan requirements of 12,640 MW for the country, capacity augmentation in BHEL was planned at 44,898 MW indicating creation of surplus capacity. While Management stated that new machines installed under capacity expansion schemes could be used for manufacture of large size super critical sets, details of actual utilization of new subcritical machines to manufacture supercritical sets (other than boilers), if any, were not provided by Management to Audit.

{ Para 3.1.(ii)}

(ii) System of award of purchase orders

(a) In 59 out of 174 selected purchase orders, in the absence of laid down procedure for preparation of cost estimates in units, the estimates were based on rates available in the Feasibility Reports (FRs) which, in turn, were based on offers received from prospective vendors and were 18 to 36 months old from the date of calling of bids for these purchase orders.

(b) Only seven *per cent* of the selected purchase orders were finalized within 75 days. Units of BHEL took more than 12 months in finalisation of purchase orders in 31 *per cent* cases. Audit observed that delay in placing purchase orders had contributed to the delivery dates getting delayed in 23 out of 174 purchase orders much beyond the scheduled date of completion of respective manufacturing capacity augmentation schemes.

(Para 4.1 and 4.5)

(iii) Execution of Manufacturing Capacity Expansion Schemes

(a) Implementation of the Capacity expansion programmes for XI and XII Plans (covered in Audit) disclosed delays between 07 months and 62 months in 17 selected schemes out of 22 schemes approved in 2007-12. 5 out of 22 schemes of Phase II and Phase III are yet to be completed (September 2013). Apart from some uncontrollable factors like poor response to tenders or high prices quoted by bidders, factors like non fixation of targets for vendors for erection and commissioning of machines, delay in replacement of damaged equipment that were largely controllable by the Management through proper planning and monitoring, had significantly contributed to delays.

(Para 5.1)

(b) Further, CEA in its Annual Report 2004-05 indicated new benchmarks for commissioning and synchronization of thermal units as 37 months and 28 months in case of 500 MW and 250 MW respectively whereas, actual time taken by BHEL for the same was 42 and 34 months which was much higher than the new benchmarks indicated by CEA. BHEL planned to meet the benchmarks indicated by CEA for commissioning and synchronisation of thermal units by reducing manufacturing cycle time upto 10 percent as a part of Phase II Capacity Augmentation Scheme which was approved during January 2007 and September 2008 after a delay of 21 months (April 2005 to January 2007). This was not achieved as the capacity expansion schemes were still (September 2013) under implementation.

{Para 5.2(i)}

(iv) Utilisation of Manufacturing Capacity of Major Power Equipments

(a) BHEL's installed capacity for Turbines and Generators remained underutilized during 2007-08 to 2010-11, whereas production exceeded the installed capacity in case of Turbines during the year 2011-12 only.

Installed capacity for boilers was overutilised during 2007-08 to 2010-11. This was due to outsourcing which ranged between 54 and 57 percent. The issue was discussed in the second Exit conference (September 2013) with the Management where Audit concern that only own equipment manufacturing capacity should be included for shop production capacity of BHEL was appreciated by the Management. Management further admitted that due to bunching of orders and some constraints in respect of facilities at the Haridwar unit, outsourcing of some core components had also to be resorted to.

In HEEP Haridwar, there was scope to improve the system of outsourcing by carrying out a cost benefit analysis at the time of outsourcing of fully machined components procured with materials. During the second Exit Conference (September 2013) it was impressed upon Management that any system of outsourcing should ensure that outsourcing was cost effective for the Company and in-house capacity, if any, for the outsourced components did not remain idle.

(b) out of 151 generating sets² delivered by BHEL during 2007-12, delivery of 126 generating sets to customers was delayed for periods ranging between 7 and 68 months. Delays were also due to controllable factors like non adherence to BHEL's internal schedules for supplies of various modules/parts of the equipments, non sequential supplies in 132 out of 217 test checked cases of generating sets supplied by Hyderabad and Haridwar units, delays in finalization of engineering drawings, acceptance of sub-vendors' delivery period beyond BHEL's own delivery schedule, delay in placement of indents and conversion of indents into purchase orders. Due to delay in deliveries of orders, customers had deducted liquidated damages (LD). BHEL had to bear LD of ₹ 1280 crore during 2007-13.

(Para 6.1, 6.2 and 6.5)

(v) Market share of BHEL

Market share of BHEL (based on projects commissioned/likely to be commissioned during the Plan period) declined from 65 *per cent* at the end of X Plan to 59 *per cent* at the end of XI Plan and was likely to come down to 58 *per cent* at the end of XII Plan (based on CEA data on projects likely to be completed in XII Plan). Despite uncertainties related to coal availability leading to dampening effect on fresh orders during 2011-12 and 2012-13 as stated by the Management, there was scope for arresting decline in the order book through timely acquisition of technology/manufacturing capacity, improvement in cost estimation for tenders and control of wage costs to increase competitiveness of products. In view of inadequate orders booked (6715 MW) by BHEL in 2012-13 as compared to manufacturing capacity of 20,000 MW created, there was a challenge for BHEL to optimally utilise its capacity.

(Para 6.3, 6.3.1, 6.3.2 and 6.3.3)

(vi) Technical collaboration agreements with foreign partners and R&D expenditure

For design and manufacture of various types of equipments, BHEL entered into 10 Technology Collaboration Agreements (TCAs) and two Memoranda of Understanding (MoU) during August 1976 to November 2010 with foreign Original Equipment Manufacturers (OEM) for 14 major products. The TCAs did not contain provisions to provide source codes and 'know why' of the technology. BHEL expressed difficulty in obtaining source codes as well as 'know why' from technology partners under the TCAs as the OEM were not willing to transfer technology. In the absence of arrangements to absorb

² Generating set comprises of boiler, turbine and generator

technology from foreign partners, in-house R&D assumes significant importance so as to reduce dependence on technology partners under TCA in the long run.

R&D expenditure remained at 1.12 *per cent* of turnover against 3.20 to 5.11 *per cent* spent by its competitors. BHEL would benefit by focussed R&D efforts and increased R&D outlay.

(Para 7.2 and 7.3)

(vii) Performance of BHEL against MOU Targets

BHEL had signed MOUs with its administrative ministry regularly. There was scope for fixing appropriately challenging targets and evaluation of performance more objectively in line with DPE guidelines.

(Chapter 8)

(viii) Monitoring Mechanism

Though a system for monitoring implementation of capacity expansion schemes and delivery of equipments in scheduled time existed, there was scope for expediting the implementation of capacity expansion schemes and delivery of ordered equipments which were delayed due to factors like non-fixation of targets for vendors for erection and commissioning of machines, acceptance of sub vendors' delivery schedules beyond BHEL's own delivery schedule that were possible to be controlled.

(Para 9.1.1 and 9.1.2)

Audit Recommendations

Based on the audit findings, the following recommendations are made:

Ministry of Heavy Industries

1. Ministry may consider reviewing performance parameters and fix challenging targets in MOU to provide a more realistic and objective basis for assessment of performance of BHEL.

BHEL

2. BHEL may review the pricing mechanism of its equipment to make it more competitive by adopting appropriate costs including employee costs.
3. BHEL may work out a time bound programme for increasing outlays on R&D activities, particularly in core areas so as to convert these into advantages in competition.
4. Monitoring mechanism may be strengthened to minimize controllable delays in project execution and delivery by fixing periodicity and levels of monitoring up to the Board of Directors.