



सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II

Power System Planning & Appraisal Division-II

सेवा मे / To,

संलग्न सूची के अनुसार

As per list enclosed

विषय: पारेषण तंत्र पर पूर्वी क्षेत्र स्थायी समिति (ईआरएससीटी) की प्रथम बैठक की कार्यसूची।

**Subject:** 1<sup>st</sup> meeting of Eastern Region Standing Committee on Transmission (ERSCT)  
- Agenda.

महोदय(Sir)/महोदया(Madam),

पारेषण पर पूर्वी क्षेत्र स्थायी समिति (ईआरएससीटी) की पहली बैठक 16 जुलाई, 2018 को प्रातः 10:00 बजे होटल नोवोटेल, न्यू टाउन, राजरहाट, कोलकाता में आयोजित की जायेगी। बैठक की कार्यसूची संलग्न है।

कृपया बैठक में सम्मिलित होने का कष्ट करें।

The 1<sup>st</sup> meeting of Eastern Region Standing Committee on Transmission (ERSCT) is scheduled to be held at 10:00 hrs on 16<sup>th</sup> July 2018 at Hotel Novotel, New Town Rajarhat, Kolkata.

Kindly make it convenient to attend the meeting.

भवदीय/Yours faithfully,

*बी.एस. बैरवा*  
10.7.2018

(बी.एस. बैरवा/ B.S.Bairwa)

निदेशक/ Director

**List of addressee:**

1. Member Secretary, Eastern Regional Power Committee, 14, Golf Club Road, Tollygange, Kolkata-700033. Tel. No. 033-24235199 Fax No.033-24171358	2. Managing Director, Bihar State Power Transmission Company, Vidyut Bhavan (4 <sup>th</sup> floor), Baily Road, Patna-800021. Tel. 0612-2504442 Fax No. 0612-2504557
3. Chairman-cum-Managing Director, Jharkhand Urja Sancharan Nigam Limited Engineering Building, H.E.C., Dhurwa, Ranchi-834004. Fax-0651-2400799	4. Chairman-cum-Managing Director, Orissa Power Transmission Corporation Ltd, Jan path, Bhubaneshwar-751022. Tel. No. 0674-2540098 Fax No.0674-2541904
5. Principal Chief Engineer cum Secretary, Power Department Government of Sikkim, Sikkim. Tel. No. 03592-2022440 Fax No.03592-202927	6. Managing Director, West Bengal State Electricity Transmission Company Ltd, Vidyut Bhavan (8 <sup>th</sup> Floor), A-block, Salt Lake City, Kolkata-700091. Tel. No. 033-23370206
7. Superintending Engineer, Electricity Department C/O Secretary (GA) Andaman and Nicobar Administration, Secretariat, Port Blair (AN)	8. Chief Operating Officer, Central Transmission Utility (CTU), Power Grid Corporation of India "Saudamini" Plot No. 2, Sector-29, Gurugram-122001 Tel. No. 0124-2571816 Fax No.0124-2571932
9. Director (System Operations), POSOCO B-9, Qutub Institutional Area, Katwaria Sarai, New Delhi-110016 Tel. No. 26852843 Fax No. 2626524525, 26536901	

**Special Invitee :**

1. Chairman-cum-Managing Director,  
Damodar Valley Corporation  
DVC Towers, VIP Road,  
Kolkata-700054.

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## **Agenda for 1<sup>st</sup> meeting of Eastern Region Standing Committee on Transmission (ERSCT) for planning of Transmission System**

Date : 16<sup>th</sup> July 2018      Time : 10:00 Hrs

Place : Hotel Novotel, New Town Rajarhat, Kolkata

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### **1.0 Confirmation of the minutes of 19<sup>th</sup> Standing Committee Meeting on Power System planning of Eastern Region(SCPSPER).**

- 1.1 The minutes of the 19<sup>th</sup> meeting of the Standing Committee on Power System Planning held on 01<sup>st</sup> September, 2017 at Kolkata were circulated vide CEA letter no. 66/5/2017/PSPA-2/1430-1444 dated 09<sup>th</sup> November, 2017. No comments have been received on the minutes of meeting.
- 1.2 Members may confirm the minutes of 19<sup>th</sup> Standing Committee Meeting.

### **Follow up issues of Previous Standing Committee Meetings**

#### **2. Installation of 3<sup>rd</sup> 400/220kV, 500MVA ICT at Patna (POWERGRID) S/s**

- 2.1 In the 19<sup>th</sup> SCM of ER held on 01-09-2017, it was decided to install 3<sup>rd</sup> 400/220kV, 500MVA ICT at Patna (POWERGRID) S/s. Following scope of work was agreed for the same in view of space constraints in installation of 3<sup>rd</sup> ICT:
  - (a) Shifting of one of the existing 420kV, 125MVA bus reactors at Patna and installation of the same in one of the circuit of Barh-Patna lines as switchable line reactor, which can be used as bus reactor in case of outage of line.
  - (b) Space created by shifting of bus reactor would be utilised for placement of 500MVA ICT.
  - (c) Additional 400/220kV, 500MVA ICT (3<sup>rd</sup>) along with associated bays at Patna.
- 2.2 MoP vide letter no. 15/2/2017 (Part-I)-Trans dated 10-01-2018 has entrusted POWERGRID to implement the above works through regulated tariff mechanism as part on ERSS-XII scheme.
- 2.3 Members may note.

#### **3. Modifications in the scope of works under the on-going ERSS-XVIII scheme**

- 3.1 In the 19<sup>th</sup> SCM of ER held on 01-09-2017, it was agreed in principal that no further works shall be carried out at Rajarhat S/s apart from the works which are under implementation as part of ERSS-V Scheme. Accordingly, LILO of Jeerat-Subhasgram 2<sup>nd</sup> 400kV line at Rajarhat S/s under ERSS-XVIII needs to be deleted from the scope of the scheme. It was also decided that final decision with regard to deletion of scope of LILO and associated bay extension works at Rajarhat S/s would be taken up in a separate meeting by CEA with all LTTCs

of ERSS-XVIII project. Accordingly, a meeting was held at CEA on 28-12-2017, wherein it was decided to drop the scope of implementation of LILO of Jeerat-Subhasgram 2<sup>nd</sup> 400kV line at Rajarhat S/s under ERSS-XVIII scheme (being implemented by M/s POWERGRID Medinipur Jeerat Transmission Ltd.). As none of the LTTCs were present in the meeting, they were requested to communicate their views on the decision within 30 days from date of issue of minutes. Further a time extension of till 15-03-2018 was provided by CEA for furnishing comments on the matter.

- 3.2 Now the decision of deletion of LILO of 2<sup>nd</sup> circuit of Jeerat – Subhasgram 400kV line at Rajarhat is being considered as final. Accordingly, the revised scope of works under ERSS-XVIII would be as follows:

Sl. No.	Transmission Element	Remarks
<b>Under the scope of M/s POWERGRID Medinipur Jeerat Transmission Ltd. (TBCB route)</b>		
1.	Establishment of 765/400kV, 2x1500MVA substation at Medinipur <u><b>765kV</b></u> <ul style="list-style-type: none"> <li>• ICTs: 7×500 MVA, 765/400kV (1-phase unit including 1 spare unit)</li> <li>• ICT bays: 2 no.</li> <li>• Line bays: 4 no.</li> <li>• Bus reactor: 7×110 MVAR single phase units including one (1) spare unit</li> <li>• Bus reactor bay: 2 no.</li> <li>• Space for future line bays (along with space for switchable line reactor): 4 no.</li> <li>• Space for future ICT bays: 2 no.</li> <li>• Space for future 765/400 kV ICT: 6x500MVA single phase units</li> </ul> <u><b>400kV</b></u> <ul style="list-style-type: none"> <li>• ICT bays: 2 no.</li> <li>• Line bays: 4 no.</li> <li>• Bus reactor: 2×125 MVAR</li> <li>• Bus reactor bay: 2 no.</li> <li>• Space for future line bays (along with space for switchable line reactor): 6 no.</li> <li>• Space for future ICT bays: 2 no.</li> </ul>	No change
2.	Establishment of 765/400kV, 2x1500MVA substations at Jeerat (New) <u><b>765kV</b></u> <ul style="list-style-type: none"> <li>• ICTs: 7×500MVA, 765/400kV (1-phase unit including 1 spare unit)</li> </ul>	No change

	<ul style="list-style-type: none"> <li>• ICT bays: 2 no.</li> <li>• Line bays: 2 no.</li> <li>• Bus reactor: 7×110 MVAR single phase unit including one (1) spare unit</li> <li>• Bus reactor bay: 2 no.</li> <li>• Space for future line bays (along with space for switchable line reactor): 4 no.</li> <li>• Space for future ICT bays: 2 no.</li> <li>• Space for future 765/400 kV ICT: 6x500MVA single phase units</li> </ul> <p><b><u>400kV</u></b></p> <ul style="list-style-type: none"> <li>• ICT bays: 2 no.</li> <li>• Line bays: 4 no.</li> <li>• Bus reactor: 2×125 MVAR</li> <li>• Bus reactor bay: 2 no.</li> <li>• Space for future line bays (along with space for switchable line reactor): 4 no.</li> <li>• Space for future ICT bays: 2 no.</li> </ul>	
3.	Ranchi (New) – Medinipur 765kV D/c line with Hexa ACSR Zebra conductor along with 765kV, 240 MVAR switchable line reactor with 750Ω NGR in each circuit at Medinipur end (total: 765kV, 7x80 MVAR single phase units, 1 unit as spare)	No change
4.	Medinipur - Jeerat (New) 765kV D/c line with Hexa ACSR Zebra conductor along with 765kV, 240 MVAR switchable line reactor with 600 Ω NGR in each circuit at Jeerat (New) end (total: 765kV, 7x80 MVAR single phase units, 1 unit as spare)	No change
5.	LILO of both circuits of Chandithala – Kharagpur 400kV D/c line at Medinipur	No change
6.	Jeerat (New) – Subhasgram 400kV D/c line (ACSR Quad Moose current rating at 85° C)	No change
7.	Jeerat (New) – Jeerat (WBSETCL) 400kV D/c line (ACSR Quad Moose current rating at 85° C)	No change
8.	LILO of Jeerat (WBSETCL) – Subhasgram (PG) 400kV S/c section at Rajarhat (POWERGRID)	<b><u>Deleted</u></b>
9.	2 no. 400kV GIS line bays at Jeerat (WBSETCL)	No change
<b>Under the scope of M/s POWERGRID</b>		
1.	2 no. 400 kV line bays at Subhasgram for termination of Jeerat (New) - Subhasgram 400 kV D/c line [ACSR Quad Moose] line	No change
2.	2 no. 400 kV line bays at Rajarhat for termination of LILO of Jeerat (WB) – Subhasgram (PG) 400 kV S/c section at Rajarhat (POWERGRID)	<b><u>Deleted</u></b>

3.	2 no. 765 kV line bays at Ranchi (New) for termination of Ranchi (New)- Medinipur 765 kV D/c line	No change
4.	240MVAR 765kV (765kV, 3x80 MVAR single phase units) switchable line reactor with 750Ω NGR in each circuit at Ranchi (New) end of Ranchi (New) – Medinipur 765kV D/c line.	No change

3.3 Members may concur the modifications in the scope of works of the ERSS-XVIII scheme.

**4. Termination of 400kV lines at Jeerat (WBSETCL) S/s under the ERSS-XV and ERSS-XVIII schemes**

4.1 In order to make way for termination of new 400kV lines being implemented under ERSS-XV and ERSS-XVIII at Jeerat (WBSETCL) S/s it was decided in the 19<sup>th</sup> SCM of ER to terminate the following existing 400kV lines of POWERGRID and WBSETCL through GIS:

**Existing:**

- (i) Jeerat (WBSETCL) – Baharampur/Farakka 400kV S/c line of POWERGRID
- (ii) Jeerat (WBSETCL) – Rajarhat/Subhashgram 400kV S/c line of POWERGRID
- (iii) Jeerat (WBSETCL) – Barkeshwar (WBSETCL) 400kV S/c line of WBSETCL
- (iv) Jeerat (WBSETCL) – Kolaghat (WBSETCL) 400kV S/c line of WBSETCL

**Under Construction:**

- (v) LILO of Sagardighi – Subhashgram 400kV S/c line at Jeerat (WBSETCL) as a part of ERSS-XV by POWERGRID
- (vi) Jeerat (New) – Jeerat (WBSETCL) 400kV D/c line (Quad) as a part of ERSS-XVIII being implemented under TBCB by POWERGRID Medinipur-Jeerat Transmission Ltd.

4.2 In regard to termination of the lines through GIS by POWERGRID as an additional scope under already approved ERSS-XV scheme, following was decided in the 19<sup>th</sup> SCM of ER held on 01-09-2017:

- (a) *Dismantling of dead end towers and termination of existing lines mentioned at 4.1 (i) to 4.1 (iv) through GIS duct to the existing 400kV Jeerat AIS S/s (WBSETCL).*
- (b) *It was also agreed that the termination of the WBSETCL lines mentioned at 4.1 (iii) & 4.1 (iv) through GIS duct to the existing 400kV Jeerat AIS S/s (WBSETCL) shall be implemented as ISTS and included in the approved scope of ERSS-XV being implemented by POWERGRID and cost recovered by POWERGRID as ISTS transmission tariff .*
- (c) *Further, it was also acknowledged that implementation of LILO of Sagardighi-Subhasgram 400kV at Jeerat along with associated line bays*

*shall get delayed by about one year due to addition of above mentioned GIS duct arrangement.*

*(d) The new lines mentioned at 4.1 (v) and 4.1 (vi) can be directly terminated on separate double ckt towers at normal height (around 45 meters) to new GIS extension area.*

- 4.3 As per POWERGRID's investment approval, the ERSS-XV scheme was to be completed by Apr 2018. In the 19<sup>th</sup> SCM of ER it was agreed that in view of modification in scope of works, the LILO of Sagardighi-Subhasgram 400kV line at Jeerat along with associated line bays will get delayed by about one year. Accordingly, the new completion schedule worked out to be Apr 2019.
- 4.4 The above works under the scope of POWERGRID involving termination of existing 400kV lines through GIS is being implemented by WBSETCL on deposit work basis. In this regard, MoU for execution of work through WBSETCL was signed on 22-08-2017 with completion schedule as Dec 2018. However, it is understood that tendering works is still in process by WBSETCL and award is expected in due course of time. Accordingly, due to delay in award of GIS works by WBSETCL completion of the ERSS-XV project could get delayed beyond Apr 2019 and further time extension in completion schedule may be required. This could also lead to delay in completion of ERSS-XVIII TBCB project (RfP schedule: July 2020).
- 4.5 WBSETCL may update for award of GIS works at Jeerat S/s and its commissioning schedule. The completion schedule of the ERSS-XV scheme needs to be modified accordingly.

4.6 Members may discuss.

## **5. Modifications in the scope of works under the on-going ERSS-XII and ERSS-XVII (Part-B) schemes**

5.1 The ERSS-XII and ERSS-XVII (Part-B) schemes inter alia includes following scope of works:

### **ERSS-XVII (Part-B):**

(a) Sasaram ICT-1 (released after replacement) may be diverted to Durgapur instead of Farakka

### **ERSS-XII:**

(b) New Purnea ICT-2 (released after replacement) may be diverted to Farakka instead of Durgapur

(c) Patna ICT-1 (released after replacement) may be diverted to Jamshedpur as ICT-3

5.2 Patna ICT-1 (released after replacement) which was to be diverted to Jamshedpur for installation has been burnt. Accordingly, New Purnea ICT-2 (released after replacement) has been sent to Jamshedpur instead of Farakka.

A new ICT is being procured to replenish the burnt Patna ICT-1. The same is now proposed to be installed as Farakka ICT-2 instead of Jamshedpur ICT-3. In the 19<sup>th</sup> SCM of ER, it was decided that in view of difficulty in transportation of ICT to Farakka, additional cost of about 4 Cr. would be incurred for transportation of the ICT through waterways. This would take about 15-18 month time for installation. Accordingly following modification is proposed in the scope of works of ERSS-XII scheme:

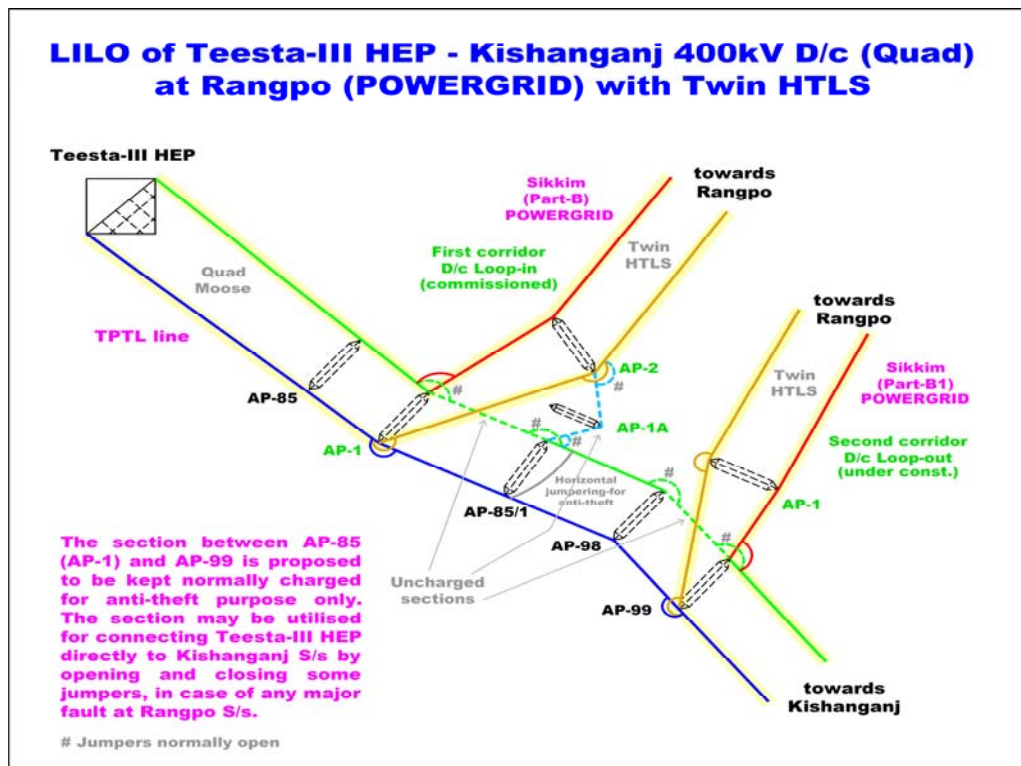
**Modifications in ERSS-XII scheme:**

- (a) New Purnea ICT-2 (released after replacement) may be diverted to Jamshedpur for installation as ICT-3
  - (b) Patna ICT-1 (viz. new ICT being procured to replenish the burnt ICT) may be diverted to Farakka for installation as ICT-2
- 5.3 Additional time of about 15-18 months will be required for installation of ICT-2 at Farakka switchyard on account of above.
- 5.4 Members may discuss.

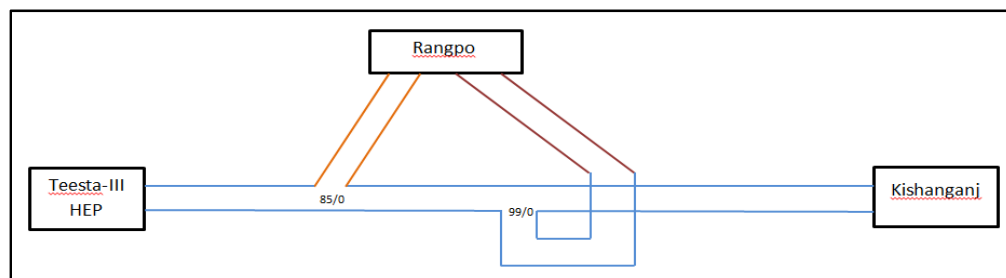
**6. LILO of Teesta-III HEP – Kishanganj 400kV D/c (Quad) line at Rangpo**

- 6.1 LILO of one circuit of Teesta-III HEP – Kishanganj line of M/s TPTL at Rangpo was under the scope of POWERGRID to be implemented as part of Transmission System for Transfer of power from generation projects in Sikkim to NR/WR (Part-B) scheme. The same has been completed. However, in view of non-readiness of Rangpo – Kishanganj section of Teesta-III HEP – Kishanganj line, the LILO section is being utilised for connecting Teesta-III and Dikchu HEPs to Rangpo S/s through D/c line. The tapping of Teesta-III HEP – Kishanganj line has been done at location AP-85 (AP-1). Upon completion of Rangpo – Kishanganj, the LILO section would be utilized for LILO of one circuit of Teesta-III HEP – Kishanganj at Rangpo S/s.
- 6.2 LILO of second circuit of Teesta-III HEP – Kishanganj line of M/s TPTL at Rangpo is under the scope of POWERGRID and is being implemented as part of Transmission System for Transfer of power from generation projects in Sikkim to NR/WR (Part-B1) scheme. The tapping of Teesta-III HEP – Kishanganj line is proposed at location AP-99. Upon completion of second LILO corridor, it is proposed that first LILO corridor may be utilised for Loop-in of both circuits from Teesta-III HEP at Rangpo S/s and the second LILO corridor may be utilised for Loop-out of both circuits from Rangpo S/s to Kishanganj S/s. The section of Teesta-III HEP – Kishanganj line between AP-85 and AP-99 locations (about 4.6km) would be kept anti-theft charged from one end. This section could be utilised for connecting Teesta-III HEP directly to Kishanganj S/s bypassing Rangpo S/s, in case of any major fault at Rangpo S/s.





6.3 The above arrangement is being proposed so as avoid crossing of one circuit while LILOing the other circuit at Rangpo as shown below. As such due to difficult terrain involving steep hills and forest area, it would be difficult to implement the LILO of 2<sup>nd</sup> circuit of Teesta-III HEP – Kishanganj 400kV D/c (Quad) line at Rangpo S/s as shown in arrangement below. Moreover, this would also result in high cost (due to increased line length and usage of heavy towers with uneven leg extensions) and damage to forest area.



6.4 Members may discuss the arrangement proposed at para 6.2 above for LILO of both circuits of Teesta-III HEP – Kishanganj line at Rangpo viz. D/c Loop-in of Teesta-III HEP – Kishanganj line at Rangpo at location AP-85 (AP-1) and D/c Loop-out of Teesta-III HEP – Kishanganj line from Rangpo at location AP-99 (or any adjacent location). Further, members may also discuss keeping the section between AP-85 (AP-1) and AP-99 anti-theft charged, which may be utilised in case of any exigencies at Rangpo S/s.

**7. Connectivity and LTA application of Odisha Integrated Power Ltd. (Odisha UMPP) and transmission system for power evacuation**

7.1 The 4000MW Connectivity and LTA applications for Odisha UMPP submitted by Odisha Integrated Power Ltd. (OIPL), wholly owned subsidiary of PFCCCL, are pending since long (June'14) on account of non-firming of generation project implementation. In this regard, it is to mention that CERC vide Amendment dated 17-02-2016 has directed CTU not to hold any application in abeyance and process them within the timeline prescribed in Regulation 7 of the Connectivity Regulations.

7.2 In the 19<sup>th</sup> SCM of ER held on 01-09-2017, the following transmission system was finalized for Odisha-UMPP:

- a) Split bus arrangement at Odisha UMPP (3x660MW in Section-A and 3x660MW in Section-B)
- b) LILO of Sundargarh-A – Dharamjaygarh 765kV D/c line at Odisha UMPP-A
- c) Odisha UMPP-B – Sundargarh-B 765kV D/c line
- d) Ranchi (New) – Gaya 765kV D/c line

It was also decided to provide OPGW connectivity to Odisha UMPP-A, 150km of OPGW (24 fibre) and associated communication equipment is to be installed on 765kV D/C Sundergarh-A – Dharamjaygarh line and respective terminal substations respectively by POWERGRID.

7.3 M/s OIPL in their Connectivity and LTA applications, had not clarified the unit size of the generation project and has left the decision of choosing unit size to the successful bidder. Now, M/s OIPL vide email dated 13-03-2018 has informed the unit size as 5x800MW.

7.4 Further, M/s OIPL had also not submitted the Ministry of Power's allocation letter. M/s OIPL vide letter dated 17-11-2017 has provided a letter of MoP in which the tentative allocation agreed in the meetings held on 10-07-2006 and 19-09-2006 is mentioned.

7.5 As the evacuation system was planned considering 6x660MW units with split bus arrangement at the UMPP bus (3x660MW in Section-A and 3x660MW in Section-B), revised studies for 2023-24 timeframe has been carried out with 5x800MW capacity for Odisha UMPP.

7.6 Both transmission system alternatives (3 units at UMPP-A bus or 2 units at UMPP-A bus) have been studied with the earlier approved transmission system. Based on load flow analysis, the revised transmission system for Odisha UMPP has been proposed as follows:

- Split bus arrangement at Odisha UMPP (3x800MW in Section-A and 2x800MW in Section-B)
- LILO of Sundargarh-A – Dharamjaygarh 765kV D/c line at Odisha UMPP-A
- Odisha UMPP-B to Sundargarh-B 765kV D/c line
- Ranchi (New) – Gaya 765kV D/c line

- 7.7 As per above, following transmission system is proposed for grating Connectivity and LTA to M/s OIPL:

**Transmission System for Connectivity:**

- Split bus arrangement at Odisha UMPP with 3x800MW in Section-A and
- 2x800MW in Section-B. For connectivity of 5x800MW, bus sectionaliser should be kept closed.
- Odisha UMPP-B – Sundargarh-B 765kV D/c line

**Transmission System for LTA**

- Split bus arrangement at Odisha UMPP with 3x800MW in Section-A and 2x800MW in Section-B. For connectivity of 5x800MW, bus sectionaliser should be kept normally open.
- LILO of Sundargarh-A – Dharamjaygarh 765kV D/c line at Odisha UMPP-A
- Ranchi (New) – Gaya 765kV D/c line

- 7.8 Further, it is required to provide OPGW connectivity to Odisha UMPP-A, 150km of OPGW (24 fibre) and associated communication equipment is to be installed on 765kV D/C Sundergarh-A – Dharamjaygarh line and respective terminal substations respectively by POWERGRID.

- 7.9 M/s OIPL vide its email dated 18-01-2018 has informed that the start date of connectivity and LTA may be considered as Unit-1: 01-04-2024 and each subsequent unit at an interval of 6 months thereafter. Accordingly, as requested by M/s OIPL, it is proposed to grant Connectivity and LTA to M/s OIPL for its 4000MW (5x800MW) UMPP project at Bhedabahal, Odisha w.e.f 01-04-2024 (LTA for 25 years from 01-04-2024). Upon grant of Connectivity and LTA, OIPL/beneficiaries need to sign requisite agreements within specified timelines for taking up the evacuation system for implementation, failing which the Connectivity and LTA intimations shall be liable for closure/cancellation.

- 7.10 Members may discuss.

**8.0 Perspective transmission plan of JUSNL up to 2021-22**

- 8.1 The perspective transmission plan of JUSNL was taken-up for discussion in the 19<sup>th</sup> SCM of ER, wherein it was decided that a separate meeting may be held at CEA to discuss the perspective intra-state transmission plan of JUSNL along with DVC. Accordingly, various rounds of discussions were held with all stakeholders at CEA on 23-10-2017, 15-11-2017, 04-12-2017 and 13-12-2017, wherein the perspective intra-state transmission plan of JUSNL was finalised. The copy of the minutes of the meeting held on 13.12.2017 is at **Annexure-8.1**

- 8.2 On the basis of studies, following five (5) new 400/220 kV SS were agreed in-principle in intra-state system of JUSNL:

(a) Jarsidih Substation, (400/220 kV, 2x500 MVA)

- (b) Chandil Substation (New) (400/220 kV, 2x500 MVA)
- (c) Koderma Substation (400/220 kV, 2x500 MVA)
- (d) Mander Substation (400/220 kV, 2x500 MVA)
- (e) Dumka Substation (New) (400/220 kV, 2x500 MVA)

Creation of above substation and interconnections between them would complete the 400kV high-capacity ring viz. Patratu TPS – Koderma – Jasidih-Dumka– Dhanbad (ISTS) – New Chandil – Patratu TPS in Jharkhand, which shall improve reliability of power transfer within the state.

- 8.3 JUSNL vide letter dated 14-06-2018 has forwarded the detailed scope of works included in their perspective transmission plan for 2021-22. The schemes are proposed to be implemented through PPP mode, World Bank funding and State funding. The final scope of works is given at **Annexure-8.2**.
- 8.4 CTU informed that JUSNL needs to indicate the following:
  - (a) Commissioning schedule of Patratu (3x800MW) TPS.
  - (b) Expected commissioning schedule of the proposed 400kV ring system inter alia including five (5) new 400kV substations and associated transmission lines.
  - (c) Confirm that the eight (8) substations in DVC command area are being implemented at suitable locations so as avoid duplication of infrastructure and ensure optimal utilisation of both DVC and JUSNL infrastructures.

8.5 Members may discuss.

## **9.0 System strengthening in southern Odisha**

- 9.1 In the 19th Standing Committee on Power System Planning for Eastern Region (SCMPSPER) held on 01.09.2017, it was decided that a separate meeting would be held at CEA to discuss the above issue.
- 9.2 Subsequently, a meeting was held on 03.07.2018 regarding above, wherein it following transmission system for additional feed to Southern Odisha was finalised.
  - a) Narendrapur – Therubali – Jeypore 400kV D/c line along with 400kV switching station at Therubali and suitable reactive compensation.
  - b) 765/400kV, 2x1500MVA new substation at Begunia
  - c) Switchgears should be designed for 50kA (or higher) and 63kA at 765kV and 400kV levels respectively at Begunia
  - d) Angul – Begunia 765kV D/c line
  - e) LILO of Pandiabil – Narendrapur 400kV D/c line at Begunia

9.3 Members may discuss.

## **10.0 Evacuation system for Kamakhyanagar (4x800MW) generation project**

- 10.1 Odisha is intending to setup a 2400MW (4x800MW) at Kamakhyanagar in two phases. 3x800MW in phase-1 and 1x800MW in phase-II. OPTCL has planned to evacuate full power with the following transmission system.
- 10.2 In the 19<sup>th</sup> Standing Committee on Power System Planning for Eastern Region (SCMPSPER) held on 01.09.2017, it was decided that a separate meeting would be held at CEA to finalize the evacuation system of Kamakhyanagar generation project.
- 10.3 Subsequently, a meeting was held on 03.07.2018 regarding above, wherein GRIDCO (vide their letter dated 02.07.2018) stated that scheduled COD of unit-1, unit-2 and unit-3 of Kamakhyanagar generation project is June 2022, December 2022 and June 2023 respectively.
- 10.4 Studies have been carried out by CTU and enclosed at Annex-9.1, Based on the results following evacuation system was finalized.
- a) Generation step-up to 765kV
  - b) Switchgears should be designed for 50kA (or higher)
  - c) LILO of Angul – Begunia 765kV D/c line at Kamakhyanagar
- 10.5 Members may discuss.

## **11. Status of downstream 220kV or 132kV network by STUs from the various commissioned and under-construction ISTS substations**

- 11.1 Many ISTS sub-stations have been commissioned and some are under construction for which the down stream system is being implemented by the STUs. Following downstream network along with expected commissioning schedule was informed by STUs, which needs to be updated:

### **A. Existing substations**

#### **(a) Chaibasa 400/220kV S/s**

- (i) Chaibasa (POWERGRID) – Noamundi (JUSNL) 220kV D/c – **yet to be awarded by JUSNL**

#### **(b) Daltonganj 400/220/132kV S/s**

- (i) Daltonganj (POWERGRID) – Latehar 220kV D/c – **Apr'19**
- (ii) Daltonganj (POWERGRID) – Garhwa 220kV D/c – **Dec'18**
- (iii) Daltonganj (POWERGRID) – Chatarpur/Lesliganj 132kV D/c – **Oct'19**

#### **(c) Bolangir 400/220kV S/s**

- (i) LILO of one ckt of Sadeipalli – Kesinga 220kV D/c at Bolangir – **Dec '18**

#### **(d) Keonjhar 400/220kV S/s**

(i) Keonjhar (POWERGRID) – Keonjhar (OPTCL) 220kV D/c – **June '18**

(ii) Keonjhar (POWERGRID) – Turumunga (OPTCL) 220kV D/c – **2019**

**(e) Pandiabil 400/220kV S/s**

(i) Pratapsasan (OPTCL) – Pandiabil (POWERGRID) 220kV D/c – **Dec'18**

**(f) Subashgram 400/220kV S/s**

(i) Subashgram (POWERGRID) – Baraipur 220kV D/c line – **Dec'18**

**B. Under Construction substations**

**(a) Rajarhat 400/220kV S/s: Expected by Dec'18**

(i) Rajarhat (POWERGRID) – New Town AA3 220kV D/c – **Matching**

(ii) Rajarhat (POWERGRID) – New Town AA2 220kV D/c – **Matching**

(iii) Rajarhat (POWERGRID) – Barasat 220kV D/c – **Matching**

**(b) Dhanbad 400/220kV S/s: May'19 (RfP Schedule)**

(i) Dhanbad – Govindpur 220 kV D/c – **JUSNL to update**

(ii) Dhanbad – Jainamore 220 kV D/c – **JUSNL to update**

11.2 Jharkhand, Odisha, and West Bengal may update the latest status of planned/under-construction downstream system.

**12. Interim connectivity to generation projects through LILO arrangement**

12.1 Numbers of generation projects in were granted Connectivity / Long Term Access (LTA) with strengthening of transmission system. In few cases generation projects were to be commissioned ahead of the anticipated commissioning of the associated transmission system. In such cases, generation projects were given temporary connectivity through loop-in & loop-out (LILO) of nearby transmission lines so as to enable them connect with the grid and commission their generation projects. The temporary connectivity through LILO was to be withdrawn after commissioning of the associated transmission system. Associated transmission system of some of such generation projects have been commissioned and their temporary connectivity through LILO has been disconnected; however, some are still connected through LILO arrangement.

12.2 Further, CERC in tariff petition for transmission system associated with Phase-1 IPPs in Odisha (Petition No.112/TT/13), has passed the order dated 07-10-2015 wherein the following direction has been given in para 65 of the order:

*"The associated transmission lines were to be constructed by the generation developer matching with the transmission system to be developed by the petitioner and the LILOs constructed by generation developers which were temporary arrangement were to be replaced by the associated transmission system. It is noticed that some of the generation developers have not commissioned the dedicated lines and are continuing to evacuate power through the temporary LILO arrangements. We direct the petitioner to discuss the issue in the Standing Committee Meeting on Transmission and finalize*

*the timeline for replacement of the LILOs of generation developer by dedicated transmission lines within a period of six months from the date of connection of LILO of the petitioner."*

- 12.3 Further, CERC in its order dated 28-09-2016 in Petition no. 30/MP/2014 has directed that:

*"CTU shall take up all the existing cases of connectivity on interim LILO with the RPC of respective regions within a period of one month from the date of issue of this order for review and decision on disconnection of the interim arrangements through LILO. All such interim arrangements through LILO shall be disconnected within a period of three months of the issue of this order unless the RPC grants extension for continuation of LILO keeping in view of all relevant factors."*

- 12.4 The progress of dedicated transmission lines of IPPs in Eastern Region, which were connected through interim arrangement, was reviewed in the 19<sup>th</sup> SCM of ER on 01-09-2017. The latest status of the dedicated transmission lines as reported by IPPs in recent meetings is summarized below:

<b>Generation Project in ER connected through temporary LILO arrangement</b>					
<b>Sl. No.</b>	<b>Generati on Project</b>	<b>IC (MW)</b>	<b>Present Connectivity through LILO</b>	<b>Final Connectivity Arrangement</b>	<b>Anticipated Completion Schedule</b>
1	Ind Barath Energy (Utkal) Ltd.	2x350	<b>LILO removed. Presently disconnected from Grid.</b>	Ind Barath - Jharsuguda 400kV D/c	The project is currently disconnected from the Grid. IBEUL has placed order to increase the tower heights at 4 locations. <b>CTU vide letter dated 18-06-2018, has served notice to IBEUL for termination of TSA in view of not opening/renewing LC as per CERC order dated 08-03-2018 in petition no. 229/RC/2015.</b>
2	Gati Infrastructure Ltd. (Chuzachen)	2x55	LILO of Rangpo - Gangtok 132kV S/c line ( <i>granted in Nov'07</i> )	Chuzachen - Rangpo 132kV D/c (with Zebra conductor)	Line completed. Project commissioned on interim arrangement. Line bays at Rangpo end being implemented by E&PD, Govt. of Sikkim were expected by Mar 2018 (as per 36 <sup>th</sup> TCC/ERPC)
3	Sneha Kinetic Power Projects Pvt. Ltd. (Dikchu)	2x48	LILO of one circuit of Teesta-III – Rangpo 400kV D/c line at Dikchu	Dikchu – Dikchu Pool 132kV D/c	( <sup>§</sup> )To be informed by E&PD, Govt. of Sikkim and project developer

Generation Project in ER connected through temporary LILO arrangement					
Sl. No.	Generati on Project	IC (MW)	Present Connectivity through LILO	Final Connectivity Arrangement	Anticipated Completion Schedule
			(granted in Dec'14 by CERC)		
4	Shiga Energy Pvt. Ltd. (Tashiding)	2x48.5	LILO of one circuit of Rangpo-New Melli 220kV D/c line at Tashiding through Tashiding-New Melli 220kV D/c	Tashiding – Legship Pool 220kV D/c line	Completion schedule of Legship Pool S/s and 2 no. 220kV line bays at New Melli needs to be informed by E&PD, Govt. of Sikkim

(§) *Dikchu Pool S/s is being implemented under Sikkim Comprehensive Scheme of Govt. of Sikkim (being implemented by POWERGRID on consultancy). The expected commissioning schedule of Dikchu Pool S/s and Dikchu – Dikchu Pool 132kV D/c line needs to be informed by Govt. of Sikkim and project developer respectively.*

- 12.5 Sneha Kinetic Power Projects Private Limited (SKPPPL) vide their letter dated 14.02.2018 have requested CEA to allow the continuity of existing connectivity of Dikchu HEP(96MW) at 400 kV level as a permanent arrangement and has further requested to allow the enhancement in quantum of power for connectivity by 10%.
- 12.6 In this regard, A Meeting was held on 26.03.2018 at CEA, wherein SKPPPL stated that Govt. of Sikkim had committed to provide power evacuation infrastructure at 132kV, level for the immediate evacuation of power from Dikchu HEP as part of comprehensive scheme for strengthening in Sikkim. Since there was time delay in execution of the 132 kV line by Govt of Sikkim, M/s SKPPPL had constructed interim arrangement for connecting Dikchu HEP at 400 kV level, which cost them around Rs. 80 crores. Now M/s SKPPPL want to retain their connectivity at 400 kV level only and stated that being very small in capacity, it does not affect the security of Grid.
- 12.7 Comprehensive Scheme inter alia covers Dikchu Pool substation along with Dikchu Pool – Parbing 132kV line and Chungthang – Singhik – Dikchu Pool – Samardong – Rangpo (POWERGRID) 220kV D/c corridor (operated at 132kV) to facilitate Sikkim in drawing its share of power from various HEPs including Dikchu HEP, which was proposed to be pooled at Dikchu Pool S/s. Dikchu pool substation is expected to be commissioned by September, 2018 and May 2019 respectively.



- 12.8 Sikkim Government may update the status of Dikchu HEP – Dikchu Pool 132kV D/c line.
- 12.9 Members may discuss.

### **New Transmission system proposals**

#### **13.0 Proposal for installation of 125 MVAR 420 kV Bus Reactors each at Gokarna, Kharagpur, New Chanditala, New PPSP and Durgapur 400 kV sub-stations of WBSETCL for proper reactive power management of the grid- (Agenda of WBSETCL)**

- 13.1 In view of high ratio of peak vs off-peak demand of West Bengal, it is experienced very high leading VAR dominating in the state grid due to capacitive effect of lightly loaded lines, so it is felt necessary to go for effective reactive power control for the state grid for proper reactive power management. During winter off-peak hours very high MVAR is generated from the lightly loaded EHT lines resulting very high system voltage (beyond IEGC specified limit) at different buses of important 400 kV substations of WBSETCL.
- 13.2 It is observed and reported that bus voltages at different 400 KV EHT substations are exceeding IEGC specified limit (+5%) during winter off-peak hours. As a result of this extremely high system voltage different equipments including LA etc are damaged and to nullify the capacitive effect of the under loaded lines, number of lightly loaded lines are made off to control the excessive leading VAR, which finally results reduction of redundancy/ network flexibility.
- 13.3 This scenario of the EHT grid of West Bengal is well supported by the fact that the state has paid Rs.23.76 Cr as VAR charge during the year 2016-17, in which the maximum charge is paid for leading VAR or for injecting VAR to the grid during off-peak hours.
- 13.4 Moreover, with due consideration of upcoming 400 kV and 765 kV lines in the state, it is felt extremely needed to install additional 420 kV Bus Reactors each at Gokarna, Kharagpur, New Chanditala, New PPSP and Durgapur 400 kV substations of WBSETCL for proper reactive power management of the grid.
- 13.5 So in consultation with SLDC scheme has been formulated based of study conducted by SLDC. Study revealed the necessity of additional bus reactors, which will not only reduce capacitive effect of lightly loaded lines in “(N-0)” condition, but also in case of outage of one Reactor in those selected substations, i.e. in “(N-1)” condition, the additional reactors will be in circuit to give the VAR support up to desire level.
- 13.6 WBSETCL has conducted feasibility study and space is available at respective substations for installation of the proposed 420 kV Bus Reactors.
- 13.7 A table is given below to show the existing vs proposed status of bus reactors in the state.

Sl. No.	Name of 400 kV Sub-station	Existing Capacity (MVAR)	Capacity under Installation (MVAR)	Proposed Capacity (MVAR)	Max. Bus Volt. in Dec 17 (kV)
1	Durgapur	1x50 (BR)	-	1x125 (BR)	422
2	Kharagpur	1x80 (BR)	-	1x125 (BR)	429
3	New Chanditala	1x80 (BR)	-	1x125 (BR)	430
4	Gokarna	1x80 (BR)	-	1x125 (BR)	425
5	New PPSP (GIS)	1x80 (BR)	-	1x125 (BR)	428
6	Arambag	1x50 (BR)	1x125 (BR)	-	436
7	Jeerat	1x50+1x50 (BR) & 1x63 (LR)	-	-	428

13.8 Members may discuss.

**14.0 Establishment of one 220/132/33 kV Sub-station near Falakata in Jalpaiguri/Coochbehar by LILO of Birpara - Alipurduar 220 kV D/C line of POWERGRID (Agenda of WBSETCL)**

14.1 The load growth at Coochbehar, Dinhata, Falakata & Mathabanga area in Jalpaiguri & Coochbehar district is taking place rapidly. Presently, power supply in these areas are met from Coochbehar 132 kV & Mathabanga 132 kV sub-stations. One 132 kV sub-station is under construction at Dinhata which is expected to be commissioned by 2018-19.

14.2 Main source of power of this area is Alipurduar 220 kV sub-station. There is another 132 kV connectivity of Mathabanga from Moinaguri 132 kV sub-station. Again, Moinguri 132 kV sub-station get power from Birpara 220 kV & NJP 220 kV sub-station via Mohitnagar 132 kV sub-station. The power map for overview of the scenario without and with Falakata is attached at Annexure-14.1 & 14.2 respectively.

14.3 For reliable power supply in that area WBSETCL has contemplated establishment of one 220/132/33 kV sub-station with 2x160 MVA, 220/132 kV Transformers near Falakata with D/C LILO of existing Birpara (PG) – Alipurduar (PG) 220 kV D/C line and 132 kV D/C interconnections to the nearby Mathabanga, Dinhata & Coochbehar 132 kV sub-stations.

14.4 The entire work would be executed by WBSETCL at their own cost.

14.5 Members may discuss.

**15.0 Construction of 2 nos. 132 kV feeder bays at Malda 400 kV substation of POWERGRID for evacuation of power (Agenda of WBSETCL)**

- 15.1 For effecting power supply at rated voltage with reliability, WBSETCL planned to establish one 132 kV sub-station at Manikchak/Paranpur in Malda district. Due to increase of load proper voltage could not be maintained at the consumer premises due to long 33 kV incoming line from Malda 132 kV sub-station of WBSETCL.
- 15.2 The main source of power in Malda district is 400/220/132 kV sub-station of POWERGRID at Malda. Installed capacity of Malda 400 kV sub-station is 3x160 MVA at 220/132 kV level. But for evacuation of power, there exists only one 132 kV D/C line presently with HTLS conductor.
- 15.3 Location map of the area is enclosed for reference as Annex-15.1. From the location map, it is observed that Manikchak/Paranpur is located nearer to Malda 400 kV sub-station of POWERGRID.
- 15.4 In view of above, it is proposed 132 kV D/C connectivity of Manikchak/Paranpur 132 kV sub-station with Malda (PG) 400 kV sub-station which will serve both evacuation of power as well as improvement of power supply condition in the district. The two nos. 132 kV bays at Malda (PG) 400 kV sub-station will be constructed by WBSETCL at its own cost.
- 15.5 Members may discuss.

**16.0 EVACUATION OF 280MW SOLAR POWER (Agenda by OPTCL)**

- 16.1 OPTCL has planned for evacuation of 280 MW out of 1000 MW Ultra Mega Solar Park Project of MNRE in the district of Sambalpur & Boudh in Odisha under Green- Energy Corridor Phase-II. The 280 MW Solar Park Project, will be implemented at two locations i.e at Jujumara cluster and Manmunda cluster.

OPTCL has proposed following power evacuation system for the Solar parks:

Sl. No	District	Tahasil	Village	Area (in ACS.)	Capacity (MW)	Power Evacuation proposal.
1	Sambalpur	Jujumara	Niladungri	287.0	55	Pooling Substation 400/220/132kV at Nildungri/Jujumara with 400kV LILO 400kV Meramundali-Lapanga and connectivity to 220kV Kiakata GSS & 132kV Maneswar GSS
			Kuturajori	274.2	55	
			Beldungri	582.1	115	

2	Boudh	Kantamal	Junani	87.5	30	Will be connected to 132/33 kV Sonapur & Boudh GSS through 132/33 kV pooling station at Manmunda
			Ghugulapadar	64.5		
			Kadampal	272	25	
Total				1415.3	280	

16.2 The 225 MW of Power generated from Nildungri, Kutrajhori and Beldungri will be done through 400/220/132/33kV Jujumara Pooling station while the 55 MW of power generated from Junani, Ghugulapadar and Kadampal will be done through the 132/33kV Manmunda Pooling station.

16.3 The Evacuation proposed by OPTCL for Jujumera and Manmunda is as follows:

	Scope of Works	Length in Ckm
1	<b>2x315 MVA 400/220/132 kV Jujumara Pooling Station &amp; Associated Lines</b>	
	400kV LILO Line (both the Ckts of Lapanga-Meramundali Line)	38
	220kV DC Line from Jujumara to Kiakata	144
	132kV DC line from Jujumara to Maneswar	24
	132kV DC Line from Interconnecting Point to Jujumara Pooling Station	30
2	<b>2x40 MVA 132/33 kV Manmunda Pooling Station &amp; Associated Line</b>	
	2 <sup>nd</sup> Ckt Stringing from Manmunda to Boudh & 132 kV LILO Sonapur -Boudh line to 132 kV Manmunda	34
	33kv Line from Interconnecting point to Manmunda Pooling Station	20

16.4 OPTCL informed that GEDCOL have stressed the need for planning of a robust system so as to evacuate additional power of around 100 to 150 MW in that area.

- 16.5 A meeting regarding above was held at 03.07.2018 at CEA, wherein it was agreed that the 132kV level would be dropped and 220kV level interconnecting line from solar parks to pooling station would be planned regarding Jujumera pooling station. It was also agreed that one circuit LILO of Meramudli- Lapanga 400kV D/c at Jujumera would be sufficient for evacuation of around 400MW.
- 16.6 It is also mentioned that as per point 16(2) of the Manual on Transmission Planning Criteria of CEA, the 'N-1' criteria may not be applied to the immediate connectivity of wind/solar farms with the ISTS/Intra-STS grid.
- 16.7 The revised proposal for Jujumera and Manmunda is as follows:

<b>Scope of Works</b>	
1	<b>2x315 MVA 400/220 Jujumera Pooling Station &amp; Associated Lines</b>
	400kV LILO Line (one circuit of Lapanga- Meramundali Line)
	220 kV Lines from solar generating stations to Jujumera Pooling Station
2	<b>2x40 MVA 132/33 kV Manmunda Pooling Station &amp; Associated Line</b>
	2 <sup>nd</sup> Ckt Stringing from Manmunda to Boudh & 132 kV LILO Sonepur -Boudh line to 132 kV Manmunda
	33kv Line from Interconnecting point to Manmunda Pooling Station

- 16.8 Members may discuss.
- 17. Grant of 200MW Connectivity to India Power Corporation Limited (IPCL) (Agenda by POWERGRID)**
- 17.1 M/s India Power Corporation Ltd. (IPCL - erstwhile DPSC) had earlier been granted Connectivity of 500MW (based on CERC order in petition no. 158/MP/2012 dated 21-09-2012) through establishment of Chalbalpur S/s along with LILO of one circuit of Mejia – Maithon 400kV line at Chalbalpur (to be implemented by M/s IPCL) vide intimation dated 12-10-2012.
- 17.2 Subsequently, vide letter dated 28-09-2016 M/s IPCL stated that in view of lower load growth, M/s IPCL has revised its transmission plan and now proposes to establish a 220kV substation at Debipur with 220kV line from Maithon (POWERGRID) S/s instead of its earlier proposed 400kV S/s at Chalbalpur.
- 17.3 Pursuant to above, M/s IPCL vide application dated 30-01-2017 had applied for Connectivity of 200MW to ISTS as Bulk Consumer. Further, M/s IPCL vide its letter dated 03-04-2017 informed that it is a Distribution Licensee and not a Bulk Consumer. Accordingly, CTU vide letter dated 12-04-2017 closed the

Connectivity application of M/s IPCL citing that a Distribution Licensee doesn't qualify for grant of Connectivity to ISTS as per the prevailing Connectivity Regulations/Detailed Procedure, 2009.

- 17.4 The matter regarding change in location and system was also discussed in the 12<sup>th</sup> Connectivity and LTA meeting of ER held on 01-09-2017. After detailed deliberations, M/s IPCL was requested to approach CERC in this regard.
- 17.5 Subsequently, in Petition No. 168/MP/2017 filed by M/s IPCL, CERC has passed an order on 29-01-2018 (order available at CERC website), wherein mainly following has been held:
- (a) *"If the CTU network is located near to the load centre and connectivity to the ISTS would result in development of efficient, coordinated and economical transmission system, then connectivity to ISTS cannot be denied to a distribution licensee."* [Para-18]
- (b) *"The Petitioner is already connected to the ISTS as the transmission of DVC has been declared as ISTS. There is no reason, why the Petitioner should be disallowed to be connected to the ISTS of PGCIL."* [Para-21]

Further, CERC had directed CTU to grant ISTS Connectivity to M/s IPCL. [Para-22]

- 17.6 Accordingly, as per system studies it was proposed to grant ISTS Connectivity of 200MW to M/s IPCL (for its application dated 30-01-2017) through Debipur (IPCL) – Maithon (POWERGRID) 220kV D/c line along with associated line bays at both ends w.e.f 30-06-2018 (as per application). Agenda note in this regard was circulated through letter dated 05-02-2018, which inter alia also proposed revocation of earlier granted connectivity of 500MW to M/s IPCL (erstwhile M/s DPSC Ltd.) at Chalbalpur substation. Comments on the proposal were received from WBSETCL vide letter dated 12-02-2018, which was replied by CTU on 16-02-2018. CTU vide letter dated 16-02-2018 granted connectivity of 200MW to M/s IPCL as "Distribution Licensee" in line with CERC order dated 29-01-2018 in petition no. 168/MP/2017 w.e.f 30-09-2019 through Debipur (IPCL) – Maithon (POWERGRID) 220kV D/c line along with associated line bays (2 no. each) at both ends. At the same time, CTU vide letter dated 16-02-2018 revoked the earlier granted connectivity of 500MW to M/s IPCL (erstwhile M/s DPSC Ltd.) at Chalbalpur substation.
- 17.7 Member may note.

### **Operational feedback report of POSOCO**

#### **18.0 Patna (POWERGRID) – Sipara (BSPTCL) 220kV lines**

- 18.1 Presently, there are three 220kV lines between Patna (POWERGRID) and Sipara (BSPTCL) S/s. The third line (200m) has been commissioned recently

and length of the same is 50% of that of first two lines (400m). This results in uneven loading on the circuits.

18.2 Major loads of Patna are fed from 220kV Sipara substation. Further, Sipara is connected with Khagaul as well as Fatuah at 220kV level. These are also major load centres normally fed in radial mode from Patna (except Fatuah, which is usually supplied radially from Biharsharif). Whenever 220kV Sipara-Khagaul is kept in service, it leads to very high loading of 220kV Patna-Sipara D/c and it does not satisfy N-1 security criteria for most of the time. The third 220kV circuit between Patna-Sipara has been commissioned recently. However at present this line cannot be operated in parallel with the other two circuits as impedance of the third circuit is 50% of that of other two circuits. So, it is being operated as Patna-Sipara-Khagaul line with no off-take at Sipara (implemented by split-bus operation at Sipara).

18.3 It is proposed that BSPTCL may re-conductor the third line with HTLS.

18.4 Members may discuss.

**19.0 Overvoltage at 400/220kV Arambagh (WBSETCL) S/s**

19.1 Arambagh is a major load centre of West Bengal. It is connected to the grid via 5 no. 400kV lines. Depending upon mode of operation of pump storage plant at Purulia and load requirements it is observed that many a times these lines become lightly loaded. Further, after commissioning 400/220kV Chanditala S/s (on LILO Kolaghat - Jeerat) loading of Arambagh ICTs have reduced. With no shunt reactive compensation at Arambagh, VAR injection from lightly loaded lines along with reduced drawl from 400/220kV ICTs, Bus voltage goes very high during night, particularly in lean hours during winter.

19.2 It is proposed that WBSETCL may plan installation of 420kV, 125MVAR bus reactor at its Arambagh S/s.

19.3 Members may discuss.



**भारत सरकार**  
**Government of India**  
**विद्युत मंत्रालय**  
**Ministry of Power**  
**केंद्रीय विद्युत प्राधिकरण**  
**Central Electricity Authority**  
**विद्युत प्रणाली योजना एवं मूल्यांकन प्रभाग-II**  
**Power System Planning & Appraisal Division-II**

No: 75/1/PSPA-II/2018/ 82-87

Dated: 12.01.2018

To

1	Managing Director, Jharkhand Urja Sancharan Nigam Limited, Engineering Building, H. E. C. Dhurwa, P.S.Hatia, Ranchi - 834004	2.	Director (System) Damodar Valley Corporation DVC Towers, VIP Road, Kolkata-700054
3.	Chairman and Managing Director, Jharkhand Bijili Vitran Nigam Limited, Engineer's Building, Dhurwa, Ranchi- 834 004	4.	COO(CTU-Plg), Power Grid Corp. of India Ltd.(PGCIL) "Saudamini", Plot No.2, Sector-29, Gurgaon 122 001, Haryana. FAX : 95124-2571932
5.	CEO, REC Transmission Projects Company Limited (RECTPCL), ECE House, 3rd Floor, Annexe - II, 28 A, KG Marg, New Delhi - 110001		

**Subject:** Minutes of Meeting regarding perspective transmission plan (2021-22) of JUSNL.

Sir,

Minutes of Meeting regarding perspective transmission plan (2021-22) of JUSNL held on 13.12.2017 at CEA is enclosed herewith.

Yours faithfully,

  
 (एस.के. रॉय महापात्रा /S. K. Ray Mohapatra)

मुख्य अभियंता /Chief Engineer (PSPA-2)

Copy to: PPS to Member(Power System), CEA



**Minutes of Meeting held on 13.12.2017 at CEA regarding JUSNL perspective transmission plan (2021-22)**

1. List of participants is enclosed at **Annexure-I**.
2. Chief Engineer, CEA welcomed the participants and highlighted about the revised Intra state Perspective Transmission plan (2021-22) report of Jharkhand state submitted by JUSNL based on discussions with DVC, CTU, CEA and JUSNL in the previous meetings.
3. The studies carried out by PRDC based on discussion held in previous meetings were deliberated at length. **The brief details of the discussions held during the meeting are as follows:**
4. A meeting was held with JUSNL, DVC, CTU & PRDC in CEA, New Delhi on 23.10.2017 to discuss perspective transmission plan (2021-22) of JUSNL considering existing and proposed transmission network ( The power map of Jharkhand submitted by JUSNL is at **Annexure-II**)
5. Director (Projects), JUSNL stated that as per the meeting held on 23.10.2017 and subsequent discussions on 15.11.2017 and 04.12.2017 with CEA & CTU regarding the JUSNL perspective plan (2021-22), PRDC have suitably incorporated the comments/observations of CEA & CTU, after further discussion with JUSNL. The remarks of PRDC/JUSNL and the changes incorporated in the report are enclosed at **Annexure –III & IV** respectively.
6. He further added that some part of the intrastate transmission system of Jharkhand is proposed to be implemented through PPP/TBCB route, 5 packages consisting of transmission elements have been identified for implementation through TBCB route. The draft packages to be considered for TBCB as prepared by JUSNL is enclosed at **Annexure-V**. The 132 kV down stream network is mostly covered under world bank /state funding schemes.
7. Director (PSPA-II), CEA stated that as per 19<sup>th</sup> EPS, the projected load of Jharkhand is 5193 MW at the end of 2021-22 (including JBVNL load of 3257 MW and DVC & Tata Steel load as 1936 MW). However, for study purpose, the same have been taken as 7097 MW (JBVNL load of 5161 MW (including 2 % transmission losses) and DVC & Tata Steel load as 1936 MW) by JUSNL.
8. Director (Project), JUSNL stated that following additional projected loads of Jharkhand, which were not envisaged in 19<sup>th</sup> EPS, have been taken into consideration for arriving at the total load projection in JUSNL's jurisdiction by 2021-22:
  - The additional bulk industrial load of 950 MW across JBVNL supply area as per the assessment of Industries Department based on the MOUs signed with Govt. of Jharkhand and JBVNL's plan for electrification of 30, 29,567 number of house hold

during 2017-2022 as per JUSNL letter to PRDC (**Annexure –VI**).

- Bulk load of 70 MW for supply to NTPC and SAIL.
- A load of 20 MW considered for proposed Airport at Deogarh.

The details of projected load by 2021-22 in JBVNL area under JUSNL supply is as follows:

<b><u>Load Calculation Parameter</u></b>	<b><u>2021/22</u></b>
Projected demand of existing domestic consumers in MW (A)	1137
Additional Projected load in domestic sector due to new house hold electrification in MW (B) (1/3 <sup>rd</sup> APL consumer= 1kW/ consumer 2/3 <sup>rd</sup> BPL consumer= 0.1kW/ consumer)	1218
Demand in existing Industrial and other sectors (except domestic sector in EPS) in MW (C)	877
Additional bulk load projected in Industrial sector as per Industries Department, Govt of Jharkhand load in MW (D)	950
Additional Bulk Industrial load projected for supply to NTPC and SAIL at 220 kV level in MW (E)	70
Additional load proposed for International Airport at Deoghar in MW (F)	20
DVC supply in JBVNL area in MW (G)	600
Distribution loss @21.25% as per 19 <sup>th</sup> EPS ( 2 % transmission loss excluded) in MW(H)	889
<b>Total Load in JBVNL area under JUSNL supply in MW (I) = (A+B+C+D+E+F-G+H)</b>	<b>4561</b>

9. Representative of DVC stated that presently the contractual demand of JBVNL with DVC is 890MVA at 33KV and 132KV level. It is being supplied from 18 Nos of 132KV/33KV or 220KV/33KV Sub-Station/generation Switchyards of DVC. DVC further added that for the last 3 months, the average maximum demand of JBVNL in DVC area was around 872 MVA. As per the perspective Intrastate transmission system Plan of JUSNL, **one (1)** 400KV/ 220KV/ 132KV/ 33KV Sub-Station at Koderma, **eight (8)** Nos. of 220KV/132KV/33KV sub stations at Gobindpur, Topchachi, Barkatha,Giridih, Baliyapur, Chandrapura, Bokaro, Hazaribagh and **fourteen(14)** Nos. 132KV/33KV Substations at Nirsa, Saria, Barhi, Jamua, Putki, Patherdih, Dugdha, Chandankiyari, Peterwar, Gola, Ramgarh, Patratu, Barkagao, Bishungarh, have been planned in the Geographical Locations

or nearby area of existing DVC Sub-Stations. The existing DVC substations in these areas are meeting the present demand of JBVNL.

10. Further, DVC stated that till the Sub-stations of JUSNL are commissioned and connectivity is established, the enhanced demand of JBVNL has to be catered by the existing infrastructure and connectivity with DVC. Accordingly, DVC has already planned for augmentation of transformation capacity at 132KV/33KV Koderma sub station (by, 30MVA), Additional 160MVA is already available in existing 400/220/132/33KV Koderma Thermal Power Station), 132KV/33KV Barhi sub station (by 80MVA), 132KV/33KV Nimiaghat sub station (by 100MVA) in Topchachi area, 132KV/33KV Ramgarh sub station (by 30MVA), 132KV/33KV Gola sub station (by 31.5MVA) 132KV/33KV Konar sub station (by 20MVA) in Bishungarh area and 220KV/132KV/33KV Bokaro Thermal Power Station (by 132/33 kV, 30MVA) in Gomia area. The augmentation works will be completed by the year 2019-2020.
11. DVC further informed that in previous meeting, JUSNL had confirmed that the existing load connected with DVC would continue to be supplied by DVC. However the same had not been confirmed by JBVNL, with which DVC had signed the supply agreement. JUSNL confirmed that the present contractual demand agreement between JBVNL and DVC is 600MW.
12. DVC also confirmed that JBVNL will switch over to Open access mode and will draw power from DVC Koderma Thermal Power Station to the tune of 600MW. Director(Project), JUSNL stated that the future load growth of JBVNL in the DVC area and loads that could not be served presently by DVC in the DVC area have been taken as additional load in the load flow study. This was discussed in the meeting convened by CEA on 23.10.17 and was also minuted wherein DVC and JUSNL were present.
13. DVC also put forward that enhanced demand in DVC areas can be catered from DVC sources such as Topchachi Area (from 132KV DVC Nimiaghat S/Stn), Barhi Area (From 132KV DVC Barhi S/Stn), Giridih Area (from existing 220KV/132KV/33KV S/Stn at Giridih), Gola Area (from 132KV DVC Gola S/Stn), Ramgarh Area (from 220/132KV/33KV DVC Ramgarh S/Stn), Hazaribagh Area (from 132KV/33KV Hazaribagh S/Stn). However the associated distribution Network may require revamping.
14. DVC requested that while finalising the perspective intra state transmission plan of Jharkhand, the above facts may be taken into consideration, so that parallel 220KV/132KV/33KV infrastructure in the DVC valley area is not created resulting in underutilisation of the existing and under construction transmission system infrastructure of DVC.

15. During discussion, it was brought to the notice by JUSNL that some of the substations and transmission lines proposed by JUSNL in the draft report are under construction by STU. Those lines & substations have also been considered in the studies.
16. On query by CE (PSPA-II) about creation of 220/132 kV new substations at Simdega, Noamundi and Khunti substations without any connectivity at 33 kV level. JUSNL informed that these new substations are being created due to non-availability of space for expansion at the existing 132/33 kV substations at these locations. Accordingly, provision has been made for interconnection of proposed new 220/132kV substations with existing 132/33kV substations at said locations through 132kV D/c line.
17. Chief Engineer (PSPA-II), CEA requested JUSNL to review the requirement of 132/33kV substations proposed in the report, based on load growth and other technical considerations, to avoid unnecessary burden on consumer. Some of 132/33 kV substation may be clubbed, if feasible.
18. Based on studies and above deliberations, following was agreed:
  - (a) JUSNL would coordinate implementation of various transmission elements being executed through PPP/TBCB route and under World Bank funding to avoid creation of stranded transmission assets and effective utilization of the assets. On the basis of studies, following five (5) new 400/220 kV substations were agreed in-principle in intra-state system of JUSNL and the matter would be taken up by JUSNL in the forthcoming Standing Committee Meeting on Power System Planning for Eastern Region (SCMPSPER) for formal approval.
    - (a) Jasidih Substation, (400/220 kV , 2x500 MVA)
    - (b) Chandil (New) Substation (400/220 kV , 2x500 MVA)
    - (c) Koderma Substation (400/220 kV , 2x500 MVA)
    - (d) Mander Substation (400/220 kV , 2x500 MVA)
    - (e) Dumka (New) Substation (400/220 kV , 2x500 MVA)

Creation of above substations and interconnections between them would complete the 400kV high-capacity ring viz. **Patratu TPS – Koderma – Jasidih- Dumka– Dhanbad (ISTS) – New Chandil – Patratu TPS in Jharkhand**, which shall improve reliability of power transfer within the state.

- (b) Considering the actual load growth of Jharkhand state during 2017-18, which is less by 1055MW as per 19<sup>th</sup> EPS projections, JUSNL is advised to take up the implementation/construction of new transmission systems in a phased manner.
- (c) JUSNL and DVC would hold a separate meeting along with JBVNL before finalization of following substations associated transmissions lines in DVC control area:

- a) 132kV level of 220/132/33kV, 2x200MVA+2x50MVA S/s at Hazaribagh
- b) 220/132/33kV, 2x200MVA+2x80MVA S/s at Gomia
- c) 220/33kV, 2x100MVA S/s at Barkatha
- d) 220/132/33kV, 2x200MVA+2x50MVA S/s at Topchanchi
- e) 132/33 kV S/s at Ramgarh
- f) 132/33 kV S/s at Gola
- g) 132/33 kV S/s at Peterwar
- h) 132/33 kV S/s at Putki

- (d) Following additional modifications were suggested during the meeting:
- i. Dropping of proposed shifting of Jadugoda (Old) - Ramchandrapur 132kV D/C line to Jadugoda (New) so as to form Jadugoda (New) - Ramchandrapur 132kV D/C line.
  - ii. Dropping of proposed shifting of Jadugoda (Old) - Golmuri 132kV S/c line to Jadugoda (New) so as to form Jadugoda (New) - Golmuri 132kV S/c line.
  - iii. Dropping of Jadugoda(New) - Jadugoda(Old) 132kV D/c line (with HTLS conductor).
  - iv. Dropping of Jadugoda(Old)-Surda 132 kV D/c line.
  - v. Jadugoda(New)-Surda 132kV D/c line (with HTLS conductor) is proposed.
  - vi. PTPS old generating units are being considered for retirement by 2021-22. Therefore, these generating units are to be considered as out of service. Accordingly, PTPS (Old) – Patratu (New) 220kV D/c HTLS line is to be deleted from scope.
  - vii. Dropping of Koderma-Jamua 132kV D/c line.
  - viii. Deletion of Mahuda - Baliyapur 132kV D/c line from PPP/TBCB and inclusion of same in state funding scheme.
- (e) Suitable reactive compensations at all voltage levels for effective voltage control like bus/line reactors at 400kV level and capacitors (if required) at 33kV level etc. shall be planned.(420kV, 2x125 MVAR bus reactors are to be provided at all of the above five 400kV substations).
- (f) JUSNL would review the requirement of new 132/33kV Sub stations considering the load growth and other technical consideration.
- (g) JUSNL would also take into consideration the following points:
- i. Consider GIS substation(s) in city areas/polluted areas/populated areas/areas requiring aesthetic consideration and HTLS conductor in high capacity corridors
  - ii. To conserve Right of Way (RoW), some transmission lines could be implemented using Multi Circuit Towers/ Multi Circuit & Multi Voltage Towers, especially in forest areas and lines passing through common corridor.

- iii. In case of termination of number of transmission lines at a substation like Mandar, Patratu (New) etc., the transmission lines in approach section of substation end may preferably be terminated on Multi Circuit Towers to avoid RoW issues.
- iv. The short time rating of switchgears in all new sub stations shall be as follows:
  - ✓ 400kV switchgear – 63kA ( for 1sec)
  - ✓ 220kV switchgear – 50kA ( for 1sec)
  - ✓ 132kV switchgear – 40kA ( for 1sec)
- (h) Based on above discussions JUSNL would finalise the perspective transmission plan ending on 2021-22 and accordingly finalise the schedule packages/schemes to be implemented through PPP/TBCB route or through World Bank funding. Single Line Diagram (SLD) for each substation is to be attached with relevant documents.
- (i) The power map showing transmission system of JUSNL has been revised incorporating all modification discussed above and is enclosed at **Annexure-VII**.



## Jharkhand Urja Sancharan Nigam Limited

### **ANNEXURE-I**

#### **PERSPECTIVE TRANSMISSION PROJECTS 2021-22 OF JUSNL (PPP Mode)**

S.N.	Name of GSS / Trans. Line	Capacity / length	
		Capacity in MVA	Line Length in KM
<b>A</b>			
1	<b>Establishment of new 400/220kV, 2x500MVA S/s at Chandil (New)</b>	1000	
2	Patratu_New (PVUNL) – Chandil (New) 400kV D/c line with Quad Moose conductor		135
3	Dhanbad(NKTL) – Chandil (New) 400kV D/c line with Quad Moose conductor		125
4	Chaibasa(PGCIL) – Chandil (New) 400kV D/c line with Quad Moose conductor		100
5	LILO of Ranchi(PG) – Chandil_Old (JUSNL) 220kV D/C at Chandil (New). Ranchi(PG) – Chandil_Old (JUSNL) shall be LILOed at Sawal (JUSNL) and Tamar(JUSNL) also, so as to form Ranchi(PG) – Sarwal (JUSNL) – Tamar (JUSNL) - Chandil(New) – Chandil (old)		20
<b>Sub -Total (A)</b>		<b>1000</b>	<b>380</b>
<b>B</b>			
1	<b>Establishment of new 220/132kV 2x200MVA and 132/33 kV 2x80MVA S/s at 220/132/33kV Bero</b>	560	
2	Mander (New) – Bero 220kV D/c line with Zebra conductor		21
3	Kamdara – Bero 132 kV D/c line with Panther conductor		50
<b>Sub-Total (B)</b>		<b>560</b>	<b>71</b>
<b>C</b>			
1	<b>Establishment of new 220/132kV 2x200MVA S/s at Noamundi (New)</b>	400	
2	Chaibasa(PG) – Noamundi (New) 220kV D/c line with Zebra conductor		69
3	Noamundi (Old) – Noamundi(New) 132kV D/c line with Panther Conductor		7

4	Manoharpur – Noamundi(New) 132kV D/c line with Panther Conductor		40
<b>Sub -Total (C)</b>		<b>400</b>	<b>116</b>
<b>D</b>			
1	<b>Establishment of new 220/132 kV, 2x200MVA S/s at Khunti (New)</b>	400	
2	Mander (New) – Khunti (New) 220kV D/c line with Zebra conductor		57
3	Simdega (New) – Khunti (New) 220kV D/c line with Zebra conductor		87
4	Khunti (New) – Khunti (Old) 132 kV D/c line with Panther conductor		14
5	LILO of Hatia (Old) – Kamdara 132 kV S/c line with HTLS (minimum 1050A) conductor at Khunti (New)		8
<b>Sub -Total (D)</b>		<b>400</b>	<b>166</b>
<b>E</b>			
1	<b>Establishment of new 400/220kV, 2x500MVA S/s at Dumka(New)</b>	1000	
2	Jasidih – Dumka 400kV D/c line with Quad Moose conductor		131
3	Dhanbad – Dumka 400kV D/c line with Quad Moose conductor		122
4	LILO of Dumka – Godda 220kV D/c line at Dumka (New) with Zebra conductor		5
<b>Sub-Total (E)</b>		<b>1000</b>	<b>258</b>
<b>F</b>			
1	<b>Establishment of new 400/220kV 2x500MVA, 220/132 kV 2x200MVA and 132/33 kV 2x80MVA S/s at 400/220/132/33kV Koderma</b>	1560	
2	Patratu(PUVNL) - Koderma 400kV D/c Quad Moose line along with 2x63MVAR switchable line reactor in both the circuits at Koderma end		150
4	Jasidih – Koderma 400 kV D/c line with Quad Moose conductor		135
5	Koderma – Giridih 220kV D/c line with Zebra conductor		80
<b>Sub-Total (F)</b>		<b>1560</b>	<b>365</b>
<b>G</b>			



1	<b>Establishment of new 220/132kV 2x200MVA and 132/33kV 2x80MVA S/s at 220/132/33kV Sarwal</b>	560	
2	LILO of both circuits of Ranchi (PGCIL) – Tamar at Sarwal on Multi ckt. Tower..so as to form Ranchi(PG) – Sarwal (JUSNL) – Tamar (JUSNL) - Chandil(New) – Chandil (old).		10
<b>Sub-Total (G)</b>		<b>560</b>	<b>10</b>
<b>H</b>			
1	<b>Establishment of new 220/132kV, 2x200MVA S/s at Jadugoda(New)</b>	400	
2	Chandil (New) – Jadugoda (New) 220kV D/c line with Zebra conductor		80
3	Chaibasa(PGCIL) – Jadugoda (New) 220kV D/c line with Zebra conductor		60
4	Jadugoda (New) – Dhalbhumgarh 132kV D/c line with HTLS(1000A) conductor (1000A)		10
<b>Sub-Total (H)</b>		<b>400</b>	<b>150</b>
<b>I</b>			
1	<b>Up-gradation of existing 132/33 kV Tamar S/s with 220/132 kV 2x200MVA ICT to form 220/132/33kV S/s</b>	400	
2	Operation of Chandil(Old) – Ranchi 220 kV line (presently operated at 132 kV) at rated voltage. Dismantling of existing 132 kV LILO section at Tamar. LILO of both circuits of Chandil (JUSNL) – Ranchi (PGCIL) 220 kV D/C line at Tamar on Multi ckt. Tower.		10
<b>Sub-Total (I)</b>		<b>400</b>	<b>10</b>
<b>J</b>			
1	<b>Establishment of new 400/220kV, 2x500MVA S/s at Mander</b>	1000	
2	LILO of both the circuits of Ranchi(PG) – Patratu (New) 400 kV D/C Quad Moose line at Mander		10
3	220 kV D/C line : Mandar - Ratu (JUSNL)		15
4	LILO of Hatia - Lohardaga 220 kV D/C line at Mandar		10
<b>Sub-Total (J)</b>		<b>1000</b>	<b>35</b>
<b>K</b>			
1	<b>Establishment of new 220/132kV 2x200MVA and 132/33 kV 2x50MVA S/s at 220/132/33 kV Palojori</b>	500	

2	LILO of 220 kV D/C Dumka –Govindpur Line at Palojori GSS		10
<b>Sub-Total (K)</b>		<b>500</b>	<b>10</b>
<b>L</b>			
1	Establishment of new 220/132kV, 2x200MVA S/s at Simdega(New)	400	
2	Simdega(New) – Simdega(Old) 132 kV D/c line with Panther conductor .		10
<b>Sub-Total (L)</b>		<b>400</b>	<b>10</b>
<b>M</b>			
1	Up-gradation of 220/132kV Jasidih S/S with 400/220kV, 2x500MVA ICT to form Jasidih 400/220/132 S/s	1000	
<b>Sub -Total (M)</b>		<b>1000</b>	<b>0</b>
<b>N</b>			
1	Extension at 400/220kV Patratu(New) JUSNL S/S with 220/132kV 2x200MVA and 132/33kV 2x50MVA ICT to form Patratu 400/220/132/33kV S/s	500	
2	220 kV D/C line for termination of existing PTPS (Old) – Hatia(New) 220 kV D/c line at Patratu (New) so as to form Patratu(New) – Hatia (New) 220 kV D/c line.		2
3	132kV D/c line for termination of existing PTPS(Old) – Hatia(Old) D/C (with one circuit LILO at Kanke) from PTPS(Old) to Patratu (New) so as to form Patratu(New) – Hatia (Old) D/c line (with one circuit LILO at Kanke)		2
<b>Sub-Total (N)</b>		<b>500</b>	<b>4</b>
<b>O</b>			
1	Establishment of new 220/132kV, 2x200MVA and 132/33 kV 2x50MVA S/s at 220/132/33kV Hazaribagh	500	
	Tenughat TPS – Hazaribagh 220kV D/c line with Zebra conductor		58
<b>Sub-Total (O)</b>		<b>500</b>	<b>58</b>
<b>P</b>			
1	Establishment of new 220/132kV 2x200MVA and 132/33kV 2x80MVA S/s at 220/132/33kV Gomia	560	
2	Topchachi – Gomia 220 kV D/c line with Zebra conductor		50

3	Tenughat (TPS) – Gomia 220 kV D/C line with HTLS(1600A) conductor		10
<b>Sub-Total (P)</b>		<b>560</b>	<b>60</b>
<b>Q</b>			
1	<b>Establishment of new 220/33kV, 2x100MVA S/s at Barkatha</b>	200	
2	Barkatha – Hazaribagh 220kV D/c line with Zebra conductor		18
<b>Sub-Total (Q)</b>		<b>200</b>	<b>18</b>
<b>R</b>			
1	<b>Establishment of new 220/132kV 2x200MVA and 132/33kV 2x50MVA S/s at 220/132/33kV Topchanchi</b>	500	
2	Baliyapur – Topchanchi 220kV D/C line with Zebra Conductor		50
3	Putki – Topchanchi 132kV D/C line with Panther Conductor		27
<b>Sub-Total (R)</b>		<b>500</b>	<b>77</b>
<b>S</b>			
1	<b>Establishment of new 220/132kV 2x200MVA and 132/33kV 2x50MVA S/s at 220/132/33kV Baliyapur</b>	500	
	LILO of 220 kV D/C Dumka –Govindpur Line at Baliyapur GSS		7
<b>Sub-Total (S)</b>		<b>500</b>	<b>7</b>

# ODISHA TRANSMISSION SYSTEM

Exhibit-E2

## Odisha UMPP, Talcher-III, Talabira & Kamakhyanager

