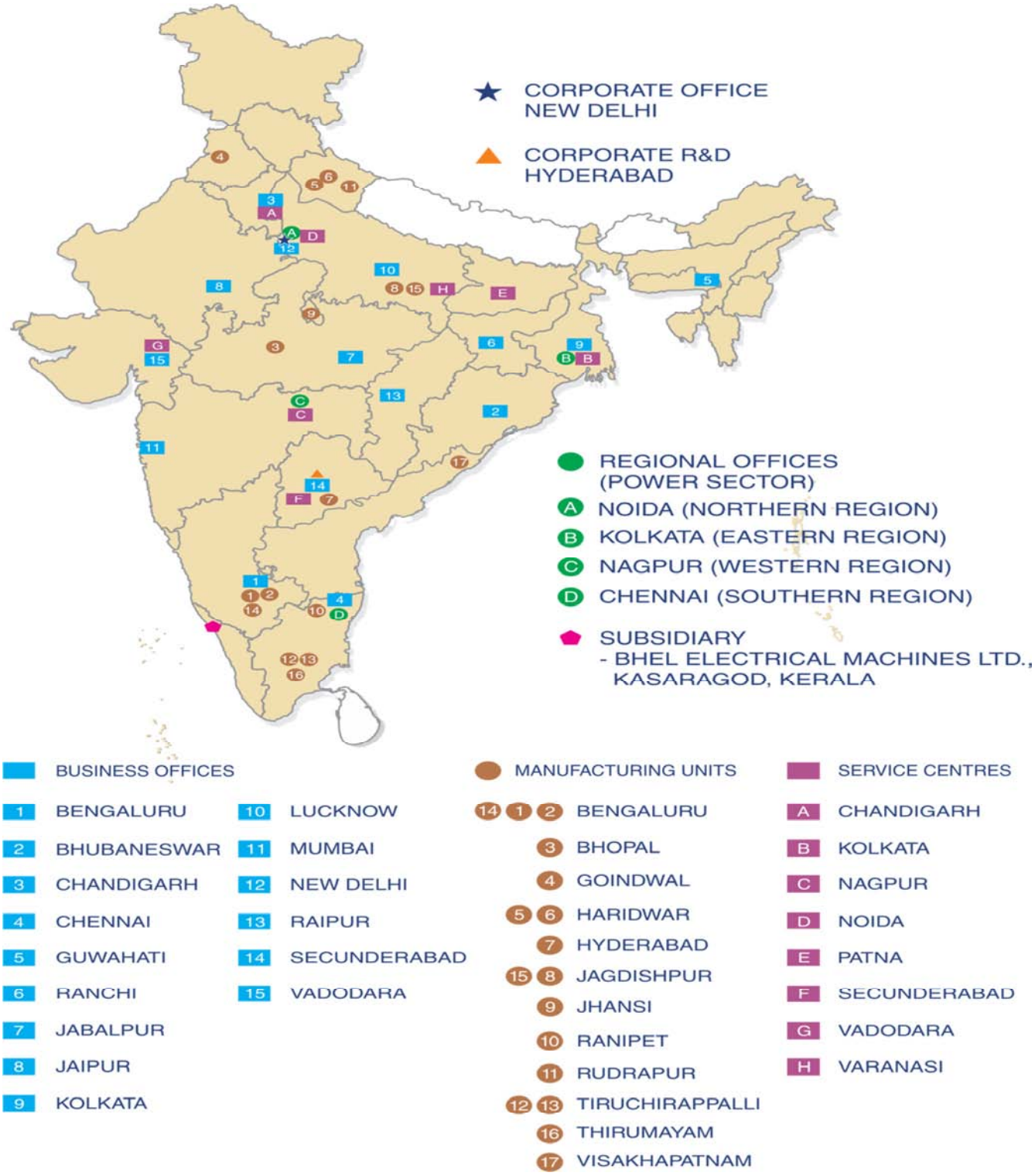
Annexures

Annexures

Annexure 1.1
(As referred to in paragraph 1.1)



Annexure 2.1
(As referred to in paragraph 2.2)

Brief profile of BHEL units selected for Performance Audit

Sl. No.	Name of Manufacturing Unit/Regional Office	Products/Activities
1	High Pressure Boiler Plant (HPBP), Trichy	Manufacturing of Boiler, Valves, Shoot Blowers and Seamless steel tubes.
2	Boiler Auxiliary Plant (BAP), Ranipet	Manufacturing of Boiler auxiliaries.
3	Heavy Power Equipment Plant (HPEP), Hyderabad	Manufacturing of Utility sets (60 MW), Small & Medium sets, Pumps & Heaters, Compressors, Gas Turbine, Bowl Mills, Heat Exchangers, Breakers, Oil Rigs.
4	Electronics Division (EDN), Bengaluru	Manufacturing of Control Equipment, Semi-Conductors, Power devices, Photovoltaic Cells & Modules and Defence Simulator Equipment.
5	Industrial Systems Group (ISG), Bengaluru	Execution of Coal Handling Plant, Ash Handling Plant, Raw material handling system.
6	Heavy Electrical Equipment Plant (HEEP), Haridwar	Electrical machines, Industrial control panels, Turbine Modules, Turbo generator modules, Hydro sets, Super Rapid Gun Mount, Gas turbine.
7	Central Foundry Forge Plant (CFFP), Haridwar	Steel casting, NF casting, Medium & heavy steel forging.
8	Heavy Equipment Plant (HEP), Bhopal	Switchgear, Control gear, Rectifier, Capacitors, Bushings, Power Transformers up to 400 kV, Reactors, Traction Motors for AC, DC & Diesel system, Large Electrical Machines, Water wheel alternators & water turbines & mini micro turbines and generators, Turbo Alternators & Steam turbines, Heat Exchangers.
9	Transformer Plant (TP), Jhansi	Power transformer and special transformers, ESP Transformer, AC EMU Transformer, Freight Loco transformers, Instrument transformers, Bus Duct, Dry type transformer, Diesel shunting locomotives, AC Loco.
10	Project Engineering Management (PEM), Noida.	Providing total engineering solutions for power projects as well as processing of LOI for non-BHEL systems & equipment, i.e. Balance of Plant items.
11	Power Sector Northern Region (PSNR)	Erection and commissioning of power projects in respective region of the country and/or power projects in other regions of the country or abroad as per allotment by Power Sector-Marketing Division of BHEL. Issue of Letter of Award and execution of BOP packages processed by PEM.
12	Power Sector Eastern Region (PSER)	
13	Power Sector Southern Region (PSSR)	
14	Power Sector Western Region (PSWR)	

Annexure-5.1
{As referred to in para 5.2.3}

List of lost tenders where Manufacturing Units failed to match market level prices indicated by IS-Marketing
(₹crore)

Sl. No.	Business Group	Description of work/order	Market price level indicated by IS- Marketing	Cost Estimates submitted by Manufacturing Units	Price quoted by L1 bidder
1	Captive Power Plant	1x35 MW STG Supply and E&C-Nirani Sugar	15 to 20	21.51	18.00
2	Captive Power Plant	1x16 MW STG Supply and E&C of -Anjani Cement	8	13.83	10.24
3	Captive Power Plant	1x20 MW STG Supply and supervision - GokulMauli	10 to 11	14.63	12.00
4	Captive Power Plant	1x12 MW STG Supply and E&C -Nirma Ltd.	26.56	32.42	22.00
5	Captive Power Plant	Supply and E&C of 1x14 MW STG-Nirma Ltd.	18.78	26	17
6	Captive Power Plant	1x33 MW STG Supply and supervision of E&C -Shamli Sugar	13.15	18.45	11.40
7	Renewable Energy and Water Group	91 MLD pre Treatment Plant- NTPC Tanda	28 to 29	48.65	31.34
8	Renewable Energy and Water Group	3 MLD RO based ETP-NTPC Jhanor	20 to 21	31.58	19.09

Annexure-5.2
{As referred to in para 5.2.3}

List of tenders lost in IS-Marketing due to techno-commercial reason

Sl. No.	Name of Business Sector & Business area	Description of work/order	Price offered by L1 bidder *(₹crore)* & name of L1 bidder	Reason for loss of tender
1	IS- CPP	1x16.5 MW STG supply and supervision MWV-RBY Mecon	16 (M/s Shin Nipon)	BHEL quoted for the duck size as 14.5-meter x 6.5 meter as against 13.5-meter x 5.5 meter (Machine offered by L1 being impulse type was smaller and could be accommodated in this space). Customer asked BHEL to explore possibility to offer machine module with smaller size and inform in 2 weeks, but BHEL did not inform to customer.
2	IS- CPP	1x410 MW TPH CFBC Boiler supply and E&C – Nirma Limited	170 (M/s ISGECF)	➢ BHEL's boiler package weight was 11700 Tons against Competitor's boiler weight of 8000 to 9000 tons. ➢ BHEL quoted auxiliary consumption of 7200 KW while competitor quoted 6300 KW to 6900 KW.
3	IS-CPP	2x25 MW GTG & HRSG – supply, E&C and civil works on EPC basis – Rashtriya Chemical & Fertilizers Ltd	445.94 (M/s Thermax)	Due to non-availability of GT model having net output of 25 MW, BHEL offered Fr6B GT model with ISO output 43 MW. Due to part load operation and lower efficiency of Fr6B GTG vis-à-vis M/s Thermax (i.e. Siemens SGT 700 GT model) there was substantial technical loading of ₹114 crore on BHEL.
4	Transmission Business Group	(i) Extension of 400/220 kV Damoh Extension of 400 kV Rajgarh Substation, (ii) extension of 400 kV Solapur Sub-staition under Solapur STPP Part-A and (iii) Extension of 400 kV Sujalpur Substation	79.45 (M/s Techno Electric & Engg. Limited)	Non-availability of Dynamic short circuit tested BHEL make 500 MVA ICT as required for the project, outsourcing from OEMs was required
5	Transmission Business Group	400/220 kV Powergrid Substation at Rewa	139.92 (M/s Alstom)	Non-availability of Dynamic short circuit tested BHEL make 500 MVA ICT as required for the project, outsourcing from OEMs was required. BHEL depends on OEMs for 500 MVA Transformers as BHEL product was not qualified.

Annexure-5.3
{As referred to in para 5.2.3}

Details of tenders lost in IS-Marketing due to longer delivery and/or higher price

Sl. No.	Business area	Description of work/order	Delivery/commissioning period offered by (months)		Price of BHEL *(₹crore)*	Value of order (L1) *(₹crore)*
			BHEL	Competitor		
1	Captive Power Plant	Gokul Mauli S&S 1x20 MW STG	14	12	16.86	12.00
2	Captive Power Plant	Narmada Sugar S7S 1x30 MW STG	12	8.50	18.08	12.00
3	Captive Power Plant	1x410 MW TPH CFBC Boiler supply and E&C – Nirma Limited	24	18 to 20	343.00	170.00
4	Captive Power Plant	Supply and supervision of 1x15 MW STG- Bidar SK	12	8	11.27	7.70
5	Transmission Business Group	Powergrid 400/220 kV substation at MP Kunta	Competitor quoted shorter delivery period of 12 months		73.17	65.07
6	Transmission Business Group	Powergrid 400/220 substation at Rewa	Competitor quoted shorter delivery period of 14 months		140.18	139.92

Annexure 5.4
(As referred to in paragraph 5.6)

List of orders accepted in violation of BHEL's Corporate Finance Guidelines

Sl. No.	Name of Project	Date of award	Condition regarding advance
1	1 X 600 MW Avantha Bhandar TPP- KWPCL	07.3.2009	Initial Advance: 7.5 *per cent*
2	5 x 270 MW TPP phase II, Amravati of Indiabulls Power Limited	11.10.2010	Initial Advance: 5 *per cent*
3	5 X 270 MW RattanIndia Power Ltd (previously known as Indiabulls Power Limited)/ Nasik phase II	08.10.2010	Initial Advance: 5 *per cent*
4	2x660 MW DB Power Project at Singrauli, MP of M/s DB (MP)P Limited	07.3.2011	• ₹50 crore shall be paid as an initial interest free advance after LOA acceptance by BHEL. Zero date shall be the date of receipt of initial advance. • ₹50 crore shall be paid within three months from zero date. • 3.34 *per cent* shall be paid within four months from zero date. • Remaining portion of 10 *per cent* shall be paid within six months from zero date.
5	1x300MW TPS, Vishakhapatnam-Abhijeet Projects Ltd.	11.1.2012	• 5 *per cent* as first advance shall be paid within 30 days (date of receipt of this advance to be reckoned as Zero Date) • 20 *per cent* second advance shall be paid within 15 days from zero date.
6	2x600 MW Raigarh project of Visa Power Ltd.	28.6.2010	• ₹100 crore after LOA acceptance by BHEL (Date of release of this advance was to be reckoned as zero date) • ₹64.75 crore within four months from zero date. • ₹64.75 crore (to complete 10 *per cent* advance) within seven months from zero date.
7	Pranahitha-Chevella lift irrigation scheme	12.05.2008	• 5 *per cent* to be paid as interest free advance along with the order. • 5 *per cent* to be paid within 3 months of the issue of LOA.
8	1x525 MW Tuticorin TPS-MEIL/SEPC	07.12.2013	• 5 *per cent* first initial advance and • 5 *per cent* on commencement of supply to project.
9	1 x 800 MW Wanakbori TPS Extension Unit no. 8-GSECL	05.09.2014	• Advance: 5 *per cent* to be paid in first month from zero date, which was indicated in the notice to proceed. • 1 *per cent* on placement of orders on Alstom within 6 months from zero date. • 1 *per cent* on placement of orders on Siemens within 8 months from zero date.

Annexure 5.5
(As referred to in Para 5.7.1)

Mean scores on a scale of five in respect of marketing sub-activities during customer surveys of 2012, 2013 and 2014

Marketing sub-activities	BHEL all total			Competitors all total		
	2012	2013	2014	2012	2013	2014
Availability of information about BHEL's latest product technologies	3.2	3.5	3.49	3.5	3.4	3.88
BHEL's response for any assistance required by customer during finalization of tender specifications	3.6	3.5	3.68	3.5	3.4	3.74
Accessibility of BHEL concerned person	3.5	3.7	3.73	3.7	3.4	3.92
Your preference to place orders on BHEL on negotiated basis	3.5	3.6	3.54	3.5	3.3	3.68
Overall score for pre-sales	**3.5**	**3.6**	**3.46**	**3.7**	**3.4**	**3.96**
Completeness of offer with respect to tender requirements	3.6	3.8	3.75	3.9	3.7	4.1
Acceptability of quoted prices with respect to estimated budget of the project	3.3	3.5	3.49	3.5	3.5	3.6
Understanding of Marketing representatives about product and services	3.5	3.6	3.69	3.7	3.6	3.86
Understanding of Marketing representatives about commercial terms and conditions	3.5	3.7	3.9	3.5	3.6	3.76
Promptness of the Marketing team in response to customer queries during tender	3.5	3.6	3.75	3.6	3.6	4.11
Flexibility during pre-award discussions	3.4	3.4	3.62	3.5	3.4	3.53
Overall score for sales	**3.4**	**3.6**	**3.48**	**3.6**	**3.6**	**3.95**
Completeness and accuracy of invoicing and billing	3.8	3.9	3.95	3.9	3.9	3.93
Flexibility in resolution of contractual issues	3.4	3.4	3.42	3.5	3.6	3.7
Ease of making changes in scope of work or other terms and conditions	3.1	3.2	3.43	3.3	3.2	3.40
Frequency of meetings with marketing representatives	3	3.1	3.33	3.5	3.1	3.52
Promptness in financial reconciliation and commercial closing of contracts	3.2	3.3	3.34	3.6	3.5	3.43
Overall score for contract management	**3.2**	**3.3**	**3.5**	**3.5**	**3.4**	**3.93**

Annexure 5.6
{As referred to in Para 5.7.2}

Mean scores on a scale of five in respect of sub-activities of project installation and management function during customer surveys of 2012, 2013 and 2014

Sl. No.	Sub-activities	BHEL all total			Competitors all total		
		2012	2013	2014	2012	2013	2014
1	Project planning and documentation	3.4	3.3	3.52	3.7	3.8	3.7
2	Timely & effective resource mobilization/deployment	3.1	3.1	3.24	3.7	3.7	3.57
3	Safety provisions at work	3.1	3.1	3.36	3.6	3.8	3.72
4	Effectiveness of Safety management system at site	-	3.1	3.34	-	3.7	3.73
5	Work executed in erectable sequence	3.4	3.4	3.48	3.7	3.7	3.68
6	Timely periodic review meeting to meet L1/L2 schedule	3.2	3.1	3.29	3.6	3.5	3.59
7	Selection of sub-contractors	3.2	3.1	3.3	3.6	3.6	3.59
8	Performance of BHEL sub-contractors	3.2	3.1	3.22	3.6	3.6	3.65
9	Commitment to project milestones (erection)	3.1	3	3.11	3.6	3.5	3.56
10	Technical capability of BHEL site engineers	3.6	3.6	3.87	3.7	3.8	3.83
11	Adherence to statutory requirements	3.5	3.6	3.71	3.7	3.7	3.72
12	Sequential supply by manufacturing units	-	2.8	3.06	-	3.6	3.66
Overall score for project erection		**3.3**	**3.3**	**3.52**	**3.7**	**3.8**	**3.83**
1	Quality and adequacy of technical man power	3.3	3.4	3.65	3.7	3.6	3.75
2	Timely inspection of each component	3.2	3.3	3.52	3.6	3.5	3.73
3	Speed of response of customer complaints during commissioning	3.2	3.3	3.44	3.5	3.6	3.65
4	Accessibility of Site Personnel	3.6	3.7	3.73	3.7	3.7	3.84
5	Commitment to commissioning mile stones	3.2	3.1	3.31	3.5	3.5	3.74
6	Availability & quality of commissioning procedure	3.4	3.5	3.64	3.6	3.6	3.75
7	Effective trouble shooting of technical problems	3.5	3.4	3.63	3.6	3.6	3.71
8	Timely replacement of failed components during commissioning	3.3	3.2	3.31	3.5	3.5	3.62
9	Timely conduct of PG tests	3.2	3.2	3.39	3.5	3.5	3.62
Overall score for commissioning of project		**3.5**	**3.4**	**3.6**	**3.7**	**3.7**	**3.67**
1	Timely execution of punch lists	3	3.1	3.34	3.50	3.6	3.57
2	Timely execution of punch list related to manufacturing (supplies)	-	3.1	3.31	-	3.6	3.57
3	Submission of project closure documentation	3.2	3	3.36	3.70	3.5	3.72
4	Conducting effective customer review meetings for project closure	3.1	3	3.37	3.60	3.6	3.69
Overall score for project closure		**3.00**	**3.00**	**3.23**	**3.50**	**3.50**	**3.72**

Annexure 6.1
(As referred to in Para 6.1.2)

Project-wise delays attributable to BHEL

Name of Project	Description
Power Sector	
1x37.2 Lakwa Waste Heat Recovery Plant-(APGCL)	Report has been received from site that you are only dumping the materials from your different units at the project site and none of your foundations are ready for installation within next couple of months. You were requested time & again to make up the lags towards timely completion of the EPC contract. (APGCL letter dated 26.7.2007)
	Though the major supplies pertaining to Boiler and TG/Auxiliaries have already been dispatched, a proper schedule was never maintained. The materials that would be required at a later stage were sent earlier and vice versa. (APGCL letter dated 29.10.2007)
	Though it is not directly related to PG test of the plant but non-completion of all pending activities of the project including BOP area remain as a great concern for APGCL. As such BHEL should give top priority to complete the project in all respect along with completion of PG test. (APGCL letter dated 23.8.2012)
	You are aware that certain part of the commissioning works of Lakwa TPS has been left undone, resulting lesser generation of unit. This has resulted strong observation from the Regulators of the State. (APGCL letter dated 16.9.2015)
1 x 350 MW Hazira CCPP - (GSEGL)	GSEG expressed serious concern on slow progress of liquidating punch points and balance jobs which are essential to make unit available for sustainable operation. (Minutes of meeting held on 07.5.2013)
	GSEG invoked termination clause of contract and issue noticed that in case of non-completion of balance works within 30 days of issue of notice it will opt for alternative actions and complete the pending jobs either by self or other third parties, solely at BHEL's cost, risk and/or consequences, including additional financial consequences to GSEG. (GSEG letter dated 02.12.2013)
1 x 500 MW Bokaro 'A' TPS-DVC	Progress of structural construction and erection activities of Boiler at BTPS 'A' are held up for non-supply of Boiler Drum. (DVC letter dated 21.6.2011)
	a) BHEL Haridwar supplied IP Turbine, LP turbine, condenser materials etc. TG top deck casting was already completed. TG hall EOT crane is yet to be supplied by BHEL b) BHEL-Jhansi dispatched UAT which is required during synchronization. BHEL Bhopal not yet submitted data sheet of Station Transformer which is required for startup power c) Drawing/Document of ID fan motor/FD fan motor are presently under the process of finalization due to delayed submission of necessary input by BHEL Trichy, whereas BHEL-Bhopal dispatched Mill Motor long back. BHEL-ISG supplied DG set long back which is required during synchronization of the unit. DG Building Drawing is yet to be finalized. (DVC letter dated 06.1.2012) BHEL –Ranipet not responding to supply minor items required for commissioning of different sub systems (ESP, FD fan etc.)- DVC letter dated 31.8.2015
	Coal synchronization and full load achieved on 22.3.2016. However, BHEL continuously shifted target date for COD with the latest one being 25.10.2016. DVC vide letter dated 01.6.2016 informed BHEL that as per CERC Regulation 2014-19, COD of the unit is required to be declared within 6

	months from the synchronization; BHEL shall be liable for any commercial impact to be faced by DVC for the same in future. (DVC letter dated 01.6.2016)
1 X 600 MW Avantha Bhandar TPP-KWPCL	BHEL should appreciate the fact that KWPCL has been one of the best paying customers in the times when BHEL had worked for this plant in peak times and has every time got supported by us and even got paid for all non-sequential supplies (up to the tune of 18000 MT for more than 2 years). You should appreciate the fact that KWPCL has incurred a lot of burden in carrying that dead inventory for years. BHEL's failure in supplying and erecting material for our project has been one of the major reasons for the situation where we are into today - KWPCL letter dated 19.6.2014 Unit can run continuously without standby equipment. However, according to the condition of trial operation as laid down in contract, all standby equipment should be ready. (Mail dated 04.7.2014 from BHEL-PSWR)
North Chennai TPS Stage-II Unit 1 and unit 2 - TANGEDCO	The fire protection system could not be put into auto mode due to tapings of fire water for other purposes regularly in following areas: (i)Bottom ash chocking and cleaning purpose, (ii) Coal Handling areas and conveyors towers for chocking and clearing, (iii) Mill Plant rejection area and Bunker chocking purposes, (iv) Civil work purposes by BHEL contractors, (v) A/c line water requirement in emergency situations, (vi) Fly ash cleaning purposes at ESP areas, (vii) Generally in all areas, bathing, hand washing and any other cleaning purposes by all contractors and workers. Due to tapping of water for above purposes from fire hydrant line, adequate pressure could not be maintained in the fire hydrant line and the fire protection system could not be put into auto mode. Further, it is brought to your kind notice that in NCTPS, Stage-II already faced some fire incidents. It is requested to establish service water to the above mentioned important plant areas and to commission the fire protection system in auto mode immediately to safeguard the plant in case of any eventuality of fire.- TANGEDCO letter dated 4.6.2014.
1x500 MW Bellary Unit-2 - KPCL (EPC)	BHEL Haridwar diverted material for Bellary 2 on the plea that TG deck was not casted at site. (BHEL /PMG letter dated 30.6.2009)
	Supply of condenser not as per condenser erection requirement. (BHEL-PMG IOM dated 9.9.2009)
	As per BHEL Haridwar priorities, supplies needed for achievement of the Feb. 2010 milestone are likely to be completed around October 2010. As a result, the delay in the project execution would be about 8 months. (BHEL Note dated 12.11.2009)
2 x 250 MW Bina TPS – Jaiprkash Power Ventures Limited	JPVL furnished details of delay in completion of facilities: Completion of delivery of mandatory spares which was to be done by 19.9.2011 is still incomplete - JPVL letter dated 18.3.2015
2x 500 MW Anpara 'D' TPS-UPRVUNL	BHEL had committed for synchronization of unit-7 in September 2015 and full loading by October 2015. We have instructed all concerned to ensure compliance of the above commitments. However, due to huge quantity of material cannibalization for unit -7 to unit-6 at the last moment, there is going to be some delay in meeting our earlier committed schedule.(BHEL letter dated 06.7.2015)
	UPRVUNL enclosed list of critical materials which were to be supplied by different BHEL units, these materials are urgently required to run the unit 6 & 7 on full load.(UPRVUNL letter dated 17.3.2016)
1x700 MW Bellary unit no. 3 EPC- KPCL	In view of the poor progress/stoppage of civil works by BHEL since past one year on the regular path of CHP (required for feeding required quantity of coal for full load operation of the Unit), we are forced to withdraw the civil portion work pertaining to the dedicated path of CHP excluding Electro-Mechanical works of the unit -3 from the scope of BHEL and get the works carried out at the risk and cost of BHEL in the interest of early commissioning of the unit to achieve COD.- KPCL letter dated 24.6.2016
4x600 MW	Whatever supplies were made to us were highly non-sequential. As a result, when the work at site re-commenced in November 2011, the erectability

Jindal STPP, Raigarh-JPL	status of available material was very poor. (JPL letter dated 27.2.2012)
2x351 MW Project at Pipavav, Gujarat- GPPC	BHEL had performed full load operation of our Pipavav Unit -2 in April 2013 and Unit-1 in February 2014 to achieve capacity addition in the year 2013-14 by performing bare minimum commissioning activities and also using many of the equipment and spare parts of Unit-2 in Unit-1 which means that all the supplies of equipment and spares for both the units have not been completed. Therefore, we have been following up with BHEL on continuous basis, to supply such equipment and spares which were taken out from Unit-2 for achieving full load operation of Unit-1. (GPPCL letters dated 08.10.2014 & 25.6.2015)
	Many of the critical issues observed in unit-2 main plant as well as BOP areas during the operation of unit-2 are yet to be rectified by BHEL. Further, critical commissioning activities like Load Rejection Test / Islanding operation, Gas Turbine IDLN Tunning, PG test etc., are pending for unit-2 which are essential for issuing Provisional Acceptance Certificate (PAC)- Principal Secretary, Govt. of Gujarat letter dated 09.3.2016
726 MW HRSG project, Palatana - OTPC	Construction of Unit-2 is suffering due to unavailability of several critical materials and shortage of manpower from BHEL and its sub-contractors. However, in spite of repeated assurances, no effort is visible from BHEL to arrange replacement of material, to augment manpower and to expedite commissioning of the project - OTPC letter dated 05.11.2012
	In spite of repeated request, BHEL has not provided Operation & Maintenance personnel as per requirement of contract in order to facilitate pre-commissioning and commissioning activities.- OTPC letter dated 01.11.2012
1x800 MW Kothagudem project- Telangana State Power Generation Corporation (TSGENCO)	It is observed that L2 schedule of material is not being followed at KTPS (1x800 MW) and BTPS (4x270 MW) Projects. The works at site are not progressing as per L2 schedule in certain areas of project activities and also certain material are being dispatched to site well in advance of stipulated L2 schedule. This is leading to huge expenditure towards increase in IDC component of the project. CMD/TSGENCO Note dated 18.2.2016 to Chief Engineers of concerned projects
	I am strained to remind that even after 15 months from the zero date, BHEL has not yet finalized the agencies for critical systems, viz, TG Erection, DM Plant, Pre-treatment Plant, CW treatment Plant, Firefighting System, HP Turbine Casing, AC Plant, Compressor House, Switch yard works etc. Even for NDCT, recently finalized vendor has not yet commenced the work. It is pertinent to inform that it may take at least 18 to 20 months for completion of Cooling Tower.- CMD/TSGENCO letter dated 06.5.2016
1 x 800 MW Wanakbori TPS Extension Unit no. 8-GSECL	The work is being delayed due to poor coordination of different units of BHEL. This shows that since beginning, BHEL fails to maintain the schedules as committed mainly due to problems of coordination amongst different units of BHEL, in particular ISG. GSECL expressed its deep concern regarding delay of EPC projects awarded to BHEL and hope that the same history shall not be repeated for prestigious Wanakbori project - GSECL letter dated 23.12.2014
	Vide our letters dated 13.7.15, 30.7.15 and 28.9.15, it was requested to ensure sequential supply of material by various BHEL units to project site. However, it seems that all BHEL units are not following the sequential supply schedule and dumping the material at site. BHEL Ranipet unit has supplied the ESP material during early days and now AHP Baskets, which are going to utilize after years and material gets deteriorated. This may require replacement/recoupment due to loss and damages at the time of actual utilisation. This results in delay of the project. Moreover, BHEL to note that there are space constraints due to dumping of non-sequential supply. Material deterioration is an issue which may be the cause of performance shortfall.- GSECL letter dated 20.10.2015

4x270 Bhadradri (Manuguru) TPS - TSGENCO	CMD/TSGENCO stated that the works at site are not progressing as per L2 schedule in certain areas of project activities and also certain material are being dispatched to site well in advance of stipulated L2 schedule. This is leading to huge expenditure towards increase in IDC component of the project- CMD/TSGENCO note dated 18.2.2016.
2 x 520 MW TPP at Vizag-Hinduja National Power Corporation Limited	Prior to start of TO procedure and list of test to be conducted during TO duly approved by HNPCL are required. HNPCL is requesting BHEL to submit the procedure since Dec. 2015. BHEL PSER submitted the procedure on 28.4.2016. Final procedure incorporating HNPCL comments is still awaited. Prior to start of trial operation all the equipment with standby are to be made ready for operation and testing for initial operation by BHEL PSER, ISG and TBG. Even today all the equipment are not put in service. - HNPCL letter dated 01.6.2016.
2x270 MW GVK TPS-GVK Power Limited	BHEL could not complete the supply of required equipment as per agreed schedule. In fact substantial quantum of the equipment is yet to be supplied from Trichy, Ranipet, Hyderabad, Chennai, Noida, Haridwar and Bengaluru units of BHEL. Even today non-availability of certain critical equipment, material and insufficient manpower at site has been affecting the site progress continuously.- GVK letter dated 29.10.2012
Durgapur power station unit-8 of Durgapur Projects Limited	DPL furnished status of activities and stated that all the activities were being delayed. Major jobs could easily be completed by end November 2014. Even, parallel activities would help to squeeze the time.- DPL letter dated 10.11.2014
	Due date of commissioning was 27.1.2014 (42 months). BHEL is unable to conduct Trial Run Operation because the Dry Ash System not yet ready. PSER along with assistance of DPL has even tried to do Trial Operation 3 times with an alternate arrangement of disposal of Ash but have not been successful. DPL has categorically mentioned that as per directives from their State Govt. further payments will not be released unless Dry Ash evacuation system is commissioned and T.O. successfully completed.- ED/Mktg. note dated 13.11.2014 to ED/PEM&ISG and ED/PMG.
Neyveli Lignite Corporation Limited NNTP-NTA-1SG Package	Kindly consider the difficulties we are facing in receiving and storing materials which are required nearly a year after start of ESP erection. Besides occupying huge storage area, we may have to spend quite a good amount on preservation of these materials. In addition, pilferage and theft of such material are adding further to our expenses. By marking a copy of this letter, we are requesting PMG to make a realistic assessment of site, keeping the approved L2 schedule as benchmark while according dispatch clearance.- PSSR letter dated 09.9.2014 to BAP Ranipet.
2x660 MW OPGCL/IB Valley BTG Package	There is at least 3 months' delay in BHEL's start of erection of Power house structure due to late finalization and mobilization of the contractor. There is also a delay of about 3 months in BHEL's progress of erection of unit 3 boiler, primarily due to EDAC's lack of resources-manpower and equipment. The project is receiving materials from different manufacturing units of BHEL in a non-sequential manner and to the best of our knowledge, many of such materials will not be required for erection for almost a year from now. We request BHEL to dispatch the materials matching BHEL site requirements and readiness to unload and store the materials properly at site, ensuring smooth and fast execution of the project. We feel that the project is not being managed by BHEL as per Contract Coordination Agreement and Project Execution Plan. BHEL's individual manufacturing units and site continue to communicate with OPGC without required internal coordination among themselves. (OPGCL letter dated 07.4.2015)

Industry Sector	
80 MW Monnet Ispat	Non-synchronization of supply with civil work by BHEL.
153 MW G.G.S.R Ltd.	Unit-I, Boiler erection was started with delay of 4 months, Hydro test was conducted with delay of 5 months, Safety Valve floating with delay of 11 months. In case of STG-1, Oil flushing, barring gear and Rolling & Synchronization was done with delays of 13, 14 and 15 months, respectively. In case of GT-1, open cycle commissioning with delay of 11 months (scheduled August 2010 and actual July 2011). In case of HRSG-1, Safety Valve floating with delay of 11 months (Schedule September 2010 and Actual Aug 2011).
150 MW OPG Gujrat, Unit-1	Delay in supply of boiler pressure parts from Trichy and10 months delay in supply of ID/FD fans by Ranipet and Hyderabad units. Inordinate delay in award of boiler erection contract by Power Sector Western Region (PSWR). Delay of two months in opening of site office. Delay in finalization of enabling contractor. Delay in finalization of mechanical contractor. Delay in construction of storage shed. Delay in supply of main Turbine, Generator stator LP bypass, LP bypass valves, cross around pipe, economizer, RH&SH Header and FD&PA Fan etc.
50 MW India cement Ltd	Delay in finalization of Bus duct layout.
223.8 MW Anrak Aluminium Ltd.	Non-sequential supply, non-compliance of SEZ formalities.
105.32 MW IOCL Barauni	Boiler drum was lifted with delay of 8 months, 27 months delay in Boiler light up due to delay in supply of materials. 19 months delay in supply of Turbine barring gear.
25 MW ACC Wadi	Delay in receipt of material from Uttar Pradesh Steels leading to delay in supply of turbine. Delay in supply of casting and forging due to over load of vendors.
101.25 MW Opel Dahej, GTG-1,2&3	Delay in submission of drawings, award of sub- contracts & ordering of various bought out-items, and delay in site mobilization.
33 MW Aditya Birla Chemicals India Ltd.	Delay in supplies of various BOI items by sub-vendors.
23 MW Paradeep Phosphate Ltd	Non-supply of outer casing by CFFP-BHEL/Hardwar as it was new design. After manufacturing at Hyderabad unit, material was supplied in January 2014.
12 Nos 160 MVA, 220/66	Delay in supply of equipment due to delay in submission of initial drawings by BHEL-Jhansi. Against schedule date of completion of 31.3.2012, work was completed on 8.8.2013. Due to delay, M/s PSTCL withheld ₹2.20 crore on account of

KV Power Transformers, 12 Nos. NIFPS & 6 Nos. spares for PSTCL, Punjab	Liquidated Damages.
International Operation Sector	
4x125 MW Kosti Thermal Power Plant, Sudan:	Delay in completion of civil works (by sub-vendor M/s MAM), delay in dispatch of critical TG material, delay in laying of river water intake pipe. Due to lack of VASAVI manpower (sub-contractor) or delay in deployment of manpower by VASAVI. Delays in transportation: In June 2009, Vessel "Atlant Triana" carrying important material on board suffered breakdown at Colombo port and took more than 2 months to reach Port Sudan. Container shipments took a minimum of 30-35 days transit time. Non-availability of engineering goods like structure hardware, cable lugs, gases etc. such basic items had to be procured from India and transported to site which was a time consuming affair. A lot of material (esp. C&I panel and switchgear) got damaged due to improper material handling at Port Sudan. Arranging replacements and their transportation to site was a time consuming affair.
	Delay in providing Mobile concrete pump and Automated Batching plants as the same was required by the Customers for entire concrete work from the start, however, BHEL was able to provide the same in 2008/2009. BHEL in the past has only used such equipment for main works and for bigger foundation.
	Delay of 31 months in supply of equipment (Generator Transformer, Bus duct, UATs, STs & spares for these equipment) by BHEL-Jhansi unit.
126 MW Qarn Alam-3, PDO, Oman	Generator with adopter box, exciter and AVR delivered by Siemens were delayed due to unprecedented snowfall in Europe, the cargo could not be shipped. Supply items like Accessory base, Gas Valve Module, Air Blast oil cooler, load coupling, and exhaust diffuser etc. were delayed in shop manufacturing at BHEL units. Supply items like GT & GTG Fire Protection system, Generator control & Relay panel and BNC vibration monitoring system were delayed due to manufacturing delayed by various vendors. Supply items like Exhaust ducting, Guillotine Damper, Diverter Damper, hydraulic power pack got delayed due to change in design by customer. Out of 13 months' delay, 3 months' delay was granted through time extension by customer. Customer also raised issues like delay in PO placement, delay in engineering drawing approval, quality issues like improper welding, painting, received in bent & dent condition, non-compliance quality parameter by vendors.
Tendaho Sugar-STG Package, Ethiopia	Delay in supplies by BHEL
Bihai HEP, Taiwan	Delay in supply of material by BHEL

Annexure 6.2
(As referred to in paragraph 6.5)

Project-wise quality and workmanship related issues observed in commissioned power projects selected for performance audit

Name of Project	Description
	Power Sector
1x37.2 MW Lakwa Waste Heat Recovery Plant- (APGCL)	APGCL's major concern of rotor stuck problem since commissioning was eliminated by BHEL, PSER during April 2012 by correcting the wrongly erected steam drain pipes and traps. During erection and commissioning same were wrongly erected. The present problem of gland steam fluctuation may be the result of internal damage in the gland area for those rotor stuck problem. (**APGCL letter dated 11.10.2012**)
	As per recommendation of the Task Force of BHEL, some corrective activities had been taken up in the year 2014 and 2015 that resulted in marginal improvement of around 2 to 3 MW. However, the designed capacity of the unit could not be achieved even after the corrective measures. The unit is presently generating around 30 MW against 37.2 MW. (**APGCL letter dated 21.3.2016).** Further, HPEP, Hyderabad did not dispatch 195 items of mandatory spares to customers even by September 2016.
North Chennai TPS Stage-II Unit 1 and unit 2 - TANGEDCO	LP Bypass (LPBS)'s left valve of Unit-1 became (October 2013) inoperative due to oil leak which had to be attended through the O Rings supplied by HEEP, Haridwar. Besides, one number of Condenser Vacuum Pump, out of total 4, had to be replaced/cannibalized from Unit-2 of the Project, due to its failure (October 2013). Both of these items adversely affected the continuous and trouble free operation of the Unit. TANGDECO (the Customer) asked BHEL for their replacement/rectification for safe running of the Unit during the Project Review Meeting of 25.09.2013 and reiterated their request vide letter dated 07.10.2013.(HEEP-Haridwar)
	Till date 7 Nos. cooling water pumps have failed out of 12 Nos. pumps in both Unit 1 & II due to failure of abutment ring. Further Unit I of NCTPP Stage 2 was under forced shutdown from 01.6.2014 due to failure of abutment ring. **(TANGEDCO Letter dated 9.6.2014).** Customer also demanded (09.6.2014) immediate replacement of necessary items for rectification of all CW pumps.
	Both Oil Vapour Extraction Fans of Main Oil Tank supplied for the Unit-1 were found defective at site due to crack noticed on motor base and stopping on high vibrations. They were immediately taken out of service and customer asked for war footing action from BHEL for their replacement/rectification for safe running of the Unit, during the Project Review Meeting of 24.10.2013 and reiterated their request vide letter dated 25.10.2013. (HEEP-Haridwar)
	Auxiliary Oil Pump (AOP) supplied by the HEEP-Haridwar under Package no. BT003 –Drawing No. 2430530014 for Unit-1 failed at site and also reflected problem of dimensions mismatching with Main Oil Tank (MOT) opening flange. HEEP Management got the material repaired at site with debiting cost by the site to the HEEP.
	Front Bearing Pedestal Drain Pipe (Package no.75601/1) and HP Module Jack Bolts supplied by HEEP, Haridwar for Unit-1 was having manufacturing defects which had to be repaired/modified at site (October 2011).
	Repeated failure of intermediate conveyor of Bottom Ash Handling System has led to forced outage of both units at NCTPP Stage II. As the design & Engineering vests with the execution, it is the responsibility of BHEL to install standby system also for trouble free uninterrupted operation of the system. **(TANGEDCO letters dated 28.4.2014, 16.6.2014, 23.7.2014 & 18.8.2014)**
	JPL desired to know reasons of blade failure at North Chennai and possible preventive actions at their 600 MW project site. It was informed to them that North Chennai-1 Turbine is under dismantling and BHEL experts are at site to examine and analyze reasons for failure. It there

	are any actions emerging from this analysis, same will be implemented at other project sites also. **Summary of discussions held with MD & CEO, JPL on 18.11.2014 relating to 4x600 MW Jindal STPP, Raigarh-JPL**
1x500 MW Bellary Unit-2 - KPCL (EPC)	Reply of BHEL regarding deviation in TG alignment from approved field quality plan is not acceptable and we request to arrange necessary corrective measures before rolling and synchronizing of the unit. This was due to certain imperfections in the coupling faces of both HP IP coupling half faces and IP-LP coupling half faces. **(KPCL letter dated 05.1.2012 and BHEL' Synopsis)**
	LP Rotor supplied by HEEP in above project was purchased with deviation after acceptance from M/s Siemens (technical collaborator) and HEEP issued additional guarantee of 50000 EOH for LP Rotor as the KPCL was not ready to accept the LP Rotor with deviation without additional guarantee. However, additional guarantee taken from the vendor or M/s Siemens for above deviation was not found on record. Further, HEEP supplied IP Inner casing with technical defects, had to be repaired by deputing HEEP, Haridwar team at site. BHEL site office has, however, incurred ₹ 1, 08,000/- on above repair. However, cost of deputing above team was not found on record. HEEP incurred an amount of ₹ 75.78 lakh on repair & maintenance and short supply against the above project. **(HEEP-Haridwar)**
	Bellary unit-2 was shut down due to failure of Boiler tubes on 26.11.2012. After Radiography tests conducted on 1200 joints in Economizer zone 393 weld joints were found defective. About 25 days time was taken for rectification of these joints. After synchronisation on 27.11.2012, the unit force tripped on 08.1.2013 (after 11 days) due to failure of Boiler tubes in LTSH zone. Frequent failure of boiler tubes of new unit which is under reliability operation stage is a matter of great concern. The unit has tripped 9 times since first synchronisation on 25.3.2012 on account of Boiler tube Failure only.**(KPCL letter dated 11.1.2013)**
	Failure of Exciter Rotor on 26.1.2013 while carrying out of commissioning activities **(KPCL letter dated 09.3.2013).** BHEL agreed to hand over a new Exciter Rotor assembly of similar type to KPCL
	On conducting the root cause analysis, it was found that indigenous Blower assembly was the root cause of the failure of the exciter rotor. In order to rectify the problem, we have replaced the blower assembly with imported version from Czechoslovakia, which is technically superior to former.- **BHEL E mail dated 8.6.2016**
	Deviation in alignment of Turbine during erection. Deviations in vibration were to be corrected to be within acceptable limits by BHEL during the first overhaul. BHEL had agreed to give an additional warranty for three years from COD if the vibration is beyond permissible limits due to run out deviation after carrying out correction during overhaul During last overhaul (Sept-Oct 14) the same could not be corrected by SAS, BHEL. In this connection a letter is also addressed to SABG, BHEL, Bangalore by CE(O&M) BT on 12.6.2015 informing that the vibration of TG bearings 5, 6, 7 and shaft vibrations have doubled compared to pre-overhaul values In view of persisting vibration problem we once again request your immediate action to address the issue and immediately arrange to furnish additional warranty for three years from COD as committed by you vide letter dated 21.2.2012 from ED(Marketing) addressed to MD, KPCL.-**KPCL letter dated 23.6.2015**
2 x 250 MW Bina TPS – Jaiprkash Power Ventures Limited	For restoration of the boiler Unit-1 (shut down on 21.11.2012 due to tube leakage) we required about 16 nos. of bends PGMA 16-275. These bend tubes were supposed to have been supplied by BHEL as part of mandatory spares already included in the contract. As such this shut down (generation loss of ₹22.3 crore) is totally attributable to BHEL. **(JPVL letter dated 28.11.2012)**
	Extra consumption of oil was attributed to improper commissioning/performance of BHEL Steam Generator **(JPVL letter dated 30.11.2012)**

	Unit 1 for which COD was declared on 31.8.2012 had to be shut down on 21.11.2012 due to tube leakage. This shows poor workmanship during erection and welding of pressure parts at site. **(JPVL letter dated 28.11.2012)**
	JPVL points out to uneconomical and inefficient operation of unit -1 and request BHEL for carrying out PG test. JPVL also asked BHEL to complete insulation work of Unit-1 and Unit-2 and take action to improve heat rate for Unit-2 **(JPVL letter dated 24.7.2013)**
	Supply of mandatory spares, completion of some works are still pending. PG test of ESP was not conducted on full load due to restriction of SLDC (regulatory board). Hence the PG test of ESP may be re-conducted. - **JPVL letter dated 18.12.2015**
2x 500 MW Anpara 'D' TPS-UPRVUNL	During execution, the chimney (which is part of BHEL's scope and sub contracted by BHEL to M/s Lanco) was constructed wrongly and required demolishing of the same and reconstruction of the chimney.(**Power Sector Marketing Note dated 1.11.2011)**
	MD/ UPRVUNL expressed deep concern over the delay in full load stabilization of both units leading to excessive oil consumption and consequent burden due to IDC. **(Record note of meeting held by MD, UPRVUNL with BHEL on 25.4.2016)**
1x700 MW Bellary unit no. 3 EPC-KPCL	On the ground that there had been alleged delay on the part of BHEL in completing project (1 x 250 MW Raichur Thermal Power Station – Unit no. 8), faulty workmanship on the part of BHEL and latent defects encountered after handing over of the unit, KPCL had alleged that it had consequently suffered an economic loss of ₹ 223.21 crore. BHEL had denied and disputed the said demand of KPCL but KPCL proceeded to recover the said amount from another contract with BHEL namely, the contracts for Bellary TPS Unit-3.(**BHEL letter dated 26.7.2016)**
1x250 MW unit no. 8 of Durgapur Power Station-DPL	Prior to 'Trial Operation' of the main plant, it was confirmed by BHEL-ISG that their system with contingency arrangements will be able to evacuate about 80 tons of fly ash per hour. Unfortunately, during operation of the plant, the system could evacuate about 15 to 20 tons of fly ash only, which resulted in high accumulation of ash in ESP hoppers and Intermediate Surge Hopper.(**DPL letter dated 10.10.2014)**
	Test synchronisation of the units was done on 28.3.2014. But till date, trial operation of the unit could not be done. The unit was lighted up on number of occasions but generation could not be continued for more than 7 to 11 days due to failure of Ash Handling System.**(DPL letter dated 12.11.2014)**
	Unit was commissioned on 31 March 2014, is still not operational at full load due to non-functional of Ash evacuation system. Requested to intimate the action plan for completion of Ash evacuation systems to achieve Trial Operation and realisation of payments in July 2015. **(GM(I)/Marketing IOM dated 08.6.2015 to ED/ISG)**
4x600 MW Jindal STPP, Raigarh-JPL	Core looseness was detected first time in Unit-1 generator at both Turbine End & Exciter End. The same was repaired by BHEL/Haridwar team at site. Further JPL requested BHEL to check core looseness in generators of Unit-2, 3 &4. On checking it was found that core looseness in generators of Unit-2, 3 &4 was more severe than Unit-1. Customer also intimated that "the nature of defect, in spite of rectification at site during warranty period does not fully eliminate the chances of failure. The risk as perceived is substantiated by the fact that similar defect has led to catastrophic failure in JITPL generator. It is evident that the situation has arisen out of serious and unusual manufacturing defect at BHEL's end and therefore, JPL is well within its rights to invoke the Clause No. 33 of GCC for Supply Contract, i.e. Rejection and Defective Plant." With the above, as a remedial measure, JPL requested BHEL to extend the warranty of all four generators of the Project for 10 years from the date of commissioning of respective units and asked BHEL to accept the same **(JPL letter dated 28.8.2015)**
	Frequent failure of ID Fan motor journal bearings. Already 4 nos. Journal bearing damaged. **(Minutes of meeting held on 17.6.2015)**
	In the recent past, there have been few failures of BHEL make Generator Transformers which resulted in outage and generation loss to the

	utilities. These failures have been examined in detail and RCA (Root Cause Analysis) indicates that these GTs have failed due to di-electric failure of bushings.**- GM(TCB), BHEL letter dated 7.1.14 addressed to ED, Power Sector (TS)**
	We have supplied 12 Nos 250 MVA Generator Transformers. Failed GTs are being repaired by us as an obligation under the contract. Spare GT is also in advance stage of manufacturing & expected for readiness for testing by 2nd week of Aug 2014.- **BHEL, Bhopal letter dated 18.7.2014**
	Failure of two No. GTs SL: 6006876 & 6006875-first GT has been repaired and will be ready for final testing by mid of Aug 14. Second failed GT is presently in transit to BHEL Bhopal. **(BHEL /Bhopal letter dated 9.8.2014)**
2x351 MW Project at Pipavav, Gujarat-GPPC	GPPC is incurring huge financial losses and commissioning due to quality control lapses during assembly of GT at BHEL Hyderabad factory of BHEL/GE. GPPC has already taken up with BHEL to supply new Balanced Compressor rotor and new compressor stator vanes at the earliest. **(GPPC letter dated 14.6.2012)** However, BHEL (HPEP, Hyderabad) did not replace the same as repair facilities were available at GE, Singapore
	In GPPC's board meeting dated 29.12.2012, it was decided that BHEL will be allowed to reassemble the GT-1 with blended rotor blades subject to submission of undertaking by BHEL providing for unconditional replacement of the affected rotor blades by brand new rotor blades free of cost basis to GPPC and an extended warranty for affected compressor rotor blades till the time these affected compressor rotor blades are replaced by new rotor blades by BHEL. **(PS-Mktg. note dated 18.12.2013)**
	We acknowledge your concern over damage occurred in GTC 2 during re-commissioning process on 11.3.2015. BHEL Haridwar has been directed categorically to dispatch the required material. **(BHEL letter dated 21.3.2015)**
	MD/GPPC raised quality issues experienced during re-start of Unit#2 like insert cover failure of Generator, bearing failure of Steam Turbine, bearing failure of CW Pump, Cooling Tower fan shaft failure etc. **(Summary of discussions dated 18.9.2015)**
726 MW HRSG project, Palatana-OTPC	GTG Rotor supplied by HEEP, Haridwar for the Unit-2 of the Project caught fire in February 2011 at DSTPS stores, where it was actually unloaded and stored. BHEL's representative examined damaged rotor at site and advised to bring it back to Haridwar works for detailed investigation and reconditioning.
	BHEL's representative has examined the damaged rotor at site and advised for bringing back to Haridwar works for detailed inspection and reconditioning.**(BHEL e mail dated 23.2.2011)**
	During the course of trial run of unit-1, two Gas Booster Compressors (GBCs) were damaged extensively, needing urgent repairs for which the GBCs have to be transported to BHEL, Hyderabad. In the absence of GBCs, the unit -2 cannot be commissioned**. (OTPC letter dated 7.8.2013)**
	Since 22.10.2013 when unit-1 was first synchronised with Grid in combined cycle mode, pre-commissioning test of unit-1 in integrated manner was started by BHEL. Before pre-commissioning tests could be completed and trial operation could be started, HRSG developed major defect in the form of hotspots leading to shutting down of unit 1 on 14.2.2013. In joint inspection it was found that problem has occurred due to installation of incorrect material by BHEL. Since, incorrect materials were installed by BHEL, responsibility for failure of HRSG and delay on account of failure of HRSG lies solely with BHEL. **(OTPC letter dated 20.11.2013)**
	Full load of STG#1:The matter of shortfall in performance is being analysed by cross-functional team of BHEL.- **BHEL letter dated 20.3.2014**

2x600 MW Shree Singhaji (Malwa)	On 6 April 2014 when execution of unit 2 was in full swing, during steam blowing operation, steam blowing device got failed. The rectified/ repaired parts came back to site in the month of August 2014 and the system was restored in September 2014. (**Management's reply referred to in PSSR report)**
Pragati Power Bawana	One Generator Transformer of 220 MVA 3-Ph 400 KV failed on 24.3.2015 during warranty period. Cost of repair of ₹4.40 crore was borne by BHEL
Santaldih TPP Extension (1x 250 MW) Unit-6 - WBPDCL	Details of major outages since commissioning (October 2011) up to 31.3.2013: Turbine vibration and over speed problem- failure of HP Turbine and Thrust Bearing due to manufacturing defects of the HP cylinder cashing. Finally, HP and LP Turbine was replaced by BHEL Hardwar Failure of boiler pressure parts (Economizer Stub Joint Failures)-failure suspected due to poor workmanship/improper welding and heat treatment procedure during manufacturing at BHEL Trichy workshop (iii) ID Fan 6A Shaft failure (iv) Turbine vibration TG Vibration balancing. (**status by WBPDCL as on 31.3.2013)**
Sikka TPP Extension 2 x250 MW, Unit 3 & 4 - GSECL	Station Service Transformer of unit 3 (commissioned on 29.3.2015) tripped on earth fault protection on 28.6.2015. Transformer could be sent to BHEL-Jhansi in 3rd week of May 2016 due to non-availability of handling system. This is a design defect of the Plant. **(GSECL letter dated 24.6.2016 addressed to GM/In-charge BHEL (PMG), New Delhi)**
	One 320 MVA, 3 –Ph. 235 KVA Generator Transformer failed due to winding on 24.3.2015 during warranty period. BHEL borne cost of repair of ₹ 35 lakh.
	Unit 3 was synchronized on 9.3.2015. Since then many modifications have been carried out by experts from BHEL but still we are unable to raise the load beyond 150 MW due to problem of heavy unburnt carbon in bottom ash and other problems. **(GSECL letter dated 16.10.2015)**
	Unit 4 was synchronized on 30.8.2015, but we are unable to put up in continuous operation due to problem in the milling system, bottom ash and other pending works. **(GSECL letter dated 16.10.2015)**
1x800 MW Wanakbori TPS Extension Unit no. 8-GSECL	Regarding balance project works of 1x500 MW Ukai Unit no. 6 and 2 x 250 MW Sikka unit 3 & 4, it is our grave concern that the work entrusted to BHEL ISG unit is not getting any momentum in any project. Also, the quality related issues are being faced by us which are getting resolved at later date - **GSECL letter dated 23.12.2014.**
2 x 250 MW Harduaganj unit 8 & 9- UPRVUNL	During operation of unit#9 at around 210 MW at 8:20 AM on 08.10.2012 two number of ESP-B pass hoppers have fallen down along with the associated structures. ESP internals collecting electrodes with frame have been deformed, fallen down and cable Gallery on right side of ESP has also fallen down causing tripping of 6.6 kV supply & auxiliaries on right side of boiler (ID fan-B, PA fan B)- Incidence report of ESP Hoppers damaged of unit#9 dated 08.10.2012
	We have already given reply to BHEL within the stipulated period of 04 weeks, as mentioned in the clause 15.8 of LOA, that trial operation has not been completed along with reasons vide UPRVUNL letter dated 20.10.2012 and 22.10.2012. This clause no. 15.8 of LOA supersedes the clause 25.3.3 of GCC as per article of Contract. BHEL has mentioned that to meet the operational requirement load of the machine was reduced is attributable to BHEL, as due to poor performance of the milling system mill got choked and load was reduced In view of the above BHEL has failed to achieve the full continuous load condition during the trial operation period of Unit 9.- **UPRVUNL**

	letter dated 05.11.2012
	Stator winding was damaged due to internal fault in the generator stator winding and not due to wrong synchronization of the unit.- **UPRVUNL letter dated 17.11.2012**
	To resolve the issue of "Un-burnt carbon in bottom ash and fly ash were on higher side" it was agreed on 24.7.2015 that BHEL/Trichy will depute expert for inspection and recommendation- **MOM held on 30.12.2015**
2 x 520 MW TPP at Vizag- Hinduja National Power Corporation Limited	It is to inform that most of the time Unit-1 was out of grid due to frequent problems in Boiler, Turbine, Switch yard, CHP and AHP. December 15: Line -4 isolator damaged, Boiler Tube Leakage and MOP breakdown; HP Casing Top bottom temperature difference, C&I Malfunction; Fire Protection acted due to wire looseness, C&I Malfunction January 2016: Boiler Tube Leakage (Economizer right side- 9 tubes); CPU-1 View glass damaged and heavy leakage of Resin from tank; MDBFP #1 Non-Drive end high vibrations; Low level in MOT and vacuum dropped in condenser February 2016: Economizer Coil Leakage; Condenser Tube Leakage; MDBFP #1 Non Drive end high vibrations The availability of unit-1 during Dec.15, Jan and Feb, 16 was 28%, 56% and 75% respectively. Though there is increasing trend in the availability of unit but it is yet to reach a level to be ready for Trial Operation of 720 hrs.- **HNPCL letter dated 01.6.2016**
2x270 MW GVK TPS-GVK Power Limited	Unit 2 stop valve actuator got damaged during commissioning of the valve prior to steam blowing. BHEL is yet to come out with a programme for rectification of damaged actuator. Turbine shaft vibrations for bearings 2, 4 and 7 were observed to be very high. Not safe to operate the unit continuously at high load. BHEL stated that matter is being referred to BHEL Haridwar with all details.- **GVK letter dated 11.3.2014**
	ESP LTMSB panels: - Unit-2 complete set will be sent back to M/s Spaceage works, in which 8 out of 11 panels are in damaged condition. - **Minutes of meeting between GVK and BHEL on 29.4.2013**
Santaldih TPP Extn. Unit-6 (1 x 250 MW)-West Bengal Power Development Corporation Limited (WBPDCL).	From 31.5.2012 to 17.12.2012 (for 6 months and 17 days) the Unit remained under shut down due to high vibrations of turbine supplied by the HEEP. Due to this shut down the WBPDCL had to suffer a production loss of 915 Million Unit electricity. BHEL's experts made an assessment of the problem at site and observed that – (i) Throttle governing amplifier module was found faulty needing replacement; (ii) Cracks on the LP Base plate were observed; and (iii) Rolling of Turbine on tracking device and abnormal sound from generator could not be observed since the Unit was under shut down.
	Turbine vibration- Failure of HP Turbine and Thrust bearing was complained due to manufacturing defects of the HP Cylinder casing (balance leak off hole not through). Same was rectified at BHEL, Haridwar and refitted.
	Turbine vibration and over speed problem – Suspected passing of valves for supply of test oil to Emergency governors, but no problem was found. Subsequently mechanical strikers suspected of not operating properly (spurious over speed trip) was also sent to Haridwar for testing and rectifications.
	Turbine vibration – From 1.06.2012 to 07.08.2012 the machine was rolled 13 times, but high vibrations were persisting. It was decided to open the HP (High Pressure) Turbine casing. On opening of the same 1st stage blade was found melted and pasted on cylinder. Finally, after replacement of HP and LP Turbine by BHEL, Haridwar, the Unit could be re-started.
	TG vibration balancing – After synchronization, bearing 2 & 4 shown high vibration. BHEL again inspected the bearings 1, 2, 3 & 4 and machine was again synchronized on 12.12.2012.

2x660 MW OPGCL/IB Valley BTG Package	Due to inadequate safety supervision of BHEL, an unfortunate fatality occurred in early January 2016. This incident was discussed at higher level meetings to bring seriousness on safety front. To our dismay another near miss accident occurred in early February 2016 where several tons of steel fell from 83 meters height to the ground. **(OPGCL letter dated 08.3.2016)**
2x800 MW Yeramaras-RPCL	One No. 315 MVA, 1-Ph 400 kV Generator Transformer (GT) failed on 17.9.2016 during warranty period due to failure of winding. GT is presently under repair in BHEL factory (December 2016).
Industry Sector	
12 Nos 160 MVA, 220/66 KV Power Transformers, 12 Nos. NIFPS & 6 Nos. spares for PSTCL, Punjab	Delay in supply of equipment due to delay in submission of initial drawings by BHEL-Jhansi. Against schedule date of completion of 31.3.2012, work was completed on 8.8.2013. Due to delay, M/s PSTCL withheld ₹2.20 crore on account of Liquidated Damages.
OPG Gujarat Unit 1	After commissioning of project, Unit # 1 was facing problems like lube oil leak from the Generator front and rear bearing from the day Unit# 1 synchronized (13 February 2015). Unit was kept in continued operation making some temporary arrangement to collect the leaking oil in drums (customer letter dated 18 April 2016). BHEL-HPEP also did not complete punch points as per contract,
	Issues like frequent failure of ESP HVR, procurement of ESP transformer materials, service charges for ESP transformer materials, procurement of Thyristro Capsule assembly for ESP etc. BHEL-Ranipet stated that two numbers of ESP HVRs were reported malfunctioning at OPG Polimer Gujarat Private Limited from unit-I. Based on site feedback, matter was taken up with supplier M/s Hind Rectifiers, Mumbai and these ESP HVRs were rectified and again put in to operation in Unit-I.
India Cement Limited	Items like rotor assembly, front housing assembly, Rear housing assembly, front bearing journal, rear bearing journal and steam chamber were sent back to BHEL for carrying out the rectification work.
	STG was initially commissioned on 18 July 2013 but due to high vibration turbine was brought to BHEL RC-Puram for repair and rectification and again re-commissioned at site on 30 November 2013. Finally, PG test was carried out on 05 May 2015
Anrak Aluminium Limited	Automatic Voltage Regulator (AVR) supplied by BHEL could not regulate the power factor and power factor went to the lead. As a result, the demand exceeded beyond 8.8 Mega Volt Ampere (MVA) and touched 24.8 MVA. In view of this, as per norm of R&C measures of EPDCL a penalty of ₹1.37 crore has been imposed on Customer. Customer vide letter dated 2 July 2013 stated that Unit-1 was synchronised on 22 April 2013 under the control of commissioning expert by BHEL-EDN and also stated that when Company found that AVR was not functioning, the Company should have stopped the commissioning process.
	During MOM dated 25 February 2016 it was agreed to rectify the problems of wheel chamber pressure of TG 1&2 showing 50 % lower than designed value during planned shutdown of TG units # 1&2. The expense incurred for rectification work will be shared between AKII and BHEL
SAIL IISCO Burnpur 3	Boiler #3 which was commissioned on December 2012, exploded in 12 March 2013. Customer awarded (31.03.2014) work for restoration of Boiler #3 power blowing station at value of ₹20 crore to BHEL. BHEL stated (April 2015) that Boiler #3 was commissioned on 5 December 2012 and was in commercial use by SAIL-ISP for more than 3 months until explosion in Boiler took place on 12 March 2013 due to prolonged wrong operation of Boiler by SAIL-ISP. Against this the customer responded (13 April 2015) that the trial run was done with

	LDO, any balance fuel line like COG, CBM & BOF/BFG were neither erected nor ready for firing. As such as per terms of contract, the criteria for commissioning was not achieved. There was no protocol signed between customer and BHEL for Trial run operation
	There were noises at 3 turbo blowers supplied by BHEL, Hyderabad during November 2015. The vendor (Filter Manufacturing Industries Private Limited) did not carry out the works required to reduce the noise at site. By September 2016, HPEP, BHEL had manufactured the duct required for controlling noise pollution and same was ready for despatch.
My Home Industries	Turbine gear problem, Turbine parting plane steam leakage, servo motor oil leakage and problems of AVR etc. as per customer to which BHEL agreed in MOM dated 24.01.2013. After opening of machine on 19.01.2013, the machine was thoroughly inspected by BHEL team and decided to shift the machine to Hyderabad for repair. Equipment such as Rotor Assembly, Inner casing, Guide blade carrier were sent back to HPEP, BHEL (04.06.2013) for rectification work. After opening the Turbine at unit, lot of sand stone in inner casing nozzle found, all BP gland fins on rotor were damaged and all fins were slightly bent in top guide blade carrier etc. Equipment were re-commissioned at site on 28.06.2014. In view of the repairs, the Customer adjusted back charges towards repair and handling charges of ₹1.76 crore from the dues.
	Even after re-fining/repair on rotor guide blade carriers and top and bottom with the spares, problems in machines like turbine gear problems higher steam consumption and AVR problems etc. was again mentioned by the customer.
	Since commissioning there had been 23 trippings and 833 hours of shutdown because of STG problems. Higher specific steam consumption to the tune of 4 *per cent* resulting in higher cost of generation leading to loss of about 4 crore per annum. BHEL agreed to replace items like steam traps, pilot valve body, HP heater -2 level transmitter and control valve hunting, AVR problem of frequent failure and higher extraction temperatures etc. BHEL agreed to conduct P.G. Test once again to clear any problems regarding performance of Turbine.
International Operations Sector	
Nyabarongo HEP, Rwanda	Temperature rise in 6.6 kV, Weld crack on liner plate and leakages from Radial Gate and issue of Generator Air Gap & Vibration of Lower Guide Bearing unit-1. Management vide letter dated 31 August 2016 had assured Customer to rectify the problems like weld crack on liner plate and leakage from Radial Gate would be attended during shut down of plant.
4x125 MW Kosti Thermal Power Plant, Sudan-M/s NEC	Rejection of Boiler Foundation work done by Civil contractor M/s MAM, Peeling off of the paint from the Boiler structure supplied by BHEL from India which were sand blasted and re-painted before erection resulting in additional cost.