



Government of India
Ministry of Power
Central Electricity Authority
System Planning & Project Appraisal Division
Sewa Bhawan, R. K. Puram, New Delhi-110066
Website: www.cea.nic.in



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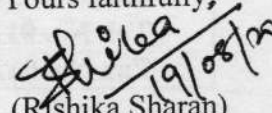
-As per List Enclosed-

Sub: Summary record of discussions of the 18th meeting of the Standing Committee on Power System Planning of Eastern Region on 13.06.2016 at Kolkata.

Sir/Madam,

Minutes of the meeting for the 18th Standing Committee Meeting on Power System Planning in Eastern Region held on 13.06.2016 at Kolkata is uploaded on the CEA website: www.cea.nic.in. (path to access: Wings of CEA/Power Systems/Standing Committee on Power System Planning/EASTERN REGION).

Yours faithfully,


(Rishika Sharan)
Director (PSPA-2)

Copy for kind information to:

1) PPS to Chairperson/Member(PS), CEA

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. Director (Projects), Power Grid Corporation of India "Saudamini" Plot No. 2, Sector-29, Gurgaon-122001 Tel. No. 0124-2571816 Fax No.0124-2571932
3. Executive Director (System), Damodar Valley Corporation DVC Towers, VIP Road, Kolkata- 700054. Tel. 033-23557939 Fax No. 033-23554841	4. Managing Director, Bihar State Power Transmission Company, Vidyut Bhavan, Baily Road, Patna-800021. Tel. 0612-2504442 Fax No. 0612-2504557

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Copy to:

1. COO (CTU), PGCIL, Saudamini, Plot No. 2, Sector-29, Gurgaon-122001. **Fax No. 0124-2571760/62)**
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Minutes of 18th Standing Committee Meeting on Power System Planning of Eastern Region

- 1.0** Member (PS) welcomed the participants and thanked POWERGRID for hosting the meeting in Kolkata, "City of Joy". He stated that the transmission system is planned for meeting future load growth, evacuation of power from upcoming generating projects, delivery of power to beneficiary states and improving the reliability of existing transmission system. He requested the partner states to be specific and resolve all the issues amicably through healthy and result oriented discussions. He requested Chief Engineer, CEA to start the proceedings.

Chief Engineer(PSPA-2) also welcomed the participants and after a brief introduction of participants, he requested Director(PSPA-2), CEA to take up the agenda items.

The minutes may be read along with the Agenda note circuited for the meeting. List of the participants is enclosed at Annexure-I

2.0 Confirmation of the minutes of 17th Standing Committee Meeting on Power System planning of Eastern Region.

- 2.1** Director (PSPA-2) informed that the minutes of the 17th meeting of the Standing Committee on Power System Planning held on 25th May, 2015 at NRPC, New Delhi were issued in June 2015 and were also uploaded on CEA web site. He stated that three corrigenda were issued on the basis of comments received from PGCIL, ERPC, WBSETCL and BSPTCL. Revised minutes of the 17th SCM, including all corrigendum were also uploaded on CEA website on 01-01-2016.
- 2.2** Subsequent to that POWERGRID has informed that under item no. 30 of the revised minutes, 50 MVAR switchable line reactors for Biharsharif - Sasaram 400 kV D/c (Quad) line has been mentioned at Sasaram end of the line, and not at Biharsharif end. CEA asked PGCIL to inform about actual reactor installed at Sasaram, Biharsharif and Varanasi end of the line.
- 2.3** AGM, POWERGRID explained that there are two no. 400 kV D/C lines between Sasaram and Biharsharif, first D/C line is with twin Moose conductor (ckt 1 & 2) and second D/C line is with Quad Moose conductor (ckt. 3 & 4). In the 5th meeting of SCSPER held on 5-5-2007, the second D/C line was approved without line reactor at Biharsharif end and 63 MVAR switchable line reactor at Sasaram end. Keeping in view the line lengths and voltage profile of ER, 50 MVAR switchable line reactors were installed at both Sasaram and Biharsharif ends of second D/C line for both the circuits. He informed that in the 29th meeting of SCMPSPNR held at POWERGRID office, Gurgaon on 29-12-10, extension of Biharsharif - Sasaram 400 kV D/c (Quad) line to Varanasi bypassing Sasaram was agreed and has been

completed. He further informed that out of 2 line reactors (50 MVAR each) at Sasaram end of the earlier Sasaram-Biharsharif line (ckt no. 3 & 4), one reactor has been used as line reactor for Sasaram (ER end) – Varanasi - Allahabad 400 kV line and 2nd line reactor is now spare and would be put to use in future.

- 2.4 In view of the above, Director (PSPA-2), CEA requested for approval of the revised minutes of the 17th meeting as uploaded on CEA website on 01-01-2016 with para 30.0 as given below.

“POWERGRID stated that the approved scope of the subject transmission system indicated 2 nos. 400 kV line bays (without reactor) at Biharsharif for termination of Biharsharif - Sasaram 400 kV D/c (Quad) line. Keeping in view the line length and voltage profile in ER, 50 MVAR line reactor at Biharsharif end of both circuits of Biharsharif - Sasaram 400 kV D/c (Quad) line (200km quad conductor) was incorporated in the DPR of the subject scheme. However, CERC (vide Order No. 187/TT/2011) disallowed the tariff for these line reactors sighting non-approval in Standing Committee and ERPC as the reason. Accordingly, constituents’ approval for these reactors is required. The matter was discussed and members agreed for post-facto approval of installation of 50 MVAR line reactors at Biharsharif end of Biharsharif -Sasaram 400 kV D/c line.”

- 2.5 The members approved the changes and confirmed the revised minutes with the para 30.0 as given above.

3.0 Status of progress of ISTS and TCB schemes:

- 3.1 Director (PSPA-2) stated that status of ongoing ISTS scheme under regulated tariff mechanism and through tariff based competitive bidding by various transmission service providers has been enclosed with the agenda at Annexure-II & III respectively. Further, the status of ISTS scheme that are under bidding process, was provided at Annexure-IV of the agenda.
- 3.2 Chief Engineer, CEA stated that 400 kV D/c Talcher – Behrampur – Gajuwaka line was awarded to M/s Reliance under tariff based competitive bidding in May 2010, but construction of line had not been started yet. Absence of this line, is restricting power flow to Southern Region through 2x500 MVA back to back at Gazuwaka under low hydro condition. Hence, an additional system strengthening in Southern part of Odisha is required to deliver more power to Southern Region. Further, if in future 400 kV D/c Talcher–Behrampur-Gajuwaka line comes, it would give additional strength to the Odisha transmission system and would also improve the low voltage problem in the area.
- 3.3 After further deliberations, it was decided that the additional system strengthening which would be independent of the Talcher–Behrampur-Gajuwaka scheme, may

be planned after joint study by CEA, CTU, and Odisha. The results would be discussed in the next meeting.

3.4 Members noted the progress of various ISTS schemes as given in the Agenda.

4.0 Transmission System Strengthening in Indian System for Transfer of power from Hydroelectric Project in Bhutan – Multi Circuit at Alipurduar end

4.1 Director (PSPA-2), CEA stated that the scheme “Requirement of additional system strengthening in Indian portion” for evacuation of power from hydro projects in Bhutan was agreed in the 16th SCM held on 02nd May 2014. The scope of works covers construction of Jigmeling – Alipurduar 400kV D/c (Quad) line (Indian Portion) by POWERGRID and (i) Alipurduar – Siliguri 400kV D/c (Quad) line (ii) Kishanganj – Darbhanga 400kV D/c (Quad) line, by M/s Kalpatru under TBCB.

4.2 He added that POWERGRID has informed that severe right of way problems is being faced for line entry at Alipurduar S/s and POWERGRID had proposed to construct the Jigmeling – Alipurduar and Alipurduar – Siliguri 400 kV (Quad) lines on Multi-Circuit (M/c) tower for about 5 km at Alipurduar end. The M/c portion would be built (along with conductor stringing in all four circuits), owned, operated and maintained by POWERGRID. The Alipurduar – Siliguri line being built under TBCB would be terminated at start of the M/c portion. Accordingly, the coordinates of starting point of M/c portion has been provided in RfP document for termination of Alipurduar – Siliguri line.

4.3 Members noted the above and approved the construction, operation and maintenance of Jigmeling – Alipurduar 400kV D/c line and Alipurduar – Siliguri 400kV D/c (Quad) line on Multi-Circuit (M/c) tower for about 5km at Alipurduar end by POWERGRID along with stringing of conductors in all four circuits.

4.4 POWERGRID stated that they are also implementing LILO of both circuits of Bongaigaon-Silliguri 400 kV D/c (Quad) (under TBCB) line at Alipurduar on multi circuit tower for about 2 km at Alipurduar end because of RoW problem.

4.5 Members noted the same.

5.0 Change of scope of the scheme under Eastern Region Strengthening Scheme-XVIII (ERSS-XVIII):

5.1 Director (PSPA-2) stated that ERSS-XVIII scheme for 765 kV System Strengthening in ER (Phase-I) was agreed in the 17th meeting of SCSPER held in May, 2015 with the scope of works as given in Agenda. Later on, WBSETCL informed that Haldia NIZ 400 kV S/S was planned in anticipation to provide connectivity to India Power Corporation Ltd. (IPCL) (3x150 MW) and Haldia Energy Limited (HEL) (2x300 MW) generation projects. In view of power from the HEL generation project being evacuated through Haldia-Subhashgram (PG) 400 kV

D/C line and IPCL connectivity at 220 kV level, they are not implementing the Haldia NIZ 400 kV S/S.

- 5.2 Director (PSPA-2) added that in this regard a meeting was held in CEA under chairmanship of Member (PS), CEA on 29.03.2016, wherein, it was decided to delete of Medinipur-Haldia NIZ 400kV D/C line along with associated bays at Medinipur from the scope of ERSS-XVIII. In the meeting, it was also informed that there is space constraint at Jeerat (WBSETCL) for termination of 2 no 400 kV AIS bays for Jeerat-Jeerat (WBSETCL) 400 kV D/c line and it was decided to construct the 2 no. 400 kV bays at Jeerat (WBSETCL) as GIS and necessary space for the same would be provided by WBSETCL.
- 5.3 He further added that in a meeting taken by Member (PS), CEA on 12.05.2016 to resolve issues related to Tariff Based Competitive Bidding (TBCB) scheme in Eastern and North Eastern Region, it was decided to provide one spare unit of line reactor of 80 MVAR each at Medinipur and Jeerat New end of Ranchi-Medinipur 765 kV D/C line and Medinipur - Jeerat (New) 765kV D/c line.
- 5.4 WBSETCL informed that there may be severe RoW problem for construction of both Jeerat (New) – Jeerat (WB) 400 kV D/c line and Jeerat (New) – Subhasgram 400 kV D/c line. He suggested that to provide connectivity between Jeerat (New) and Jeerat (WBSETCL), lines terminating at Jeerat (WBSETCL) may be LILO at Jeerat (New).
- 5.5 GM, CTU stated that Jeerat, Subhasgram and Rajaharat 400 kV Sub-stations are the major load centres in West Bengal and the lines terminating at Jeerat (WBSETCL) S/s have limited capacity. Further, the bid process coordinator i.e. PFCCL for the scheme has not indicated any RoW problem during the meeting taken by Member (PS), CEA.
- 5.6 MS, ERPC asked WBSETCL to provide load growth at their existing and new 220 kV sub-stations in West Bengal. WBSETCL agreed to furnish load growth for 13th plan period at their existing and new 220 kV sub-stations to CEA and ERPC.
- 5.7 After detailed discussion, Member(PS) stated that as this scheme is already approved and revised RfQ for the scheme is to be issued shortly, any change in the scheme would further delay the implementation of the scheme. If any, ROW problems are pointed out by PFC in the construction of these lines, then the issue can be discussed among CEA, CTU, PFC and West Bengal to find an alternative solution and if required joint study may also be carried out by them.
- 5.8 After, further deliberations, members agreed to the changes in the scheme. The modified scope of work vis-à-vis the scope given in the Gazette notification is given below.

Scope as per Gazette Notification		Modified Scope	
1.	<p>Establishment of 765/400kV, 2x1500MVA substation at Medinipur</p> <p>765 kV</p> <ul style="list-style-type: none"> • ICTs: 7x500 MVA, 765/400 kV (1 spare unit) • ICT bays: 2 no. • Line bays: 4 no. • Bus reactor: 7x110 MVAR single phase units including 1 spare unit • Bus reactor bay: 2 no. • Space for line bays: 4 no. • Space for ICT bays: 2 no. • Space for 765/400 kV ICT <p>400 kV</p> <ul style="list-style-type: none"> • ICT bays: 2 no. • Line bays: 6 no. • Bus reactor: 2x125 MVAR • Bus reactor bay: 2 no. • Space for line bays: 4 no. • Space for ICT bays: 2 no. 	1.	<p>Establishment of 765/400kV, 2x1500MVA substation at Medinipur</p> <p>765 kV</p> <ul style="list-style-type: none"> • ICTs: 7x500 MVA, 765/400 kV (1 spare unit) • ICT bays: 2 no. • Line bays: 4 no. • Bus reactor: 7x110 MVAR single phase units including 1 spare unit • Bus reactor bay: 2 no. • Space for future line bays (Incl. space for sw. line reactor): 4 no. • Space for future ICT bays: 2 no. • Space for future 765/400 kV ICT: 6x500MVA single phase units <p>400 kV</p> <ul style="list-style-type: none"> • ICT bays: 2 no. • Line bays: 4 no. • Bus reactor: 2x125 MVAR • Bus reactor bay: 2 no. • Space for future line bays (Incl. space for sw. line reactor): 6 no. • Space for future ICT bays: 2 no.
2.	<p>Establishment of 765/400kV, 2x1500MVA substations at Jeerat (New)</p> <p>765 kV</p> <ul style="list-style-type: none"> • ICTs: 7x500MVA, 765/400 kV (1 spare unit) • ICT bays: 2 no. • Line bays: 2 no. • Bus reactor: 7x110 MVAR single phase unit including 1 spare unit • Bus reactor bay: 2 no. • Space for line bays: 4 no. • Space for ICT bays: 2 no. • Space for 765/400 kV ICT <p>400 kV</p> <ul style="list-style-type: none"> • ICT bays: 2 no. • Line bays: 4 no. • Bus reactor: 2x125 MVAR • Bus reactor bay: 2 no. • Space for line bays: 4 no. • Space for ICT bays: 2 no. 	2.	<p>Establishment of 765/400kV, 2x1500MVA substations at Jeerat (New)</p> <p>765 kV</p> <ul style="list-style-type: none"> • ICTs: 7x500MVA, 765/400 kV (1 spare unit) • ICT bays: 2 no. • Line bays: 2 no. • Bus reactor: 7x110 MVAR single phase unit including 1 spare unit • Bus reactor bay: 2 no. • Space for future line bays (Incl. space for sw. line reactor): 4 no. • Space for future ICT bays: 2 no. • Space for future 765/400 kV ICT: 6x500MVA single phase units <p>400 kV</p> <ul style="list-style-type: none"> • ICT bays: 2 no. • Line bays: 4 no. • Bus reactor: 2x125 MVAR • Bus reactor bay: 2 no. • Space for future line bays (Incl. space for sw. line reactor): 4 no. • Space for future ICT bays: 2 no.
3.	<p>Ranchi (New) – Medinipur 765kV D/c line with Hexa ACSR Zebra conductor along with 240 MVAR 765 kV (765 kV, 3x80 MVAR single</p>	3.	<p>Ranchi (New) – Medinipur 765kV D/c line with Hexa ACSR Zebra conductor along with 765kV, 240MVAR switchable line reactor with 750Ω</p>

Scope as per Gazette Notification		Modified Scope	
	phase units) switchable line reactor in each circuit at Medinipur end.		NGR in each circuit at Medinipur end (total: 765kV, 7x80MVAR single phase units, 1 unit as spare)
4	Medinipur - Jeerat (New) 765kV D/c line with Hexa ACSR Zebra conductor along with 240 MVAR (765 kV, 3x80 MVAR single phase units) switchable line reactor in each circuit at Jeerat (New) end	4	Medinipur - Jeerat (New) 765kV D/c line with Hexa ACSR Zebra conductor along with 765kV, 240MVAR switchable line reactor with 600Ω NGR in each circuit at Jeerat (New) end (total: 765kV, 7x80MVAR single phase units, 1 unit as spare)
5	Medinipur – Haldia New (NIZ) (WBSETCL) 400kV D/c line [ACSR Quad Moose/ HTLS (equivalent to ACSR Quad Moose current rating at 85° C)]	5	[Deleted]
6	LILO of both circuits of Chandithala – Kharagpur 400 kV D/c line at Medinipur	6	LILO of both circuits of Chandithala – Kharagpur 400 kV D/c line at Medinipur
7	Jeerat (New) – Subhasgram 400 kV D/c line [ACSR Quad Moose/ HTLS (equivalent to ACSR Quad Moose current rating at 85° C)]	7	Jeerat (New) – Subhasgram 400 kV D/c line (ACSR Quad Moose current rating at 85° C)
8	Jeerat (New) – Jeerat (WB) 400 kV D/c line [ACSR Quad Moose/ HTLS (equivalent to ACSR Quad Moose current rating at 85° C)]	8	Jeerat (New) – Jeerat (WB) 400 kV D/c line (ACSR Quad Moose current rating at 85° C)
9	LILO of Jeerat (WB) – Subhasgram (PG) 400 kV S/c section at Rajarhat (PG)	9	LILO of Jeerat (WB) – Subhasgram (PG) 400 kV S/c section at Rajarhat (PG)
10	2 no. 400 kV line bays at Haldia New (NIZ) (WBSETCL)	10	[Deleted]
11	2 no. 400 kV line bays at Jeerat (WBSETCL)	11	2 no. 400 kV GIS line bays at Jeerat (WBSETCL)
12	<p>Note:</p> <ol style="list-style-type: none"> 1. CTU (POWERGRID) would provide 2 no. 400 kV line bays at Subhasgram (PG) for termination of Jeerat (New) - Subhasgram 400 kV D/c line [ACSR Quad Moose/ HTLS] line 2. CTU (POWERGRID) would provide 2 no. 400 kV line bays at Rajarhat (PG) for termination of LILO of Jeerat (WB) – Subhasgram (PG) 400 kV S/c section at Rajarhat (PG) 3. CTU (POWERGRID) would provide 2 no. 765 kV line bays at Ranchi (New) (PG) along with 2X240 MVA_r switchable line reactor with 750 Ω NGR on each circuit for Ranchi (New)-Medinipur 765 kV D/c line. 4. WBSETCL would provide space for 2 no. 400 kV line bays at Haldia New (NIZ) (WBSETCL) for termination of Medinipur- Haldia (New) (NIZ) (WBSETCL) 400 kV D/c line 5. WBSETCL would provide space for 2 no. 400 kV line bays at Jeerat (WBSETCL) for 	12	<p>Note:</p> <ol style="list-style-type: none"> 1. CTU (POWERGRID) would provide 2 no. 400 kV line bays at Subhasgram (PG) for termination of Jeerat (New) - Subhasgram 400 kV D/c line [ACSR Quad Moose/ HTLS] line 2. CTU (POWERGRID) would provide 2 no. 400 kV line bays at Rajarhat (PG) for termination of LILO of Jeerat (WB) – Subhasgram (PG) 400 kV S/c section at Rajarhat (PG) 3. CTU (POWERGRID) would provide 2 no. 765 kV line bays at Ranchi (New) (PG) along with 2X240 MVA_r switchable line reactor with 750 Ω NGR on each circuit for Ranchi (New) - Medinipur 765 kV D/c line. 4. [Deleted]. 5. WBSETCL would provide space for 2 no. 400 kV GIS bays at Jeerat (WBSETCL) for

Scope as per Gazette Notification		Modified Scope	
	termination of Jeerat (New)- Jeerat (WBSETCL) 400 kV D/c line		termination of Jeerat (New)- Jeerat (WBSETCL) 400 kV D/c.

6.0 Ranchi (New) – Purulia PSP 400kV D/c line under ERSS-VII

6.1 Director(PSPA-2) informed that in a meeting taken by Member (PS), CEA on 29-3-2016, WBSETCL had informed that there is a space constraint at Purulia PSP generation switchyard and the Ranchi (New)–Purulia PSP 400kV D/c line could not be terminated at Purullia PSP. WBSETCL had further informed that they are establishing New Purulia 400 kV GIS S/s near Purulia PSP by LILO of both circuit of Purulia PSP-Arambagh 400 kV D/C line and had proposed to PKTCL to terminate the line at New Purulia GIS substation instead of earlier approved Purulia PSP generation switchyard. 400 kV line bays for termination of the line at both ends are under the scope POWERGRID and line bays at New Purulia and Kharagpur substations are being implemented by WBSETCL as deposit work of POWERGRID. In the above meeting, WBSETCL had informed that New Purulia GIS is expected to be commissioned by Nov., 2016. In that meeting, M/s PKTCL informed that the Ranchi-New Purulia 400 kV D/C line will be completed by May, 2016. In order that the line does not remain unutilised for about six months or till the New Purulia GIS is commissioned, it was agreed in the meeting that as an interim arrangement, Ranchi (New)-Purulia 400 kV D/C line will be connected with one circuit of Purulia PSP-Arambagh 400 kV D/C line at suitable location, so as to form Ranchi (New)-Purulia PSP (about 115 km), Ranchi (New)-Arambagh (about 327 km) and Purulia PSP-Arambagh 400 kV lines. This interim arrangement would be implemented by M/s Sterlite and for additional cost, if any, incurred, M/s PKTCL may approach CERC for revision of tariff.

6.2 Chief Engineer (PSPA-2) stated that during the meeting on 29-03-2016, WBSETCL was requested to provide following, but had not submitted yet:

- i. SLD and general arrangement (GA) layout of the Purulia PSP and Arambagh S/s respectively to CEA
- ii. Load flow /system studies results in respect of New Purulia 400 kV S/s and associated transmission lines to CEA.

Director, WBSETCL agreed to submit the same to CEA within a week.

6.3 Director(PSPA-2) stated that as decided in the meeting, POWERGRID had submitted line charging studies and DOV studies for Ranchi (New)-Arambagh line, which were enclosed with the Agenda. POWERGRID was requested to present the studies.

- 6.4 POWERGRID presented the studies carried out by them as summarised below:
- i) The total voltage rise on charging of Ranchi (New)-Arambagh line from Ranchi (New) end is about 30 kV and that from Arambagh end is about 18 kV. Accordingly, the line may preferably be charged from Arambagh end with pre-charging voltage at Arambag around 400 kV.
 - ii) From load flow studies under various scenarios, maximum loading observed on Ranchi (New)-Arambagh 400 kV line remains within 450 MW and in this situation the DOV is about 1.37 pu, which is within the limit (1.5 pu). Further, up to a load throw off of 625 MW, the DOV remains within limit up, the probability of which is very low.
 - iii) NGR Study: 400 ohm NGR is being implemented along with 50 MVAR Line Reactor at Ranchi (New) end of Ranchi (New)-Arambagh 400 kV line. Studies carried out shows, no issue is anticipated during single phase auto reclosing of the line.
- 6.5 On a query from ERLDC, regarding generation despatch taken at Purulia PSP, while carrying out studies, POWERGRID informed that generation from Purulia PSP was taken as 800 MW in the study. Representative from ERLDC informed the members that most of the time the generation from Purulia PSP is lower than 800 MW and voltage at Purulia remains high. He suggested installation of bus reactor at Purulia PSP to overcome the high voltage problem. WBSETCL informed that there is no space at Purulia PSP for putting bus reactor.
- 6.6 On a query from Chief Engineer, CEA regarding latest commissioning schedule of 400 kV bays at New Purulia, WBSETCL informed that two no. 400 kV GIS bays at New Purulia for Ranchi- New Purulia 400 kV D/c would be ready by March 2017.
- 6.7 After detailed discussion, members approved the proposed interim arrangement with the recommendation that the Ranchi (New)- Arambagh 400 kV S/C line may preferably be charged from Arambagh end keeping pre-charging voltage at Arambag end around 400 kV.
- 6.8 Director (PSPA-2) stated that for another line under ERSS-VII being implemented by M/s PKTCL i.e. the Kharagpur (WB)-Chaibasa (PG) 400 kV D/C line, an interim arrangement was agreed in the meeting taken by Member (PS), CEA on 29-3-2016 as the line is ready and the bays at Kharagpur (WBSETCL) are not ready. The 400 kV bays at Kharagpur (WBSETCL) are under the scope of POWERGRID and are being implemented by WBSETCL as deposit work. In the interim arrangement, M/s PKTCL would interconnect Kharagpur (WB)-Chiabasa (PG) 400 kV D/C line by LILO one circuit of Kharagpur (WB)-Kolaghat 400 kV D/C line near Kharagpur end, till the 400 kV bays at Kharagpur (WB) are commissioned. The

interim arrangement would be implemented by M/s PKTCL, with no additional cost to be recovered as tariff.

- 6.9 ERLDC informed that the line was charged on 12.06.2016 as per interim arrangement, however both the lines tripped and patrolling of the line may be required before charging again.
- 6.10 Chief Engineer (PSPA-2) informed that implementing agency would need to take prior approval of the Government of India u/s Sec-68 of EA, 2003 for the interim arrangements also.
- 6.11 Members also approved the above interim arrangement.

7.0 Termination of Banka(PG) – Deoghar 132 kV D/c line at Jasidih GSS – Proposal of JUSNL

- 7.1 Director (PSPA-2) stated that proposal from ERPC to establish Banka (PG) - Deoghar 132kV D/C line (about 40 km) to feed Deoghar S/S(JSEB) for reliable and uninterrupted power supply to Railways was agreed in the 16th SCM held on 02nd May 2014. The above line has been entrusted to POWERGRID by MoP for implementation under compressed time-frame. In view of space constraint at Deoghar, JUSNL has requested that the line may be terminated at Jasidih. JUSNL has informed that proposal for construction of 220/132/33 kV Jasidih sub-station, which is about 5 km from Deoghar S/S and Jasidih– Deoghar 132 kV D/C line is under tendering stage. Also the Jasidih S/S, has sufficient space for termination of line from Banka (PG) to Deoghar 132 kV D/c line.
- 7.2 MS, ERLDC stated that the supply to railways is not reliable as JUSNL operate their 132 kV bus at Deoghar S/S with Bus coupler open. The line was proposed to give additional feed to Deoghar S/S from ISTS. Since Jasidih GSS – Deoghar GSS 132 kV D/C line is under tendering stage, it may take another 2-3 years to commission. During this period the supply to Railway at Deoghar would remain unreliable.
- 7.3 Chief Engineer (PSPA-2) stated that in view of the space constraint indicated by JUSNL at Deoghar S/S for termination of the above line, it is suggested that an alternative proposal may be discussed in a separate meeting at ERPC forum with various stake holders including Railways.
- 7.4 After detailed deliberation, it was agreed that construction of Banka (PG)-Deoghar 132 kV D/c may be dropped and an alternative proposal may be worked out to augment the power supply to Railways by ERPC after discussing with various stake holders.

8.0 Common Transmission System for Phase-II generation project in Odisha

- 8.1 Director (PSPA-2) informed that following transmission system was agreed in earlier SCMs, as a part of common transmission system for phase-II generation projects in Odisha of POWERGRID.
- i. Addition of 2x1500MVA, 765/400kV ICTs with associated bays at Jharsuguda (Sundargarh).
 - ii. Addition of 2x1500MVA, 765/400kV ICTs with associated bays at Angul.
 - iii. Split bus arrangement at 400 kV and 765 kV bus at both Angul and Jharsuguda (Sundargarh) substations [in GIS at Jharsuguda (Sundargarh)].
 - iv. LILO of both circuits of Rourkela - Raigarh 400kV D/c (2nd line) at Jharsuguda (Sundargarh) substation with associated line bays in GIS at Jharsuguda (Sundargarh) substation.
- 8.2 He added that POWERGRID has informed about space constraint at Jharsuguda (Sundargarh) S/s and RoW problem & forest involvement for the above LILO line. POWEREGRID has also submitted the general layout of 765/400 kV sub-station at Angul and Jharsuguda. Accordingly, POWERGRID has proposed:
- a) Implementation of 400 kV and 765 kV bays for the 2x1500 MVA ICTS at Jharsuguda with GIS.
 - b) Spare single phase 765/400 kV, 500 MVA transformer at Angul and Jharsuguda.
 - c) LILO of both circuits of Rourkela-Raigarh 400kV D/c (2nd line) at Jharsuguda on multi circuit towers for about 17 km and associated line bays in GIS at Jharsuguda substation
- 8.3 Chief Engineer (PSPA-2) stated that in view of the non-implementation of NSL generation project (1320 MW), relinquishment of about 950 MW LTA by M/s Jindal, delay in Talchar-III (1320 MW, delay / reduced LTA of LANCO Babandh and splitting of generation units by GMR (3x350 MW), which are being pooled at Angul 400 kV bus, the requirement of new 2x1500 MVA ICT (including spare) at Angul must to be reviewed. The 15000 MVA transformer capacity at Angul for about 3000 MW LTA would be very much over provision.
- 8.4 POWERGRID stated that investment approval for the scheme has already been taken and any change in the scheme would further delay the scheme. However, POWERGRID agreed to review the requirement of spare single phase transformer unit (765/400kV, 500MVA) at Angul and Jharsuguda substations.
- 8.5 After further deliberations, members agreed to the following:
- a) Implementation of 400 kV and 765 kV bays for the 2x1500 MVA ICTs at Jharsuguda with GIS by POWERGRID.

- b) Implementation of LILO of both circuits of Rourkela-Raigarh 400kV D/c (2nd line) at Jharsuguda on multi circuit towers for about 17 km and associated line bays in GIS at Jharsuguda substation by POWERGRID.

9.0 Eastern Region System strengthening Scheme – XVII (ERSS-XVII)

- 9.1 Director (PSPA-2) stated that establishment of 400/220kV S/s at Daltonganj agreed as a part of ERSS-III, got delayed due to land acquisition problems. Creation of 220/132 kV level at Daltonganj S/s was agreed in the previous meeting as a part of ERSS-XVII. For ease of implementation, POWERGRID has now suggested that ERSS-XVII may be split into two parts. Works associated with creation of 220/132 kV level at Daltonganj may be named as ERSS-XVII Part-A and remaining works as ERSS-XVII Part-B. POWERGRID has also informed that 50 MVA fixed line reactor at Biharsharif end of Lakhisarai-Biharsharif 400 kV D/C line, which was approved in previous SCM to be converted in switchable line reactor has been under implementation as a part of ERSS-III scheme.
- 9.2 He said that a number of 315 MVA ICT have been replaced with 500 MVA ICT at 400/220 kV level. This has resulted in availability of large number of spares of 400/220kV, 315MVA ICT. Additionally, CERC has denied tariff for these additional spare ICTs, available after replacement. In order to utilise the spare transformers and space constraint at New Siliguri and Gaya, POWERGRID has proposed following revised augmentation of transformation capacity under ERSS-XVII:
 - a) Installation of 400/220 kV, 1x500 MVA ICT at Gaya S/s (400kV bay in AIS and 220kV bay in GIS)
 - b) Replacement of 400/220kV, 2x315MVA ICTs at Malda S/s with 400/220kV, 2x500 MVA ICTs
 - c) Installation of 3rd 400/220kV, 1x315MVA ICT at New Siliguri S/s: to be sourced from pool of spare ICTs (400kV bay in GIS and 220kV bay in AIS)
 - d) Installation of 3rd 400/220kV, 1x315 MVA ICT at Durgapur S/s: to be sourced from pool of spare ICTs
 - e) Installation of 400/220kV, 2x315MVA ICTs at Jeypore S/s (one each in parallel to the existing ICTs): to be sourced from pool of spare ICTs
 - f) Installation of 400/220kV, 2x315MVA ICTs at Rourkela S/s (one each in parallel to the existing ICTs): to be sourced from pool of spare ICTs
- 9.3 He added that elements c) to f) above would be sourced from the pool of spare ICTs as given below after refurbishment, if required:

Present Spare ICT Location	ICT No.	Age	Proposed new location for installation
Malda	ICT-3	8 years	New Siliguri (ICT-3)
Purnea	ICT-2	4 years	Durgapur (ICT-3)
Patna	ICT-2	7 years	Jeypore (ICT-3)
Sasaram	ICT-2	11 years	Jeypore (ICT-4)
Ballabgarh	ICT-1	9 years	Rourkela (ICT-3)
Mandola	ICT-4	9 years	Rourkela (ICT-4)

- 9.4 Chief Engineer (PSPA-2) suggested that in view of large number of spare ICTs at regional level, it is advisable that an exercise may be conducted in each region for optimum number of spare ICTs, their place of deployment and their mode of use/cost, if two transmission licensees are involved.
- 9.5 MS, ERPC stated that in Eastern Region, procurement of regional spares and their placement is decided in TCC/ERPC meetings.
- 9.6 Director (PSPA-2) informed that in the previous meeting conversion of 63MVAR fixed line reactor at Rengali end for Keonjhar – Rengali 400kV S/c line, was agreed to be converted to switchable line reactor. Now POWERGRID has informed that due to space constraints at Rengali S/s, it is now proposed to convert the same to bus reactor.
- 9.7 ERLDC stated that the reactor at Rengali may be kept as fixed line reactor, otherwise line could not be charged due to high voltage.
- 9.8 After further deliberations, members agreed with following modified ERSS-XVII scheme:
- **ERSS-XVII (Part-A)**
 - (i) 2x160MVA, 220/132kV ICT along with associated bays at Daltonganj sub-station
 - (ii) 4 nos. of 132 kV line bays
 - **ERSS-XVII (Part-B)**
 - (i) **Augmentation of transformation capacity at POWERGRID substations:**
 - (a) Installation of 400/220 kV, 1x500 MVA ICT at Gaya S/s (400kV bay in AIS and 220kV bay in GIS)
 - (b) Replacement of 400/220kV, 2x315MVA ICTs at Malda S/s with 400/220kV, 2x500 MVA ICTs
 - (c) Installation of 3rd 400/220kV, 1x315MVA ICT at New Siliguri S/s: to be sourced from pool of spare ICTs (400kV bay in GIS and 220kV bay in AIS)

- (d) Installation of 3rd 400/220kV, 1x315 MVA ICT at Durgapur S/s: to be sourced from pool of spare ICTs
- (e) Installation of 400/220kV, 2x315MVA ICTs at Jeypore S/s (one each in parallel to the existing ICTs): to be sourced from pool of spare ICTs
- (f) Installation of 400/220kV, 2x315MVA ICTs at Rourkela S/s (one each in parallel to the existing ICTs): to be sourced from pool of spare ICTs

Note: For elements from (c) to (f) above, sourcing of old ICTs from pool of spare ICTs shall be as given below.

Present Spare ICT Location	ICT No.	Age	Proposed new location for installation
Malda	ICT-3	8 years	New Siliguri (ICT-3)
Purnea	ICT-2	4 years	Durgapur (ICT-3)
Patna	ICT-2	7 years	Jeypore (ICT-3)
Sasaram	ICT-2	11 years	Jeypore (ICT-4)
Ballabgarh	ICT-1	9 years	Rourkela (ICT-3)
Mandola	ICT-4	9 years	Rourkela (ICT-4)

(ii) Reconductoring of Maithon RB - Maithon 400kV D/c line

The existing Twin ACSR Moose line needs to be reconducted with Twin HTLS conductor of ampacity equivalent to that of Quad ACSR Moose: 4 x 798A (for 45°C ambient temperature and 85°C maximum conductor temperature)

(iii) Bypassing arrangement of LILO of 400kV lines at Angul

LILO of Meramundali – Bolangir/Jeypore 400kV S/c line and LILO of one circuit of Talcher – Meramundali 400 kV D/c line has been done at Angul 765/400kV substation. POWERGRID would establish a switching arrangement at Angul substation such that, the above 400kV LILOs may be operated either by-passing Angul substation or terminating at Angul substation as and when required depending upon the power flow condition.

10.0 Installation of 400/220kV, 500MVA (4th) ICT at Biharsharif

- 10.1 Director (PSPA-2) stated that POWERGRID has informed that the peak loading on 400/220kV, 3x315MVA ICTs at Biharsharif S/s has been constantly observed in the range of about 700-750MW in recent times. The bus split at Biharsharif is also under advance stage of implementation. Subsequent to bus splitting, one section would have only one ICT. Thus, keeping in view the loading of ICTs and the requirement of meeting the N-1 security criteria, it is proposed to install 400/220kV, 500MVA ICT at Biharsharif S/s in the bus section having one 315MVA ICT.

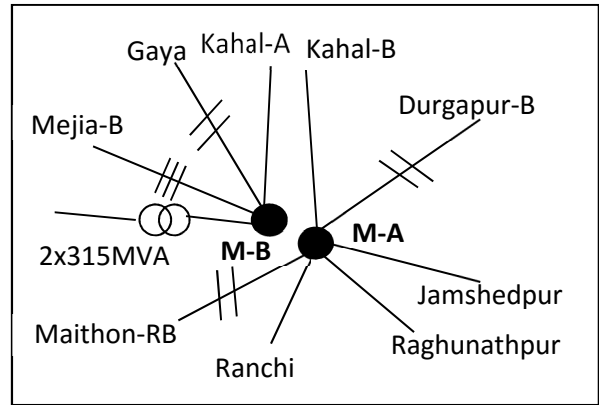
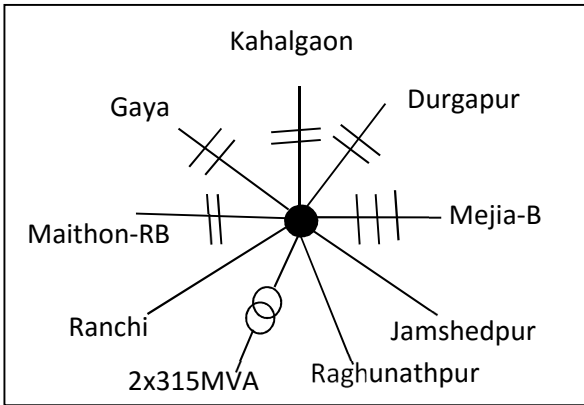
- 10.2 Members agreed for installation of 400/220kV, 500MVA ICT (4th) at Biharsharif S/s in the bus section having one 315MVA ICT.
- 10.3 POWERGRID presented the load flow and short circuit studies carried out them after considering split bus arrangement as given below:
- (i) Schematic showing split bus arrangement at Maithon, Durgapur, Kahalgaon and Biharsharif are given below:

Note: *Bus splitting at 400kV level at Maithon, Durgapur & Biharsharif substations is being implemented by POWERGRID and at Kahalgaon generation switchyard by NTPC.*

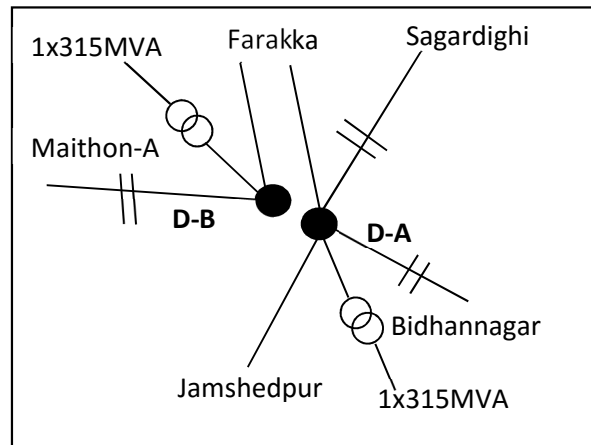
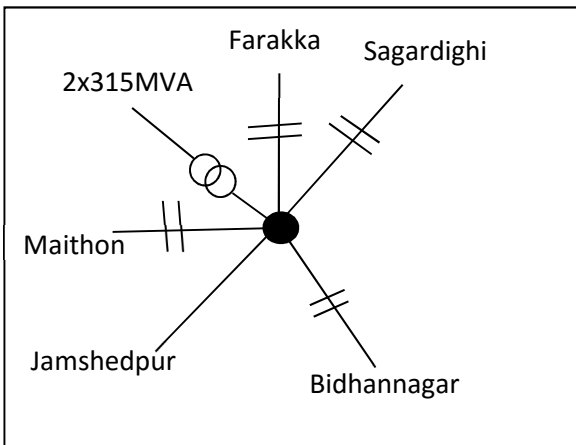
Before Splitting

After Splitting

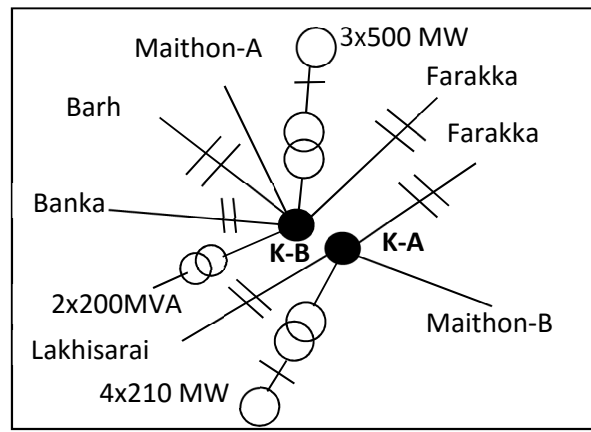
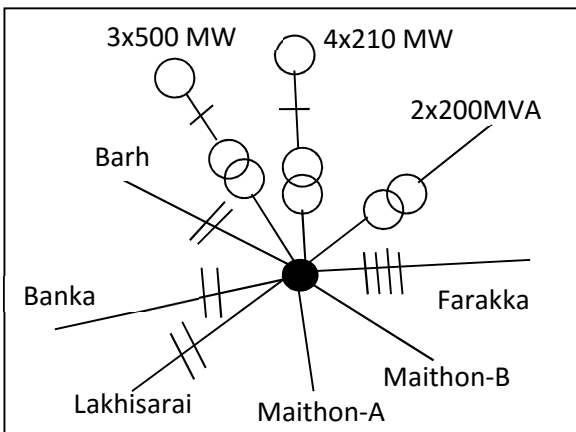
Maithon S/s



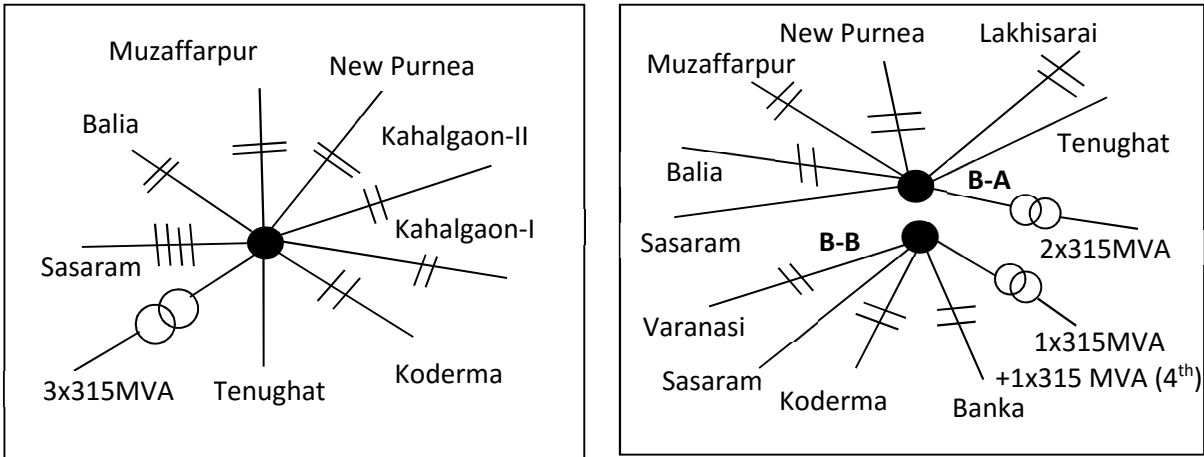
Durgapur S/s



Kahalgaon Switchyard



Biharsharif S/s



(ii) Fault level of ER substations with and without split bus arrangement for March, 2016 and 2021-22 time frame are given below:

Substation Section	kV Level	Fault Level (in kA)		
		Without Split	With Split	Design Capacity
Fault Level - ER (Substations with Bus Splitting) - Mar'16				
BIHARSHARIF-A	400	38.83	26.67	40
BIHARSHARIF-B	400	38.83	20.15	40
KAHALGAON-A	400	42.72	21.09	40
KAHALGAON-B	400	42.72	30.76	40
MAITHON-A	400	48.45	27.32	40
MAITHON-B	400	48.45	19.24	40
DURGAPUR-A	400	38.83	23.88	40
DURGAPUR-B	400	38.83	18.03	40
Fault Level - ER (Substations with Bus Splitting) - 2021-22				
ANGUL-A	765	38.85	14.74	50
ANGUL-B	765	38.85	21.34	50
ANGUL-A	400	72.41	26.83	63
ANGUL-B	400	72.41	29.90	63
JHARSUGUDA-A	765	55.31	36.08	50
JHARSUGUDA-B	765	55.31	22.46	50
JHARSUGUDA-A	400	73.07	48.05	63
JHARSUGUDA-B	400	73.07	35.66	63

10.4 CE (PSPA-2) said that there is need to assess that how many spare transformers and reactors should be kept in a region. MS, ERPC informed that they have already worked on this aspect. It was decided that CEA and ERPC would work together to

assess the requirement of spares for period up to 2021-22 and the same would be deliberated in the next meeting.

10.6 Members noted the same.

11.0 Construction of Gaya (PG) – Sonenagar (New) 220 kV D/C line in Phase-3 scheme of BRGF under 12th Plan by BSPTCL

11.1 Director (PSPA-2) stated that BSPTCL has informed that they were constructing 220 kV Sonenagar (New) S/S and Gaya (PG) – Sonenagar (New) 220 kV D/C line is under Backward Region Grant Fund (BRGF) Phase-III and concurrence of constituents is required for construction of 2 no. 220 kV bays at Gaya (PG).

11.2 On a query regarding ownership of 2 no. 220 kV bays at Gaya (PG), POWERGRID informed that the bays are being implemented as a deposit work by POWERGRID for BSPTCL. After implementation, the bays will be operated and maintained by BSPTCL as state network assets.

11.3 COO(CTU) informed the members that as per recent amendment (Fourth) in IEGC (para 4) dated 6th April, 2016, an Implementation Agreement have to be signed between generating company and transmission licensee, two transmission licensee as per following. The relevant para 4 from the IEGC are as follows:

“Where the transmission line or substation is dedicated for evacuation of power from a particular generating station and the dedicated transmission line is being implemented other than through tariff based competitive bidding, the concerned generating company and transmission licensee shall endeavour to commission the generating station and the transmission system simultaneously as far as practicable and shall ensure the same through appropriate Implementation Agreement in accordance with relevant provisions of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2014 or any subsequent amendment or re-enactment thereof. In case the transmission line or sub-station dedicated to a generator is being implemented through tariff based competitive bidding, then matching of commissioning of the transmission line/sub-station and generating station shall be monitored by Central Electricity Authority

Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavor to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement. Where either of the transmission systems or both are implemented through tariff based competitive

bidding, the progress of implementation of the transmission systems in a matching time schedule shall be monitored by the Central Electricity Authority.

(iv) In case a transmission system or an element thereof is prevented from regular service on or before the Scheduled COD for reasons not attributable to the transmission licensee or its supplier or its contractors but is on account of the delay in commissioning of the concerned generating station or in commissioning of the upstream or downstream transmission system of other transmission licensee, the transmission licensee shall approach the Commission through an appropriate application for approval of the date of commercial operation of such transmission system or an element thereof. (v) An element shall be declared to have achieved COD only after all the elements which are pre-required to achieve COD as per the Transmission Services Agreement are commissioned. In case any element is required to be commissioned prior to the commissioning of pre-required element, the same can be done if CEA confirms that such commissioning is in the interest of the power system.

(vi) The transmission licensee shall submit a certificate from the CMD/CEO/MD of the Company that the transmission line, sub-station and communication system conform to the relevant Grid Standard and Grid Code, and are capable of operation to their full capacity.

11.4 Member agreed for construction of 2 no. 220 kV bays at Gaya (PG) by BSPTCL for Gaya (PG) – Sonenagar 220 kV D/C line and noted the 4th IEGC amendment.

12.0 Establishment of 400/220/132kV Intra-State Grid Sub-stations at potential load centres in Bihar – By BSPTCL

12.1 Director (PSPA-2) stated that CEA has agreed Transmission System requirement of Bihar for the 12th plan in three parts vide letter no. 69/1/2012-SP&PA-1203-05 dated 15-11-2012.

- Part-1: Bihar Sub Transmission Phase-2 Extension Scheme (Given at Annexure-I of the above letter)
- Part-2: Transmission System Strengthening Scheme-Phase-1 & Phase-2 (Given at Annexure-II (a) and Annexure-II (b) respectively of the above letter)
- Part-3: ATS for Case-II projects i.e. Lakhisarai, Pirpainti and Buxar (2x660 MW) each at Annexure-III (a) and for BTPS & MTPS extension at Annexure-III (b) of the above letter.

12.2 He said that Chief Engineer (Transmission) BSPTCL has informed that due to better convenience, the entire works covered under Part-2 (Phase-2) i.e. Annexure-II (b) of the above referred letter has been divided into two groups by

Bihar Grid Company Ltd. (BGCL - a joint venture of BSP(H)CL and POWERGRID) under new head “Phase-IV Part-I” and “Phase-IV Part-II”. The works covered under Phase-IV Part-I are under execution by BGCL.

- 12.3 BSPTCL has forwarded the list of works covered under Phase-IV Part-I to CEA which is given below:

A: Substation

Sl. No.	Details of S/S work
01	Construction of 2x160 MVA + 2x50 MVA 220/132/33 kV new GIS S/S at Chapra
02	Construction of 2x160 MVA + 3x50 MVA, 220/132/33 kV new GIS S/S at Gaya (Manpur)
03	Construction of 2x160 MVA + 2x50 MVA, 220/132/33 kV new GIS S/S at Nawada
04	Construction of 2x160 MVA + 2x50 MVA, 220/132/33 kV new GIS S/S at Sheikhpura
05	Construction of 2x160 MVA + 2x50 MVA, 220/132/33 kV new GIS S/S at Hathidah
06	Construction of 2x160 MVA + 2x50 MVA, 220/132/33 kV new GIS S/S at Jamalpur
07	Construction of 2x160 MVA + 2x50 MVA, 220/132/33 kV new GIS S/S at Sabour

B: LINES

Sl. No.	Details of transmission work	Line Length (km)
01	Chapra 220/132 kV new S/S – Chapra 132/33 kV S/S, 132 kV D/C line (Zebra conductor)	24
02	Hazipur 220/132 kV new S/S – Chapra 220/132 kV S/S, 220 kV D/C line	47
03	Chapra 220/132 kV S/S – Siwan, 132 kV D/C line	66
04	LILO of one circuit of 132 kV D/C Khagual-Digha line at Bihta	27
05	Patna (POWERGRID)-Khagaul, 220 kV D/C line	26
06	LILO of 220 kV D/C Biharsharif – Bodhgaya line at Gaya (new) (Manpur) S/S	14
07	LILO of 132 kV D/C Bodhgaya-Chandauti (ckt 3 & 4) at Gaya new (Manpur) S/S	Deleted
07.a	132KV D/C Gaya(new) – Jehanabad line	35
08	LILO of 132 kV S/C Bodhgaya-Wazirganj line at Gaya new (Manpur) S/ S	29
09	132 kV S/C (on D/C Tower) Gaya new (Manpur)-Hulasganj line	10
10	220 kV D/C (High Capacity) Gaya (POWERGRID)-Gaya new (Manpur) line	56
11	220 kV D/C (High Capacity) Nawada new-Gaya new (Manpur) line	55
12	132 kV D/C Sheikhpura(New) – Sheikhpura (Old) transmission line (High Capacity)	24
13	220 kV D/C Sheikhpura (New) – Nawada (New) transmission line (High Capacity)	51
14	220 kV D/C (High Capacity) Jamalpur new-Sheikhpura (New) transmission line	125
15	132 kV S/C (on D/C tower) Sheikhpura new – Biharsharif transmission line	40
16	132 kV D/C Nawada (New) – Nawada 132/33 kV (High Capacity) S/S	17
17	LILO of 220 kV Begusarai-Biharsharif line at 220 kV Hathidah	30
18	132 KV D/C Hathidah (New) –Hathidah (Old) transmission line (Zebra Conductor)	8

19	LILO of 132 kV D/C (High Capacity) Sultanganj-Lakhisarai transmission line at Jamalpur	44
20	132 kV D/C Jamalpur (New) – Jamalpur (Old) transmission line (Zebra Conductor)	34
21	132 kV D/C Sabour (New) – Sabour (Old) transmission line (Zebra Conductor)	13
22	LILO of 132 kV D/C Kahalgaon-Sultanganj line at Sabour	18
23	220 kV D/C (High Capacity) Sabour (New) – Jamalpur (New) transmission line	60
Total		852

- 12.4 CE (PSPA-2) said that to bring out clarity and completeness, BSPTCL should inform the scope of transmission works covered under Phase-I, Phase-II and Phase-III also. BSPTCL agreed for the same.

Phase IV – Part-II Transmission works by BSPTCL

- 12.5 Director (PSPA-2) said that the works covered under **Phase-IV Part-II** which, interalia, includes transmission system associated with establishment of 3 no. 2x500 MVA 400/220 kV sub-stations around Patna under state sector at Bihta, Fatuha and Gaighat along with downlinking 220 kV & 132 kV system has been revised due to non-availability of land at these locations. In this context, the joint studies carried out by BSPTCL and POWERGRID for the 12th plan has been revised considering new substations at Naubatpur, Bakhtiyarpur and Jakkampur in place of Bihta, Gaighat and Fatuha respectively. BPTCL vide their letter no. 17/BSPTCL, Patna dated 02-072016 had intimated to CEA that Naubatpur GSS 400/220/132/33kV would be connected to Paliganj 132/33 kV 2x50 MVA S/S (tender invited) and existing 132/33 kV Masaurhi 2x20 MVA & Attula 2x20 MVA sub-stations over 132 kV D/C lines. The revised system proposed by BSPTCL associated with above sub-stations and other transmission works under Phase-IV part-II are given below:

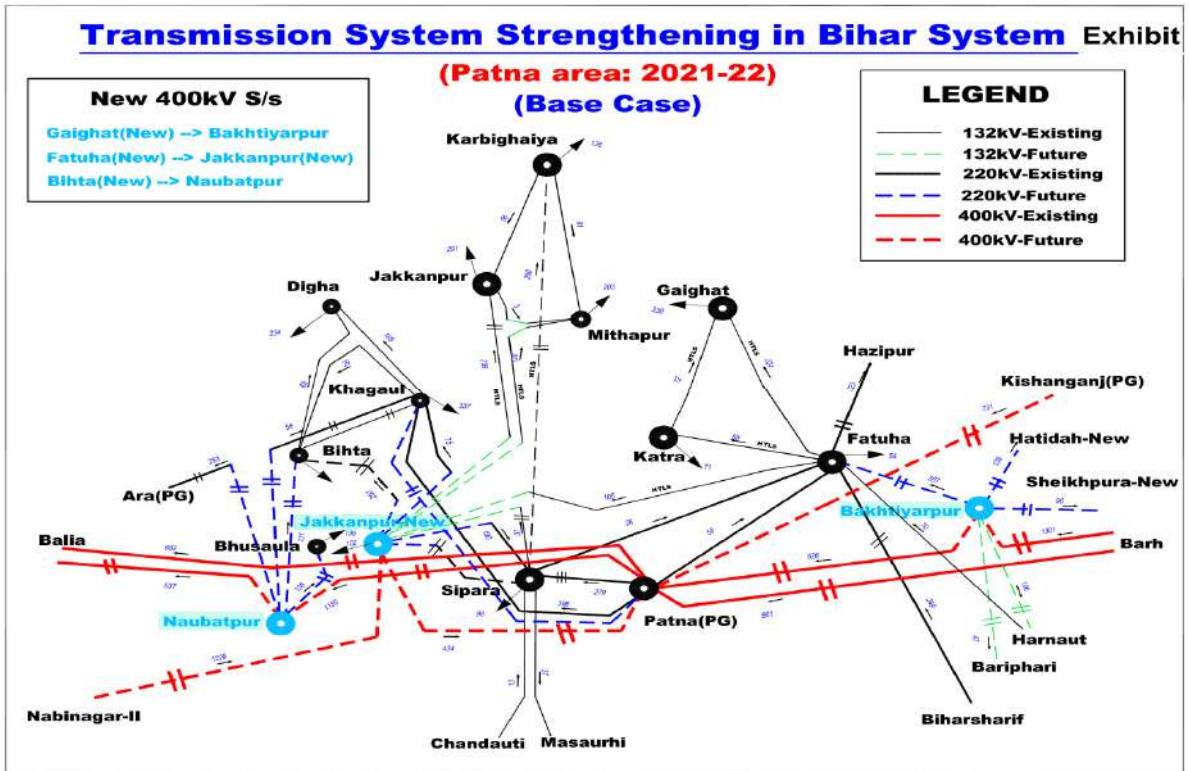
a) Naubatpur 400/220/132/33 kV GIS S/s

- i) Establishment of 2x500 MVA +2x160 MVA+2x80 MVA 400/220/132 kV S/S at Naubatpur
- ii) LILO of circuits 3 & 4 of Patna (PG)-Balía 400 kV D/c (Quad) line at Naubatpur 400 kV 2x D/C line
- iii) LILO of both circuits of Ara (PG) – Khagaul (BSPTCL) line at Naubatpur (New) 220 kV 2xD/C
- iv) Naubatpur (New)-Bihta (BSPTCL) 220 kV D/C line
- v) Naubatpur (New)-Bhusaula (New) 220 kV D/C Transmission line
- vi) Naubatpur (New)- Paliganj 132 kV D/C Transmission line

- vii) Naubatpur (New)- Masaurhi (existing) 132 kV D/C Transmission line
- b) Naubatpur (New)- Attula (existing) 132 kV D/C Transmission line. Bakhtiyarpur 400/220/132 kV GIS S/s**
- i) Establishment of 2x500 MVA +2x160 MVA 400/220/132 kV GIS S/S at Bakhtiyarpur
 - ii) LILO of both circuits of Barh – Patna (PG) 400kV D/c (Quad) line-1 at Bakhtiyarpur 400 kV 2xD/C
 - iii) Bakhtiyarpur (New) - Sheikhpura (New) 220 kV D/C line.
 - iv) Bakhtiyarpur (New) - Hathidah (New) 220 kV D/C line.
 - v) Bakhtiyarpur (New) - Fatuha (BSPTCL) 220 kV D/C line.
 - vi) Bakhtiyarpur (New) - Harnaut (BSPTCL) 132 kV D/C line
 - vii) Bakhtiyarpur (New) - Baripahari (BSPTCL) 132 kV D/C line.
 - viii) 132 kV D/C Bakhtiyarpur (New) - Baripahari (BSPTCL) line.
- c) Jakkanpur 400/220/132/33 kV GIS S/s**
- i) Establishment of 2x500 MVA +3x160 MVA+3x80 MVA 400/220/132/33 kV GIS S/S at Jakkanpur
 - ii) LILO of both circuits of Nabinagar-II – Patna (PG) 400kV D/c at Jakkanpur 400 kV 2xD/C
 - iii) LILO of both circuits of Sipara (BSPTCL)-Bihta (BSPTCL) line at Jakkanpur (new) 2x220 kV D/C
 - iv) LILO of Khagaul (BSPTCL) - Sipara (BSPTCL) 220 kV S/C line at Jakkanpur (New) 220 kV D/C
 - v) LILO of both circuits of Jakkanpur-Sipara line at Jakkanpur New (being re-conducted with HTLS by BSPTCL) 2x132 kV D/C
 - vi) LILO of 132 KV S/C Jakkanpur/Mithapur-Fatuha line at Jakkanpur New (being re-conducted with HTLS by BSPTCL) 132 kV D/C
- d) Bhusaula 220/33 kV GIS sub-station**
- i) Establishment of 2x100 MVA 220/33 kV GIS S/S at Bhusaula
- e) Dumraon 220/132/33 kV GIS sub-station**
- i) Establishment of 2x160 MVA+2x80 MVA 220/33 kV GIS S/S at Dumraon
 - ii) LILO of both circuits of 220 kV Ara (PG)-Pusauli (PG) D/c line at Dumraon (New) 2x220 kV D/C
 - iii) Dumraon (New)- Dumraon (BSPTCL) 132 kV D/C

- iv) Dumraon (New)- Buxarn (BSPTCL) 132 kV D/C
- v) Dumraon (New)- Jagdishpur (BSPTCL) 132 kV D/C
- f) **LILO of one circuit of Purnea-Naugachia / Khagaria 132 kV D/C line at Katihar (BSPTCL)**

12.6 Schematic showing the transmission system around Patna is given below:



12.7 After deliberations, members agree for establishment of 3 no. 400kV GIS sub-stations at Naubatpur, Bakhtiyarpur and Jakkampur in place of Bihta, Gaighat and Fatuha respectively along with down-linking 220kV & 132kV works and other transmission works mentioned above as **Phase-IV - Part-II** transmission works to be implemented by BSPTCL as intra-state transmission works.

13.0 Additional ISTS 400 kV sub-stations in Bihar along with down linking system by BSPTCL

13.1 Director (PSPA-2) stated that BSPTCL had informed that the demand of Bihar has increased to 3226 MW under unrestricted condition in Sep., 2015 and may go up to 8774 MW by 2018-19 due to segregation of agricultural feeders. BSPTCL and POWERGRID have carried out detailed load flow studies jointly to evolve transmission system requirement for the end of 13th plan period i.e. 2021-22 considering load demand of Bihar as 11000 MW (Study Report was enclosed at Annexure-V of the agenda). The studies have, interalia, recommended

establishment of 2 no. 400/220/132 kV sub-stations in North Bihar at Sitamarhi & Saharsa and one no. 400/220/132 kV sub-stations in South Bihar i.e. Chandauti (Gaya) along with augmentation of 400/132 kV Motihari S/s of Essel Infra by 315 MVA and 3rd ICT at Banka and Lakhisarai 400/132 kV S/S. The study has also recommended establishment of 2 no. new 220 kV sub-stations at Motihari (New) & Karmanasa and upgradation of Korha (New) 132/33 kV sub-station to 220/132 kV by BSPTCL.

13.2 The transmission works proposed along with associated 220 and 132 kV network is given below:

1) **Sitamarhi (New) S/s & associated interconnections (to be implemented as ISTS)**

- i) 400/220/132kV, 2x500MVA + 2x200MVA new S/s at Sitamarhi
- ii) Darbhanga – Sitamarhi (New) 400kV D/c (Triple Snowbird) line
- iii) Sitamarhi (New) – Motihari 400kV D/c (Triple Snowbird) line
- iv) 2x125MVA_r, 420kV bus reactors along with bays
- v) **400kV Line bays** (along with space for switchable line reactor): 4 nos. for above lines
- vi) **220kV Line bays:** 4 nos. for Sitamarhi (New) – Motipur 220kV D/c and Sitamarhi (New) – Motihari (New) 220kV D/c lines (**lines to be constructed by BSPTCL**)
- vii) **132kV Line bays:** 4 nos. for Sitamarhi (New) – Sitamarhi 132kV D/c (Single Moose) and Sitamarhi (New) – Pupri 132kV D/c lines (**lines to be constructed by BSPTCL**)
- viii) **Space for**
 - 400/220kV, 2x500MVA ICT along with associated bays
 - 220/132kV, 2x200MVA ICTs along with associated bays
 - 400kV line bays (including space for switchable line reactor): 6 nos.
 - 220kV line bays: 4 nos.
 - 132kV line bays: 4 nos.

2) **Chandauti (New) S/s & associated interconnections (to be implemented as ISTS)**

- i) 400/220/132kV, 3x500MVA + 3x200MVA new S/s at Chandauti
- ii) LILO of both circuits of Nabinagar-II – Gaya 400kV D/c (Quad) line of POWERGRID at Chandauti (New)

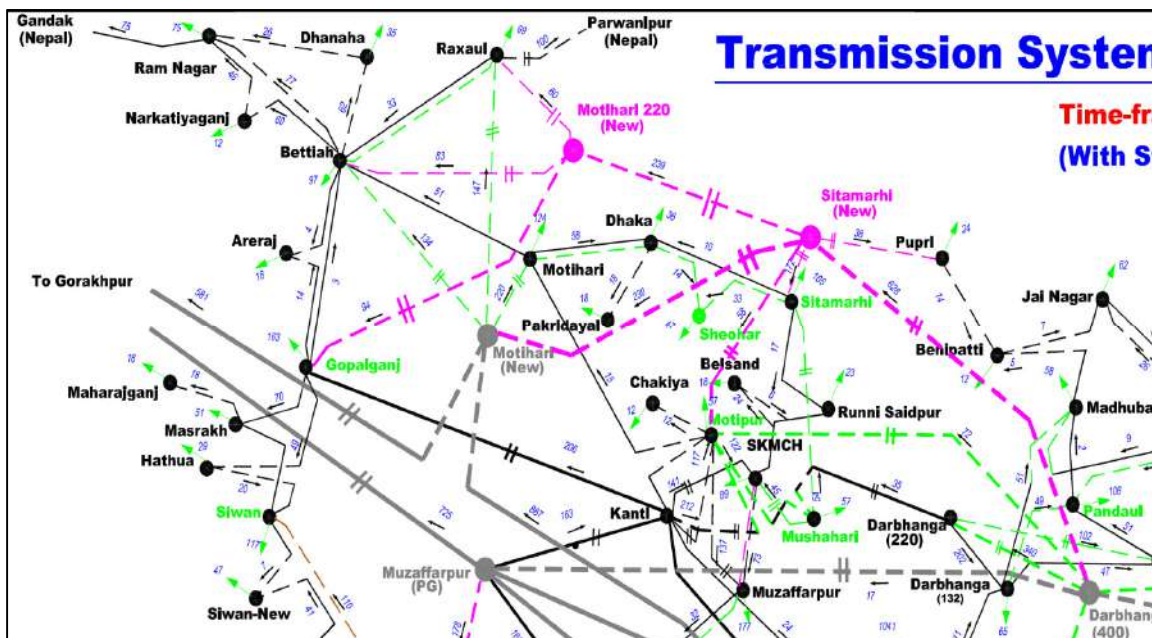
- iii) 2x125MVA, 420kV bus reactors along with bays
- iv) **400kV Line bays** (along with space for switchable line reactor): 4 nos. for above LILO lines
- v) **220kV Line bays:** 4 nos. for LILO of Gaya (POWERGRID) – Sonenagar 220kV D/c at both Bodhgaya (BSPTCL) and Chandauti (New) substations, so as to form Gaya (POWERGRID) – Bodhgaya (BSPTCL) – Chandauti (New) – Sonenagar 220kV D/c line (**LILOs to be done by BSPTCL**)
- vi) **132kV Line Bays:** 4 nos. for LILO of Chandauti – Rafiganj and Chandauti – Sonenagar 132kV S/c lines (**LILOs to be done by BSPTCL**)
- vii) **Space for**
 - 400/220kV, 2x500MVA ICT along with associated bays
 - 220/132kV, 2x200MVA ICTs along with associated bays
 - 400kV line bays (including space for switchable line reactor): 6 nos.
 - 220kV line bays: 4 nos.
 - 132kV line bays: 4 nos.

Note: Under the scope of BSPTCL

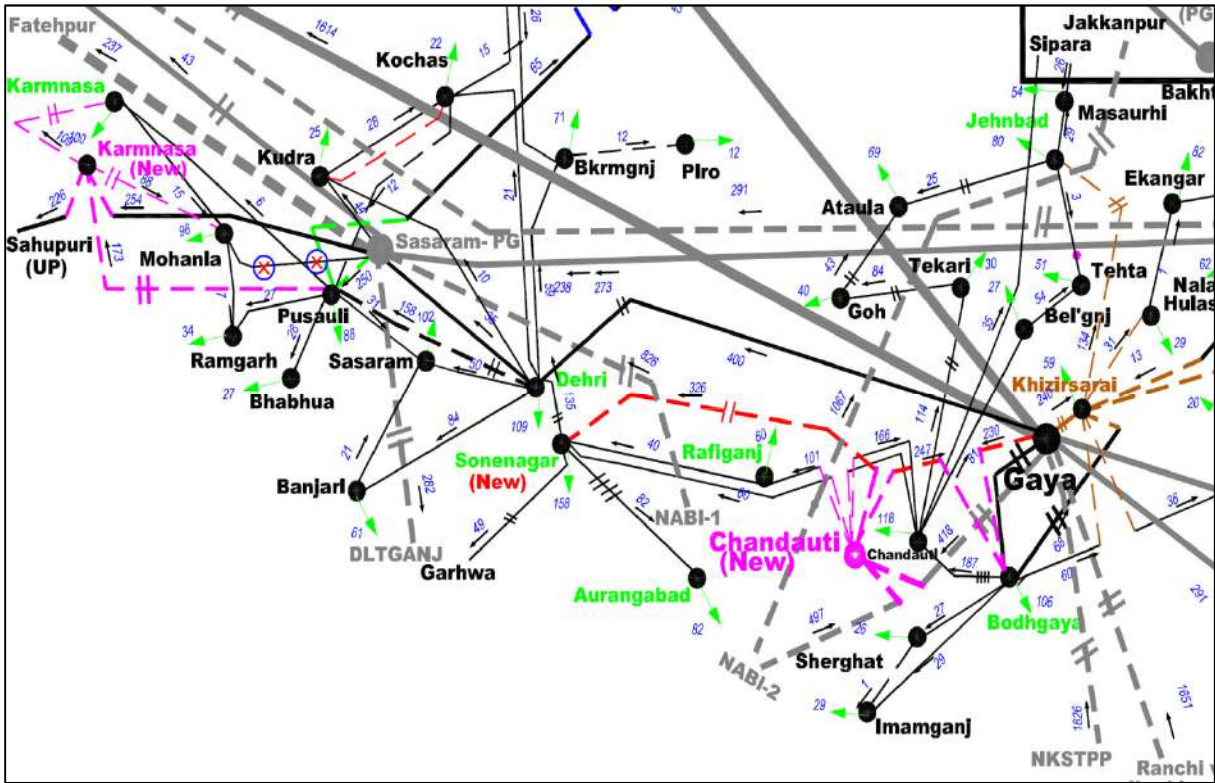
- i) Reconductoring of Chandauti – Rafiganj – Sonenagar 132kV S/c line with HTLS conductor of 240MVA (ampacity - 1050A)
 - ii) LILO of Chandauti – Rafiganj 132kV S/c line at Chandauti (New)
 - iii) Reconductoring of Chandauti – Sonenagar 132kV S/c line with HTLS conductor of 240MVA (ampacity - 1050A)
 - iv) LILO of Chandauti – Sonenagar 132kV S/c line at Chandauti (New)
- 3) **Saharsa (New) S/s & associated interconnections (to be implemented as ISTS)**
- i) 400/220/132kV, 2x500MVA + 2x200MVA new S/s at Saharsa
 - ii) LILO of Kishanganj – Patna 400kV D/c (Quad) line of POWERGRID at Saharsa (New)
 - iii) 2x125MVA, 420kV bus reactors along with bays
 - iv) **400kV Line bays** (along with space for switchable line reactor): 4 nos. for above LILO lines
 - v) **220kV line bays:** 4 nos. for Saharsa (New) – Begusarai 220kV D/c and Saharsa (New) – Khagaria (New) 220kV D/c lines (**lines to be constructed by BSPTCL**)

- vi) **132kV line bays:** 2 nos. for Saharsa (New) – Saharsa 132kV D/c (Single Moose) line (lines to be constructed by BSPTCL)
- vii) **Space for**
- 400/220kV, 2x500MVA ICT along with associated bays
 - 220/132kV, 2x200MVA ICTs along with associated bays
 - 400kV line bays (including space for switchable line reactor): 6 nos.
 - 220kV line bays: 4 nos.
 - 132kV line bays: 6 nos.
- 4) **Installation of 400/132kV, 315MVA (3rd) ICT at Motihari substation of Essel Infra (to be implemented as ISTS)**
- 5) **ICT Augmentation at POWERGRID sub-stations:**
- i) Installation of 400/132kV, 315MVA (3rd) ICT at Banka and Lakhisarai substations of POWERGRID
- 6) **Reconductoring of Purnea-Purnea (New) 220kV D/C line of POWERGRID with HTLS conductor (to be implemented by POWERGRID as ISTS).**
- i) Purnea–Purnea (New) 220kV D/c line along with suitable modification in line bay equipment at both ends (*Ampacity of single HTLS shall be 1596A – equivalent to Twin ACSR Moose cond. for 45°C ambient and 85°C maximum conductor temperature*)
- 13.3 The schematic showing the above three new 400kV ISTS sub-stations is given below:

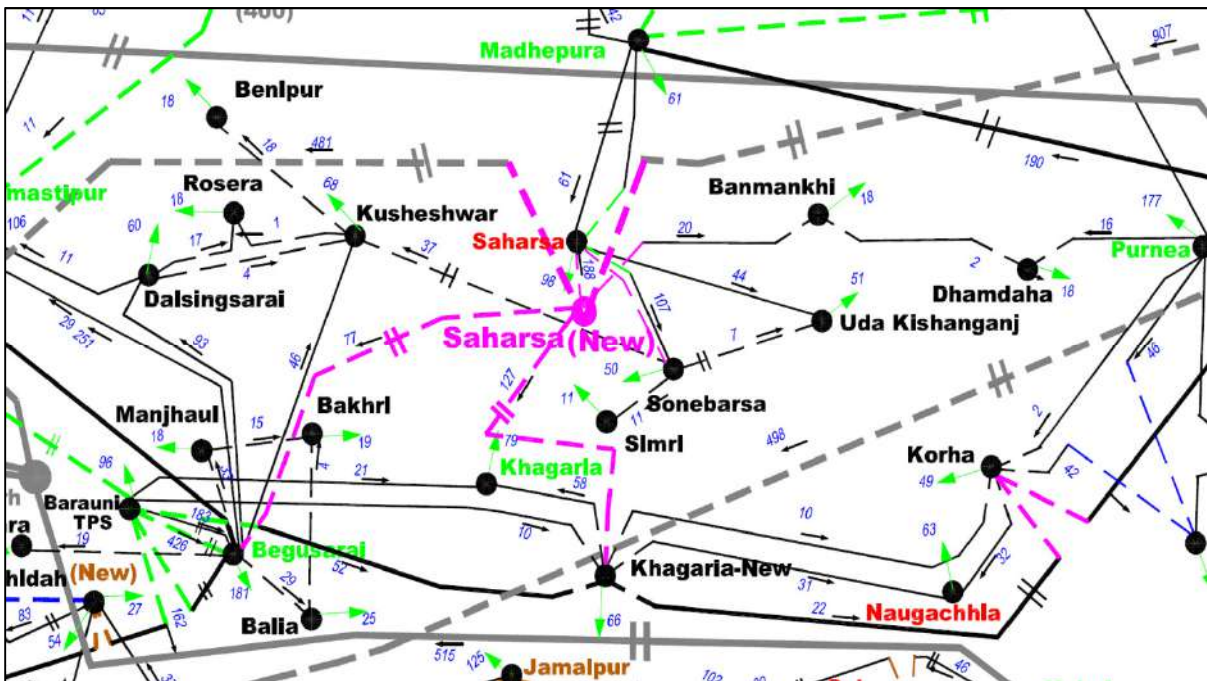
(i) **Sitamarhi (New) S/S**



(ii) Chandauti 400/220/132kV S/s



(iii) Saharsa 400/220/132kV S/s



- 13.4 Director, CEA added that in addition, BSPTCL has also requested 400/220/132 kV sub-stations at Ara (Bhojpur) and Munger in South Bihar (refer Additional Agenda-2), but no system studies (*justification was submitted by BSPTCL and the same was included as Additional Agenda-2 in SCM*) have been submitted by the BSPTCL for supporting these two additional sub-stations. These substations may be considered at later date depending upon results of the system studies.
- 13.5 After deliberation, members agreed for establishment of three new 400kV substations at Sitamarhi, Chandauti and Saharsa along with transformation capacity augmentation at Motihari as ISTS scheme to be implemented as ISTS. Further, augmentation of transformation capacity augmentation at Banka and Lakhisarai by POWERGRID was also approved. The downlinking 220kV & 132kV systems associated with above three ISTS sub-stations as mentioned above would be under the scope of BSPTCL, shall be implemented by BSPTCL as intra-state system.

14.0 Strengthening of Intra state transmission system in Bihar by BSPTCL

- 14.1 Director (PSPA-2), CEA stated that BSPTCL has also proposed following system strengthening works as intra state transmission works to be implemented by BSPTCL to meet their increasing load demand.
- 1) **Motihari (New) S/s: 220/132kV, 2x200MVA (to be implemented by BSPTCL)**
 - (a) Sitamarhi (New) – Motihari (New) 220kV D/c (Twin Moose)
 - (b) Motihari (New) – Gopalganj 220kV D/c(Twin Moose)
 - (c) Motihari (New) – Raxaul 132kV D/c
 - (d) Motihari (New) – Betiah 132kV D/c (Single Moose)
 - 2) **Karmanasa (New) 220/132kV S/s: 2x200MVA (to be implemented by BSPTCL)**
 - (a) LILO of Sasaram – Sahupuri 220kV S/c at Karmnasa (New)
 - (b) Karmnasa (New) – Pusauli (BSPTCL) 220kV D/c line (Twin Moose)
 - (c) Karmnasa (New) – Mohania 132kV D/c (Single Moose)
 - (d) Karmnasa (New) – Karmnasa 132kV D/c (Single Moose)
 - 3) **Upgradation of Korha (New) 132/33kV to 220/132kV S/s with 2x100MVA ICT (to be implemented by BSPTCL)**

- (a) LILO of both circuits of Purnea (POWERGRID) – Khagaria (New) 220kV D/c at Korha (New)

4) Augmentation of ICTs at following sub-station of BSPTCL (to be implemented by BSPTCL)

Substation	kV - 1	kV - 2	Rating	Loading	N-1 Loading	Through additional ICT	Through Replacement
Bihta New	132	220	2x160	2x180	257	3 rd 200 ICT	
Chapra New	132	220	2x160	2x116	175	3 rd 160 ICT	
Gopalganj	132	220	2x160	2x159	232	3 rd 160 ICT	
Darbhangha	132	220	3x100	3x93	119		3x100 by 3x200
Hazipur	132	220	3x100	3x88	108		3x100 by 3x200
Khagaul	132	220	4x100	4x126	150		4x100 by 4x200
Kishanganj New	132	220	2x160	2x162	238	3 rd 160 ICT	
Sipara	132	220	2x150+ 1x160	2x142 +151	170		2x150+160 by 3x200
Sonenagar	132	220	2x160	2x147	205	3 rd 160 ICT	

5) Reconductoring of 132kV BSPTCL transmission lines with HTLS conductor of 240MVA (1050A ampacity) – to be implemented by BSPTCL

- i) Kanti – SKMCH 132kV D/c
- ii) Dehri – Banjari 132kV S/c
- iii) Barauni – Begusarai 132kV D/c
- iv) Mithapur – Karbhigaiya 132kV S/c
- v) Arrah (POWERGRID) – Arrah 132kV S/c
- vi) Lakhisarai (POWERGRID) – Lakhisarai 132kV D/c
- vii) Chhapra (New) – Chhapra 132kV D/c
- viii) Kishanganj (Old) – Kishanganj (New) 132kV D/c
- ix) Chandauti – Tekari 132kV D/c
- x) Kahalgaon – Sabour 132kV S/c
- xi) Kahalgaon – Kahalgaon (BSPTCL) 132kV S/c
- xii) Dehri – Sonenagar 132kV D/c
- xiii) Biharsharif – Baripahari 132kV D/c

6) Stringing of 2nd Circuit (to be implemented by BSPTCL)

- i) Stringing of 2nd circuit of Saharsa – Sonebarsa 132kV S/c on D/c
- ii) Stringing of 2nd circuit of Muzaffarpur – SKMCH 132kV S/c on D/c

7) Scheme modification (to be implemented by BSPTCL)

Sl. No.	Old Scheme	New Scheme
1	Banka – Banka (New) 132kV D/c	Banka (POWERGRID) – Banka (New) 132kV D/c with HTLS
2	Bihta – Bihta (New) 132kV D/c with Panther	Bihta – Bihta (New) 132kV D/c with HTLS of 240MVA
3	Motihari (ISTS) – Motihari 132kV D/c (Panther)	Motihari (ISTS) – Motihari 132kV D/c with HTLS of 240MVA

8) lines (to be implemented by BSPTCL)

- i) Muzaffarpur – Chhapra 220kV D/c
- ii) Laukhi – Phulparas 132kV D/c (HTLS)
- iii) Vaishali – Hazipur 132kV D/c

14.2 On a query regarding intimation by State Transmission Utilities (STUs) to CEA about their planning to strengthen intra-state transmission network, Chief Engineer (PSPA-2) informed that as per Section (39) of Electricity Act, 2003, the functions of STUs, inter alia, includes planning of intra-state transmission network in co-ordination CEA and CTU. He emphasized that even if their transmission system does not envisage inter-connection with ISTS system, STU should inform to CEA before taking up its implementation.

14.3 After detailed discussions, members agreed for three new 220kV substations at Karmnasa, Motihari and Korha (near Katihar) along with augmentation of existing sub-stations, re-conductoring of existing lines with HTLS conductor, stringing of 2nd circuits, modification in old scheme and construction of new lines as indicated above would be implemented by BSPTCL.

15.0 Standardisation of OPGW in lieu of One Earth wire in all Transmission lines

15.1 POWERGRID informed that the requirement for communication system for reliable and efficient operation of grid is increasing many fold day by day. It has been observed that installation of OPGW on existing lines is taking long time due to

- a) Delay in getting shut down of the line
- b) RoW issues
- c) Capacity constraints of executing agencies

15.2 In view of above, POWERGRID has proposed to include one 24 Fibre (OPGW) in all new transmission lines (including LILO) in lieu of one earth wire. This will ensure availability of wideband communication from all substations for various power system applications. For this communication equipment (SDH– STM-16) shall be provided at all terminal stations.

15.3 Members agreed for the same.

16.0 Status of downstream 220kV or 132kV system development by STUs from the various commissioned and on-going ISTS substations

16.1 Director (PSPA-II) stated that following ISTS sub-stations has been commissioned / expected to be commissioned shortly and are under construction. Down linking system for the various sub-stations are given against each sub-station. STUs are requested to indicate the status of the down linking system.

a) Banka 2x200 MVA 400/132kV S/s in Bihar by POWERGRID: Existing

- i. LILO of both circuits of Banka (BSPTCL) – Sabour (BSPTCL) 132kV D/c line at Banka (POWERGRID) – *June'15*

BSPTCL informed that one line has been commissioned in June 15 and other line is held up for termination at Banka (PG)

- ii. Banka (POWERGRID) – Sultanganj (BSPTCL) 132kV D/c line ***BSPTCL informed that line has been commissioned in May 15.***

b) Lakhisarai 2x200 MVA 400/132kV S/s in Bihar by POWERGRID: Existing

- i. Lakhisarai (POWERGRID) – Lakhisarai (BSPTCL) 132kV D/c line ***BSPTCL informed that line completed except railway crossing***

- ii. Lakhisarai (POWERGRID) – Jamui (BSPTCL) 132kV D/c line ***BSPTCL informed that line has been commissioned in June'15***

c) Chaibasa 2x315 MVA 400/220kV S/s in Jharkhand by POWERGRID: Existing

- i. Chaibasa (POWERGRID) – Chaibasa (JUSNL) 220kV D/c

JUSNL informed that the line has been commissioned.

- ii. Chaibasa (POWERGRID) – Ramchanderpur (JUSNL) 220kV D/c line

JUSNL informed that the line is expected to be commissioned by Sep., 16.

d) Daltonganj 2x315 MVA+2x160 MVA 400/220/132kV S/s by POWERGRID: Expected by June 17

- i. Daltonganj (POWERGRID) – Latehar 220kV D/c

JUSNL informed that the line would be commissioned matching with S/s

- ii. Daltonganj (POWERGRID) – Garhwa 220kV D/c

JUSNL informed that the line would be commissioned by Oct., 16

- iii. Daltonganj (POWERGRID) – Daltonganj (JUSNL) 132kV D/c; **JUSNL informed that the line would be commissioned matching with S/s**
- iv. Daltonganj (POWERGRID) – Chatarpur/Lesliganj 132kV D/c : Matching with S/s
JUSNL informed that the line would be commissioned matching with S/s
- e) **Bolangir 2x315 MVA 400/220kV S/s in Odisha by POWERGRID: Existing**
 - i. LILO of one ckt of Sadeipalli – Kesinga 220kV D/c at Bolangir **OPTCL informed that the line would be commissioned by Dec'16**
 - ii. LILO of one ckt of Katapalli - Sadeipalli 220kV D/c at Bolangir – **OPTCL informed that the line is commissioned.**
- f) **Keonjhar 2x315 MVA 400/220kV S/s in Odisha by POWERGRID: Existing**
 - i. Keonjhar (POWERGRID) – Keonjhar (OPTCL) 220kV D/c
OPTCL informed that the line would be commissioned by Dec'17
 - ii. Keonjhar (POWERGRID) – Turumunga (OPTCL) 220kV D/c
OPTCL informed that the line would be commissioned by Dec'19
- g) **Pandiabil 2x500 MVA 400/220kV S/s in Odisha by POWERGRID: Existing**
 - i. Pratapsasan (OPTCL) – Pandiabil (POWERGRID) 220kV D/c
OPTCL informed that the line would be commissioned by Dec'17
 - ii. LILO of one circuit of Atri – Puri (Samangara) 220kV D/c line at Pandiabil (POWERGRID) – Sep 16
OPTCL informed that the line would be commissioned by Sep'16
- h) **Kishanganj: 2x500MVA, 400/220kV in Bihar by POWERGRID: Existing**
 - i. Kishanganj (POWERGRID) – Kishanganj (BSPTCL) 220kV 2xD/c
BSPTCL informed that the line would be commissioned matching with construction of 220kV bays at Kishanganj.
- i) **Darbhanga: 2x500MVA, 400/220kV in Bihar by DMTCL (Oct., 16)**
 - i. Darbhanga (ISTS) – Darbhanga (BSPTCL) 220kV D/c
BSPTCL informed that the line would be commissioned Matching with the S/S
 - ii. Darbhanga (ISTS) – Motipur 220kV D/c

BSPTCL informed that the line would be commissioned Matching with the S/S

- iii. Darbhanga (ISTS) – Samastipur New 220kV D/c (S/c strung)

BSPTCL informed that the line would be commissioned Matching with the S/S

- iv. Darbhanga (ISTS) – Laukhi (earlier Supaul New) 220kV D/c

BSPTCL informed that the line would be commissioned Matching with the S/S

j) Motihari: 2x200MVA, 400/132kV in Bihar by DMTCL (Oct., 2016)

- i. Motihari (ISTS) – Motihari (BSPTCL) 132kV D/c

BSPTCL informed that the line would be commissioned Matching with the S/S

- ii. Motihari (ISTS) – Betiah 132kV D/c

BSPTCL informed that the line would be commissioned Matching with the S/S

- iii. Motihari (ISTS) – Raxaul 132kV D/c

BSPTCL informed that the line would be commissioned Matching with the S/S

k) Alipurduar: 2x315MVA, 400/220kV in West Bengal by POWERGRID (Expected by Mar 2017)

- i. Alipurduar (POWERGRID) – Alipurduar (State) 220kV D/c

WBSETCL informed that the line would be commissioned Matching with the S/S

l) Rajarhat 2x500 MVA 400/220kV S/s in West Bengal by POWERGRID (Expected by Dec., 2016)

- i. Rajarhat-New Town AA3 220 kV D/C

WBSETCL informed that the line would be commissioned by Oct., 16

- ii. Rajarhat-New Town AA2 220 kV D/C 8

WBSETCL informed that the line would be commissioned by Oct., 18

- iii. Rajarhat-Barasat 220 kV D/C

WBSETCL informed that the line would be commissioned by June, 18

m) Dhanbad: 2x500 MVA, 400/220kV in Jharkhand by North Karanpura Transco Limited (Expected by May 2019)

i. Dhanbad-Govindpur (JUSNL) 220 kV D/C

JUSNL informed that the line would be commissioned matching with S/s.

ii. Dhanbad-Jainmore (JUSNL) 220 kV D/C

JUSNL informed that the line would be commissioned matching with S/s.

16.2 Members noted the time lines provide by STUs and requested them to commission the downlinking system at the earliest to fully utilize the ISTS assets.

17.0 2 nos. 400kV line bays at Muzaffarpur for Muzaffarpur – Dhalkebar 400kV D/c line

17.1 Director (PSPA-2) stated that the interconnection between India and Nepal through Muzaffarpur – Dhalkebar (Nepal) 400kV D/c (to be initially operated at 220kV) line has been recently commissioned and is being operated at 132 kV, due to delay in implementation of 220 kV S/S at Dhalkebar (Nepal). In the 2nd Joint Steering Committee meeting on Indo-Nepal Cooperation in Power Sector held on 29th Jan 2016 at Kathmandu, Nepal, it was decided to operate the line at 220kV level by Oct 2016 and at rated voltage level of 400kV by Dec 2017. To operate the line at 400kV, 2 nos. 400kV line bays shall be required at Muzaffarpur 400/220kV S/s and 400/220kV substation needs to be established at Dhalkebar (Nepal). Accordingly, it is proposed to construct 2 nos. 400kV line bays at Muzaffarpur substation of POWERGRID. These line bays are proposed to be constructed by POWERGRID and the transmission charges for the two 400kV line bays shall be borne by Nepal. Further, shifting of the transmission line from 220kV switchyard to 400kV switchyard may require some transmission line works as well.

17.2 Representative of BSPTCL added that Bihar would like to use 2 no. 220 kV line bays, which would become spare, when Muzaffarpur–Dhalkebar (Nepal) 400kV D/c would be charged at its rated voltage of 400 kV.

17.3 POWERGRID stated that Bihar could use the 2 no. 220 kV spare line bays after paying charges to the Cross Border Power Transmission Company Limited.

17.4 After further deliberation, members agreed for construction of 2 no. 400 kV line bays at Muzaffarpur and construction of 400kV D/c line section at Muzaffarpur end

for termination of Muzaffarpur – Dhalkebar (Nepal) line (presently operated at 132kV) at 400kV bus by POWERGRID with tariff to be borne by Nepal.

18.0 Re-conductoring of Rangpo – New Siliguri 400kV D/c (Twin Moose) line and new 220/132kV, 160MVA (4th) ICT at Rangpo

18.1 Director(PSPA-2) stated that power to the tune of 3200 MW from existing and under construction Phase-I and Phase-II hydro projects in Sikkim, is anticipated to be pooled at Rangpo 400 kV sub-station. The power from the Rangpo S/S would be evacuated through following lines:

- a) Rangpo – Siliguri 400kV D/c (Twin Moose)
(Formed after LILO of Teesta-V – Siliguri 400kV D/c at Rangpo)
- b) Rangpo – Kishanganj 400kV D/c (Quad Moose)
(Formed after LILO of Teest-III – Kishanganj 400kV (Quad) D/c at Rangpo)

18.2 He said that in the event of N-1-1 outage of Rangpo-Kishanganj 400kV (Quad Moose) line, the Rangpo-Siliguri 400 kV D/c line would get overloaded. Accordingly, it is proposed to re-conductor the Rangpo – Siliguri 400kV D/c Twin Moose line with Twin HTLS conductor.

18.3 He added that initially power from only two generation projects – Chuzachen (99 MW) and Bhasmey (51 MW) total 150MW was planned to be pooled at Rangpo 132kV level and accordingly 3x100MVA was planned considering N-1 security criteria. Now, in view of modification in Sikkim Comprehensive scheme (of Govt. of Sikkim), power from Dikchu HEP (96 MW) will also be pooled at Rangpo at 132kV level. In view of the above, about 250MW power from three generation projects viz. Chuzachen, Bhasmey and Dikchu would be injected at 132kV level at Rangpo S/s. In case of outage of one 220/132kV ICT at Rangpo during off-peak condition, when drawl by Sikkim at Gangtok S/s is very less, the other two ICTs would get overloaded. Therefore, it is proposed to install new 220/132kV, 160MVA ICT at Rangpo S/s.

18.4 After deliberations, members agreed to following:

- a) Re-conductoring of Rangpo–Siliguri 400kV D/c Twin Moose line with Twin HTLS conductor along with suitable modification in line bay equipment at both ends *(Ampacity of single HTLS shall be 1596A – equivalent to Twin ACSR Moose cond. for 45°C ambient and 85°C maximum conductor temperature).*
- b) Installation of 4th 220/132kV, 160MVA ICT at Rangpo

19.0 Conversion of fixed line reactor at Purnea end of Kishanganj – Purnea 400kV D/c line to switchable line reactor

- 19.1 POWERGRID has informed that Siliguri – Purnea 400kV D/c (Quad) line is being LILO at Kishanganj S/s and the same is expected to be commissioned shortly. Presently, one circuit of Siliguri – Purnea 400kV D/c line has 63MVAR fixed line reactor at Purnea end. After LILO of the line at Kishanganj S/s, length of Kishanganj – Purnea section would be about 72km. In view of the above, it is observed that the one circuit of Purnea – Kishanganj 400kV D/c (after LILO) is becoming over compensated (about 108%). Accordingly, it is proposed that the 63MVAR fixed line reactor at Purnea end in one circuit of Kishanganj – Purnea 400kV D/c (Quad) line may be converted to switchable line reactor.
- 19.2 Members agreed to the proposal.

20.0 Transmission system for evacuation of power from Nabinagar-II STPP (1980MW) of NTPC

- 20.1 Director (PSPA-2) stated that the transmission system for evacuation of power from Nabinagar-II STPP of NTPC is being implemented by POWERGRID with following scope of works:
- (a) Nabinagar-II – Gaya 400kV D/c line with Quad moose conductor
 - (b) Nabinagar-II – Patna 400kV D/c line with Quad moose conductor
 - (c) Additional 1x1500MVA, 765/400kV ICT at Gaya
- 20.2 He said that POWERGRID has informed that there are RoW constraints near Nabinagar-II generation project due to thick population in the area. Accordingly, POWERGRID has proposed construction of Nabinagar-II–Gaya and Nabinagar-II–Patna 400kV D/c lines for about 7km on multi circuit towers at Nabinagar-II end.
- 20.3 NTPC informed that they have revised the position of the line bays for termination of these lines in the generation switchyard and with revised configuration, multi circuit may not be required.
- 20.4 The matter was discussed and it was decided that in case there is a requirement of multi circuit towers, the same may be taken up by PGCIL. PGCIL will inform CEA and ERPC accordingly.

21.0 Talcher Stage-III (2x660MW): Application for Connectivity of 1320MW and Long Term Access (LTA) of 622MW

- 21.1 Director (PSPA-2) informed that the Connectivity & LTA application of NTPC for Talcher-III (2x660 MW) generation project was discussed in the 10th Connectivity and LTA meeting held on 25th May 2015, wherein following system was proposed for LTA:

- Talcher-III – Angul 400kV D/c line (HTLS equivalent to Quad Moose)
- 21.2 He said that in the previous meeting, Odisha has proposed construction of Talcher-III – Meramundli-B 400kV D/c line for drawl of its 622 MW share. In view of Odisha's proposal, issue of paralleling of ISTS & STU (Odisha) network at Talcher-III generation switchyard was discussed and it was decided to resolve the issue in a separate meeting. CEA convened a meeting on 04th Nov 2015 to resolve the issue of drawl of power by Odisha. In the meeting, it was decided that GRIDCO would apply for LTA of 622MW (Odisha's share) from Talcher-III project, OPTCL would submit details regarding drawl of Odisha's share and evacuation system would be finalised in the next SCM.
- 21.3 He added that for evacuation and transfer of power from Tacher-III to beneficiaries, it is proposed to connect the generation project to Angul S/s of POWERGRID through high capacity 400kV D/c line. Accordingly, it is proposed to grant LTA of 622MW to NTPC for Talcher-III generation project with following connectivity transmission line:
- (i) Talcher-III – Angul 400kV D/c (Triple Snowbird)
- 21.4 OPTCL reiterated its stand for connection of Talcher-III project to Odisha network, so that Odisha can directly draw its share from generation switchyard without paying any ISTS charges for drawl of its share of power. OPTCL also informed that they have planned a new 400/220kV, 2x500MVA substation at Meramundali B as a part of intra state system with the following scope of works near existing Meramundali substation of OPTCL.
- i) Shifting of Duburi – Meramundali 400kV D/c line from Meramundali to Meramundali B.
 - ii) Shifting of GMR – Meramundali 400kV S/c line from Meramundali to Meramundali B (1x350MW unit of GMR is connected to Odisha grid through the subject line).
 - iii) Shifting of Duburi – Meramundali 220kV D/c line from Meramundali to Meramundali B.
 - iv) Angul – Meramundali B 400kV D/c line (under ISTS system)
- 21.5 On a query about the project status, NTPC informed that coal linkage for the project is yet to be obtained. Forest and environment clearances for the project are also pending. The revised commissioning schedule of the project is now 2021-22.
- 21.6 In view of unavailability of various clearances for the project, delayed/uncertain commissioning schedule and keeping in view the CERC directive for processing of applications in timely manner, members agreed to close the Connectivity and

LTA applications of Talcher-III generation project. NTPC representative agreed for closure of its Connectivity and LTA applications. NTPC was requested to apply afresh on achieving considerable progress in project implementation.

22.0 Interim connectivity to generation projects through LILO arrangement

22.1 Director (PAPA-2) stated that a number of generation projects in Eastern Region 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.

22.2 He said that the Hon'ble CERC, in its order in the tariff petition (Petition No.112/TT/13), for Phase-1 IPPs in Odisha has observed that Sterlite and Ind-Barath generation projects have not constructed their dedicated transmission system and are still connected through temporary LILO arrangement. In the order dated 07-10-15, CERC at para 65 has given following direction:

"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."

22.3 He added that in line with the direction given by CERC, timelines for generation projects given temporary connectivity through LILO arrangement as given below need to be fixed by which the temporary arrangement would be replaced with Dedicated Transmission line.

Sl. No.	Generation Project	Installed Capacity (in MW)	Present Connectivity through LILO	Final Connectivity Arrangement (not commissioned)
1	Sterlite Energy Ltd.	4x600	LILO of one circuit of Rourkela - Raigarh 400kV D/c line (<i>granted in Sept'09</i>)	Sterlite - Jharsuguda 400kV 2xD/c
2	Ind Barath Energy (Utkal) Ltd.	2x350	LILO of one circuit of Jharsuguda - Raigarh 400kV D/c line (<i>granted in Sept'09</i>)	Ind Barath - Jharsuguda 400kV D/c
3	Gati Infrastructure Ltd. (Chuzachen)	2X49.5	LILO of Rangpo - Melli 132kV S/c line (<i>granted in Nov'07</i>)	Chuzachen - Rangpo 132kV D/c (with Zebra conductor)
4	DANS Energy Pvt. Ltd. (Jorethang)	2x49	LILO of one circuit of Rangpo - New Melli 220kV D/c line (<i>granted in May'15</i>)	Jorethang - New Melli 220kV D/c
5	Sneha Kinetic Power Projects Pvt. Ltd. (Dikchu)	2x48	LILO of one circuit of Teesta-III – Rangpo 400kV D/c line (<i>granted in Dec'14 by CERC</i>)	Dikchu – Dikchu Pool 132kV D/c

22.4 For discussing the time line by which the temporary arrangement would be replaced with Dedicated transmission line, generation developers were called to give their views. Accordingly, following was discussed.

22.5 Dikchu (2x48 MW) - Sneha Kinetic Power Projects Pvt. Ltd.

Director (PSPA-2) stated that Dikchu HEP was granted Interim arrangement vide CERC order in Petition no. 157/MP/2014 dated 03rd Dec 2014 through LILO of one circuit of Teesta-III – Rangpo 400kV D/c line. The interim arrangement is under implementation by the project developer. The dedicated transmission line from the project i.e. Dikchu – Dikchu Pool 132kV D/c is under the scope of project developer. Dikchu Pool S/s is being implemented under Sikkim Comprehensive scheme of Govt. of Sikkim (being implemented by POWERGRID as project management consultant). The expected commissioning schedule of Dikchu Pool S/s is Mar/Apr 2019.

The project developer agreed to complete the dedicated line in matching time-frame.

22.6 Jorethang (2x49 MW) - DANS Energy Pvt. Ltd. (DEPL)

Director (PSPA-2) stated that in view of delay in completion of Jorethang – New Melli 220 kV D/C line by generation project developer, Jorethang HEP was provided interim connectivity through LILO of one circuit of New Melli – Rangpo

220kV D/c line at Jorethang HEP in the 17th SCM held on 25th May 2015. Therein, it was also decided that M/s DEPL shall complete balance portion (from LILO point to New Melli S/s) of its dedicated line along with 2 nos. 220kV line bays at New Melli by Mar'16. He added that M/s DEPL has informed that their 220 kV line from LILO point to New Melli has been completed and the 2 no. 220 kV GIS bays at New Melli for line termination has been delayed due to floods in Chennai (Alstom is implementing these bays and the equipment is being manufactured at its Chennai plant) and alignment problems between various phases of the bays at New Melli. They are making all efforts to complete the bays by July 2016.

The project developer was asked to complete the dedicated line along with bays at New Melli S/S by July 2016.

22.7 Sterlite Energy Ltd. (4x660 MW)

Representative from M/s Vedanta informed that OERC has directed conversion of ISTS connected units (3x600MW) from IPP to Captive Power plant (CPP). Accordingly, they intend to connect 1000MW smelter load to their captive generation switchyard, which is located in the same premises. Vedanta informed that its dedicated line from generation switchyard to Jharsuguda is expected by Nov 2016.

MS, ERPC informed that M/s Vedanta has not been maintaining grid discipline and at times drawing more than scheduled / allowed quantum of power without its permission. They are frequently changing connectivity at their generation switchyard with STU and ISTS without taking permission from ERPC / ERLDC. At many times, it is not clearly known, how many units are connected to ISTS and how many units are connected to Odisha's network. Also, M/s Vedanta has so far not shown any sincerity towards completion of their dedicated line and missed every timeline given by ERPC for completion of their dedicated line.

Members were of the opinion that the interim arrangement granted to Vedanta should be disconnected, in view of non-compliance of decisions and its insincere efforts towards completion of dedicated transmission line. Finally, it was agreed that decision in this regard shall be taken in the forthcoming ERPC meeting.

22.8 Ind Barath Energy (Utkal) Ltd. (2x350 MW)

Representative from M/s Ind-Barath informed that their generation unit -1 is expected to be commissioned in June/July 2016, and unit -2 is expected to be commissioned by Nov 2016. With regard to status of their dedicated line to Jharsuguda, he informed that about 1.8 km of stringing and erection of one tower is pending. The line is expected to be commissioned by 31.07.2016. Member agreed to extend the temporary LILO arrangement by July 2016.

22.9 Gati Infrastructure Ltd. (Chuzachen) (2x49.5 MW)

Director (PSPA-2) informed that for Chuzachen 2x49.5 MW generation project, the dedicated 132 kV line from the project to Rangpo has been constructed by Department of Power, Government of Sikkim. Representative from Sikkim informed that the line has been commissioned till Rangpo S/s; however, the 2 no. 132kV line bays at Rangpo for line termination is pending and the same is expected to be commissioned by Dec., 2017. Members noted the same.

22.10 In respect of above temporary arrangements, it was decided that these would be disconnected after getting instructions from ERPC.

23.0 Tashiding HE Project, Sikkim: Evacuation of Power (Interim Arrangement) – Proposal of Shiga Energy Private Ltd.

23.1 Director (PSPA-2) stated that M/s Shiga Energy Pvt. Ltd., has informed that their Tashiding HEP (THEP) in Sikkim is in advanced stage of construction and expected to be commissioned by December 2016. The power evacuation system for the project comprises of the following:

i) Immediate Evacuation System (under scope of Gen. Developer)

a) Tashiding - Legship 220kV D/c line (7km)

ii) Common Transmission System (under scope of Govt. of Sikkim)

a) Establishment of 220kV substation at Legship

b) Legship - New Melli 220kV D/c with twin moose conductor

23.2 He said that the Legship Pooling station and 220 kV D/C transmission line from Legship Pooling station to New Melli substation, with 2 number GIS bays at New Melli are being implemented by Department of Power, Govt. of Sikkim as a part of Comprehensive Scheme for strengthening of Transmission and Distribution system in Sikkim (being implemented by POWERGRID on consultancy basis).

23.3 He added that in the meeting held in CEA with representatives from NLDC, CTU-PGCIL & Shiga Energy on 23.11.2015, it was agreed that in case of delay in Legship Pooling station, the transmission line from Tashiding HEP to Legship Pooling station and transmission line from Legship pooling station to New Melli substation may be directly connected bypassing the Legship Pooling station as an interim arrangement to ensure power evacuation. In the meeting, M/s Shiga Energy had informed that the 2 no. 220 kV GIS bays at New Melli may not be ready by Dec., 2016. Therefore, for evacuation of power from Tashiding HEP, one circuit of New Melli – Rangpo 220 kV D/C line may be LILO at suitable point so as form Tashiding-New Melli, Tashiding-Rangpo and New Melli-Rangpo 220 kV S/c lines as an interim arrangement.

- 23.4 POWERGRID informed that the Legship-New Melli 220 kV D/C line is being expedited and may be completed by Dec., 2016 matching with the commissioning of Tashiding HEP and the line bays at New Melli by March 2017.
- 23.5 In view of anticipated delay in commissioning of Legship Pooling station and 2 no. 220 GIS bays at New Melli S/s and expected commissioning of Tashiding HEP by Dec., 2016, members agreed to the following interim arrangement, till the commissioning of Legship Pooling sub-station and 2 no. 220 kV GIS bays at New Melli.

Temporary Arrangement no. 1

- a) Interconnection of Tashiding-Legship Pool 220 kV D/C line with Legship Pool-New Melli 220 kV D/C line by bypassing Legship Pooling station.

Temporary Arrangement no. 2

If the bays at New Melli for termination of Legship Pool-New Melli 220 kV D/C line are not ready.

- b) LILO of one circuit of New Melli-Rangpo 220 kV D/c line at a suitable location near New Melli and connecting it with Tashiding-New Melli line so as to form Tashiding-New Melli, Tashiding-Rangpo and New Melli-Rangpo 220 kV S/c lines.
- 23.6 Members also agreed that the temporary arrangement at (b) above would be discontinued after the commissioning of 2 no. 220 kV bays at New Melli. The temporary arrangement at (a) would be discontinued after the commissioning of Legship pooling sub-station.

24.0 Additional 400 kV D/C line from Derang (Generation project of JITPL) to Angul Pooling Station(PG) – Proposal of JITPL

- 24.1 Director (PSPA-2) stated that JITPL has commissioned 2x600 MW generating plant at Derang, Odisha and power from the project is being evacuated through Derang-Angul (PG) 400 kV D/C line. M/s JITPL had applied for 1044 MW LTOA after considering drawl of 156 MW by Odisha (GRIDCO) from bus bar of the generating switchyard as per PPA signed with Odisha. Accordingly, M/s JITPL was granted Long Term Open Access (LTOA) of 1044 MW under CERC Regulation.
- 24.2 He said that M/s JITPL was asked to construct Derang - Angul Pool 400 kV D/C twin Moose line with for maximum conductor temperature of 95°C as per the minutes of the meeting held on 8-12-2008 and 15-12-2008 at POWERGRID office, Gurgaon regarding grant of LTOA for generation projects in advance stage in Odisha. However, M/s JIPTL has constructed the above dedicated line (Twin Moose with ACSR conductor) for maximum conductor temperature of 75°C.

Hence, in the event of N-1 contingency, the above dedicated line is not able to evacuate full power from the project .

- 24.3 He added that in this regard, a meeting was held in the CEA on 16.12.2015 with CEA, CTU, POSOCO & JITPL, in which, JITPL agreed to construct an additional Derang - Angul 400 kV D/C line to meet the N-1 contingency criteria. This second line may also cater to the additional units that JITPL was considering as expansion of Derang project in future.
- 24.4 Members agreed for construction of another Derang - Angul 400 kV D/C line along with two 400kV line bays at Angul S/s by JITPL as Dedicated Transmission Line.

25.0 Installation of 400/220kV, 500MVA ICT (3rd) at Maithon

- 25.1 Director (PSPA-2) stated that POWERGRID has informed that presently, there are 2 X 315MVA, 400/220kV ICTs at their Maithon S/s. The split bus arrangement has been made at Maithon sub-station at 400kV level and both the ICTs are located on one side of the bus sectionalizer. In view of growing ICT loading, transformation capacity augmentation by replacement of 2x315MVA ICTs with 2x500MVA ICTs along with addition of 1x125MVA bus reactor was approved in the 14th SCM held in January-2013. The loading of Maithon ICTs has grown to more than 600MVA. Thus, even after replacement of ICTs, the N-1 criteria shall not be met during peak load condition. Therefore, POWERGRID has proposed addition of one no. 400/220 kV 500 MVA transformer at Maithon. With this, the total transformation capacity at Maithon S/sat 400/220 kV level would become 3x500MVA.
- 25.2 In view of increased loading at Maithon S/S, members approved installation of one more 400/220kV, 500MVA ICT (3rd) at Maithon S/s.

26.0 Replacement of 220/132kV, 1x50MVA ICT at Malda

- 26.1 Director (PSPA-2) stated that POWERGRID has informed that presently, there are 220/132kV, 2x160MVA+1x50MVA ICTs at Malda S/s. During the last summer, a peak demand to the tune of 270MVA was observed against an installed transformation capacity of 370MVA and 50MVA ICT, which is 20 years old, is getting heavily loaded during summer and tripping of any 220/132kV ICT would lead to cascaded tripping. Accordingly, POWERGRID has proposed replacement of 50 MVA transformer with 200 MVA transformer.
- 26.2 WBSETCL stated that they are planning to shift some load incident on Malda 220/132kV S/s and thus 160 MVA, 220/132 kV ICT would be sufficient for catering the load with N-1 contingency. Due to urgent requirement of replacement of the transformer, WBSETCL proposed to provide 160 MVA transformer, till the time POWERGRID arranges the same.

- 26.3 In view of increased loading at Malda S/s, members agreed the proposal for replacement of existing 50MVA, 220/132 kV ICT at Malda with new 160 MVA, 220/132 kV ICT along with suitable modifications in bay equipment.
- 26.4 Further, regarding WBSETCL proposal for shifting 220/132 kV, 160 MVA transformer from their site to Malda S/s for interim period till POWERGRID procures the new 160MVA ICT, WBSETCL will coordinate with POWERGRID. However, WBSETCL will bear the cost of installation of 220/132kV, 160MVA (sourced from WBSETCL) ICT at Malda S/s for the interim period.
- 27.0 Installation of 420kV, 1x125MVAR bus reactor at Subhasgram S/s of POWERGRID**
- 27.1 Director (PSPA-2) stated that POWERGRID has informed that in the recent past, high voltage (up to 430kV) has been observed at Subhasgram sub-station of POWERGRID. This sometimes leads to tripping of lines due to over voltage. Presently, there is no bus reactor at Subhasgram S/s and there is only one 50MVAR line reactor at Subhasgram end of Sagardighi – Subhasgram 400kV S/c line. Accordingly, it is proposed to install 1x125MVAR bus reactor at Subhasgram S/s of POWERGRID to control over voltage.
- 27.2 In view of over voltage at Subhasgram, Members agreed for installation of 420kV, 1x125MVAR bus reactor at Subhasgram S/s of POWERGRID.
- 28.0 Provision of 765kV, 80MVA single phase spare reactor at Ranchi (New) substation of POWERGRID**
- 28.1 Director (PSPA-2) stated that POWERGRID has informed that the switchyard layout of 765/400kV Ranchi (New) S/s is Breaker and a half scheme. There are two bus reactors and one line reactor (in Ranchi-New – Dharamjaygarh 765kV S/c, ckt-1) of 765kV, 240MVA capacity on one side (side-1) of the substation (total 10x80 MVA single phase units including one 765kV, 80MVA single phase spare reactor). There are 3 nos. of 240MVA line reactors (1 no. with Ranchi New – Dharamjaygarh 765kV S/c, ckt-2 & 2 nos. with Ranchi New – Medinipur 765kV D/c line under ERSS-XVIII) on the other side (side-2). However, this side (side-2) is not having any spare reactor unit.
- 28.2 He said that the 765kV, 1-ph spare reactor is installed as ready standby along with 765kV auxiliary bus and 145kV neutral bus arrangement on side-1 such that in case of failure of any single phase reactor on that side the spare reactor can be taken into service in short span of time (without any physical movement of spare reactor). However, in case of failure of any single phase reactor on the side-2, there is no single phase spare reactor available for replacement. In view of above, POWERGRID has proposed one no. 80 MVAR single phase reactor as spare.

28.3 Members approved the installation of 765kV, 1x80MVAR single phase spare reactor at Ranchi (New) substation of POWERGRID on the side-2 also.

29.0 Modification in “Transfer of power from generation projects in Sikkim to NR/WR scheme (HCPTC-3)” for Phase-1 IPPs in Sikkim

29.1 POWERGRID informed that the LILO of both circuits of Teesta-III – Kishanganj 400kV D/c at Rangpo was agreed as a part of transmission system associated with Sikkim Phase-I generation projects and the LILO lines i.e. 400kV 2xD/C are under construction. One 400kV D/c LILO line is complete and the 2nd 400kV D/c LILO line has got delayed due to forest clearance issues. About 8km stretch of the 2nd LILO line involves Tandong Reserve forest. Site officials of POWERGRID have indicated that obtaining forest clearance for 2nd 400kV D/c LILO may take substantial time and the length of the line may increase additionally by 30-35 km due to Diversity Park coming in the route of the line. Due to anticipated delay in commissioning of the second LILO at Rangpo, POWERGRID has proposed to delink the second LILO from the scheme “Transfer of power from generation projects in Sikkim to NR/WR scheme (HCPTC-3)” for Phase-1 IPPs in Sikkim and take it up as a separate scheme.

29.2 Members agreed to delink the second LILO at Rangpo from Part-B of the scheme “Transmission System for Transfer of power from generation projects in Sikkim to NR/WR (Part-B)” and take it up as a separate part (Part-B1) of the same scheme as “**Transmission System for Transfer of power from generation projects in Sikkim to NR/WR (Part-B1)**”.

29.3 Members requested PGCIL to complete the second LILO at Rangpo at the earliest.

30.0 Construction of 01 no. 220 kV line bay at Darbhanga (400/220 kV) GSS under DMTCL (Darbhanga – Motihari Transmission Company Ltd.)

30.1 Director (PSPA-2) informed that BSPTCL has requested for construction of 01 no. 220 kV line bay at Darbhanga (400/220 kV) GSS for termination of 2nd circuit of 220 kV Darbhanga (400/220 kV)-Samastipur (new) (220/132/33 kV) transmission line.

30.2 He informed that CEA vide letter no. 69/1/2012-SP&PA/1203-05 dated 15.11.2012 has cleared following transmission system of Bihar as a part of 12th plan transmission & sub-transmission system strengthening in Bihar-Phase-1 for delivery of power from Dharbhanga 400/220 kV sub-station:

- (i) 220kV D/C Darbhanga (400/220kV) – Bikhampur (New) transmission line
- (ii) 220kV D/C Darbhanga (400/220kV) – Darbhanga (220kV BSPTCL) transmission line

- (iii) 220kV D/C Darbganga (400/220kV) – Supoul (Laukahi) (220/132kV) transmission line
 - (iv) 220kV DCSS Darbganga (400/220kV) – Samastipur (New) (220/132/33kV) transmission line
- 30.3 He added that BSPTCL has informed that 2nd circuit stringing of 220kV Darbhanga (400/220 kV) – Samastipur (new) (220/132/33kV) DCSS transmission line is required to be done at this stage due to the following reasons:
- a) To have extra source at 220 kV level from Darbhanga (400/220kV).
 - b) To cater rising demand of electricity in future as demand is increasing exponentially due to implementation of different scheme of DISCOMS and PFA (24x7) scheme of GOI.
 - c) To avoid ROW, if this worked is delayed and taken up at later stage. ROW is increasing day by day. Presently sever ROW is being faced in construction of transmission lines.
- 30.4 He said that Darbhanga 400/220 kV GSS is under construction by M/s DMTCL under TBCB route. As per the scope of work given to M/s DMTCL, there is provision of 7 Nos. 220 kV line bays and space for 6 Nos. 220 kV future line bays. The seven (7) no. of 220 kV line bays at Darbhanga are being utilized by BSPTCL for termination of the double circuit line to Motipur, Darbganga (BSPTCL) and Supoul (Laukahi), and 220 kV DCSS line to Samastipur (new). Beyond these 7 bays, M/s DMTCL is to provide only space for six (6) bays.
- 30.5 He further added that CEA has given no objection for construction of 01 no. 220 kV line bay at Darbhanga (400/220 kV) GSS for termination of 2nd circuit of 220 kV Darbhanga (400/220 kV)-Samastipur (New) (220/132/33 kV) transmission line. The scope for space for additional bay was already there in RFQ and would be provided by DMTCL. The cost of equipment for line bay will be borne by BSPTCL.
- 30.6 Members noted and approved the above.

31.0 CESC Limited: Connectivity of 500MW as Bulk Consumer

- 31.1 CTU informed that CESC Limited has applied as a bulk consumer for connectivity to avail 500MW power from Rajarhat (PG) S/s at 400 kV level mentioning that connectivity will be essential to enable CESC to meet the increasing power demand of the Metropolis of Kolkata in the coming years. The applicant has also mentioned that they are a distribution licensee in West Bengal and has informed that dedicated transmission Network from Rajarhat (PG) to CESC system will be arranged by CESC Limited. The definition of Bulk Consumer as per Connectivity Regulations, 2009 is as follows:

“2.(1) (c) “Bulk consumer” means in respect of connectivity, any consumer who intends to avail supply of a minimum load of 100 MW from the Inter-State Transmission System;” “2.(1) (f) “consumer” means any consumer eligible to avail open access as specified by the State Commission under sub-section (2) of section 42 of the Act;

As per the Electricity Act, 2003, definition of consumer is as follows:

"consumer" means any person who is supplied with electricity for his own use by a licensee or the Government or by any other person engaged in the business of supplying electricity to the public under this Act or any other law for the time being in force and includes any person whose premises are for the time being connected for the purpose of receiving electricity with the works of a licensee, the Government or such other person, as the case may be;

- 31.2 CTU informed that with the above, it emerges that CESC is a distribution licensee and shall supply 500MW power to licensed area of CESC. CESC shall not be consuming the above power for its own use. Hence, it does not fall under bulk consumer category. Further, as per the Connectivity Regulations, 2009 and Detailed Procedure, only Generator (other than captive)/Captive Generator/Bulk Consumer/Solar Power Park Developer are eligible for grant of connectivity by CTU.
- 31.3 CTU added that the application of CESC is not in conformity with the regulations, and proposed to close the application.
- 31.4 WBSETCL informed that they would provide adequate connectivity to CESC as STU system. For this, they would coordinate with CESC and inform CEA / CTU accordingly.
- 31.5 Members approved closure of Connectivity application of CESC.

32.0 Establishment of three new 400kV substations in Odisha under intra-state scheme

- 32.1 Director (PSPA-2) informed that OPTCL vide letter dated 24-05-2016 has proposed construction of three new 400kV substations in Odisha at Meramundli-B, Narendrapur and Khuntuni as intra-state transmission system.
- 32.2 He added that in view of delay / non-implementation of “Talcher-II Augmentation System” by Reliance Power Transmission Company Ltd. (discussed at Agenda-2), it has been decided to plan a new transmission system for strengthening of southern Odisha grid. Thus, the proposal of OPTCL and identification of new transmission system for strengthening of southern Odisha grid may be jointly studied by CEA, CTU and Odisha.

32.3 Member agreed that the system to be implemented by OPTCL may be finalised in the proposed meeting and the final scope may be included in the minutes of this standing committee meeting.

32.4 Accordingly, a joint study was carried out on 30 June, 2016 at CEA. The study report of the same is enclosed at Annexure-II. Following transmission system strengthening was finalised in Odisha as an Intra-State scheme (to be implemented by OPTCL):

(a) New 2x500MVA, 400/220kV sub-station at Meramundali-B

- (i) Shifting of Duburi – Meramundali 400kV D/c line from Meramundali to Meramundali-B
- (ii) Shifting of GMR – Meramundali 400kV S/c line from Meramundali to Meramundali-B (1x350MW unit of GMR shall be connected to Odisha grid through the subject line)
- (iii) Shifting of Duburi – Meramundali 220kV D/c line from Meramundali to Meramundali-B

(b) New 2x500MVA, 400/220kV sub-station at Narendrapur (New)

- (i) Pandiabil – Narendrapur (New) 400kV D/c line
- (ii) Narendrapur (New) – Aska 220kV D/c line
- (iii) LILO of both the circuits of existing Therubali – Narendrapur 220kV D/c line at Narendrapur(New)

(c) New 2x500MVA, 400/220kV sub-station at Khuntuni

- (i) LILO of Meramundali-B – Duburi 400kV D/c line (*formed after Shifting of Duburi – Meramundali 400kV D/c line from Meramundali to Meramundali-B*) at Khuntuni
- (ii) LILO of Meramundali – Mendhasal 400kV D/c line at Khuntuni
- (iii) Khuntuni – Dhenkanal (New) 220kV D/c line
- (iv) Khuntuni – Bidanasi 220kV D/c line

Note: *With commissioning of Khuntuni S/s, one unit of Lanco Babandh (2X660 MW) shall be connected to Khuntuni through a 400kV D/c line.*

32.5 Further, following transmission system was finalised for strengthening of ISTS in Southern Odisha and for strengthening of transmission on Eastern side of Gazuwaka HVDC back – to – back.

- (i) Angul – Narendrapur (New) 400kV D/c (Triple Snowbird) line
- (ii) Narendrapur (New) – Gazuwaka 400kV D/c (Triple Snowbird) line

- 32.6 The ISTS strengthening as mentioned above shall be taken up for discussion / approval in the next meeting of SCSPER.

List of the participants of 18th Standing Committee Meeting on Power System Planning of Eastern Region held on 13-06-2016 at Kolkatta

<u>Sl. No.</u>	<u>Name and Organization</u>	<u>Designation</u>	<u>Mobile No.</u>	<u>E-Mail</u>
Central Electricity Authority (CEA)				
1.	Shri S.D. Dubey	Member (Power System)		
2.	Shri Pardeep Jindal	Chief Engineer (PSPA-2)		
3.	Shri Ravinder Gupta	Director (PSPA-2)	9968286184	
4.	Smt. Rishika Sharan	Director (PSPA-2)	9868021299	
Power Grid Corporation of India Ltd (PGCIL)				
1.	Smt. Seema Gupta	COO (CTU)		
2.	Shri Bharat Bhushan	ED.ER-II		
3.	Shri Ramachandra	DGM(CTU-Plg.)	9910378128	ramachand@powergridindia.com
4.	Shri Sanjai Gupta	GM(I/c)	9422211226	Sanjai.gupta@powergridindia.com
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8.	Shri S.J. Lahiri	DGM(Engg.)	9434742001	sjlahiri@powergridindia.com
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10.	Shri P. Vijay Gopam	DGM	9434742004	
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Eastern Region Power Commission (ERPC)				
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Bihar State Power Transmission Corporation Ltd. (BSPTCL)				
1.	Shri B.Sharma	DGM	9771496900	
2.	Shri G.K. Choudhari	CE	7763817705	
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GRIDCO				
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2.	Shri Nokham	LO	9433035435	
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2.	Shri U.K. Verma	CM	08802496220	ujwalkumarverma@gmail.com
3.	Shri P.S. Das	Asst. GM	09433041837	Psdas1972@gmail.com
4.	Shri Sourav K Sahay	Sr. Engineer	09432013173	sahay.saurav@gmail.com
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3.	Shri Manish Ranjan Meshari	Design Engineer	8826094864	Manish.keshari@powergridindia.com
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2.	Shri A. Ghosh	CE (CPD)	9434910019	arundhati.ghosh@wbsetcl.in

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4.	Shri A. Karmakar	ACE(CPO)	9434910090	asik.karmakar@wbsetcl.in
5.	Shri S.K. Bag	SE(E)	9434910093	sajal.bag@wbsetcl.in
Damodar Valley Corporation				
1.	Shri Subrata Ghosal	Dy. Chief Engineer	9432677003	Ghosal.subrata@rediffmail.com
2.	Shri A. Debnath	Executive Director (System)	9831954257	dir.system@dvc.gov.in
JUSNL				
1.	Shri A.K. Singh	ESE	9973850208	cetjusnl@gmail.com
E&PD (Government of Sikkim)				
1.	Shri Sanjay P. Kozi	CE	9434169660	acepowersikkim@gmail.com
BSPHCL				
1.	Shri Rajdeep Bhattacharjee	RE	9830380689	

Annexure-II**Study Report for Strengthening of Transmission System in Odisha for 2021-22****A. Introduction:**

A meeting was held on 30th June 2016 at CEA to discuss the system strengthening requirement in Odisha system for 2021-22 time-frame. Following issues were discussed:

- (a) OPTCL's proposal for construction of 400/220 kV Substations at Meramundali-B, Narendrapur and Khuntuni by Odisha as Intra-state system by 2018-19 and other 400/220kV substations by 2021-22.
- (b) System strengthening for full utilization of Gazuwaka HVDC back to back system

This joint study was carried out by officials from CEA, CTU and OPTCL. List of participants is given at Para G below.

This is the brief report of the joint study.

B. Load Generation Balance

Studies have been carried out for 2021-22 timeframes.

Generation:

Total installed capacity of all the generation projects (including ISGS projects) expected to be materialized by 2021-22 in Odisha is about 16660 MW. List of generation projects in Odisha is attached at **Appendix-1**.

The share of Odisha from these generation projects totals to around 6000MW, of which about 2000MW is from ISTS connected generation projects and the remaining 4000MW is from state connected projects.

Point of connection	Thermal		Hydro	
	Installed Capacity	Share of Odisha	Installed Capacity	Share of Odisha
ISTS	11370	2000	-	-
STU	3150	1777	2142	2084
Total	14520	3777	2142	2084

Considering 80% despatch of Thermal plants (80% of 3777MW) and 60% despatch of Hydro plants (60% of 2084MW), total availability of power for Odisha comes out to be 4082MW (2832 MW from Thermal and 1250 MW from Hydro).

Load:

The projected load of Odisha as per 19th EPS is expected to be around 6400 MW in 2021-22 timeframe. Considering the urgent transmission system requirements by 2018-19, the schemes have been evolved to be implemented in two phases, i.e., Phase –I by 2018-19 and Phase-II by 2021-22.

From above it may be observed that, to meet the projected demand of 2021-22 Odisha needs to tie up for additional power from various generation projects.

The all India Load Generation scenario for 2021-22 timeframe is attached at **Annexure-2**.

C. Transmission system

C1. Intra-state Strengthening in Odisha

(a) 2018-19 time-frame

It has been proposed to implement following three nos. of new 400/220kV substations in Odisha as intra state system to meet its growing demand:

1. New 2x500MVA, 400/220kV sub-station at Meramundali-B

- (i) Shifting of Duburi – Meramundali 400kV D/c line from Meramundali to Meramundali-B
- (ii) Shifting of GMR – Meramundali 400kV S/c line from Meramundali to Meramundali-B (*1x350MW unit of GMR shall be connected to Odisha grid through the subject line*)
- (iii) Shifting of Duburi – Meramundali 220kV D/c line from Meramundali to Meramundali-B

2. New 2x500MVA, 400/220kV sub-station at Narendrapur (New)

- (i) Pandiabil – Narendrapu (New) 400kV D/c line
- (ii) Narendrapur (New) – Aska 220kV D/c line
- (iii) LILO of both the circuits of existing Therubali – Narendrapur 220kV D/c line at Narendrapur(New)

3. New 2x500MVA, 400/220kV sub-station at Khuntuni

- (i) LILO of Meramundali-B – Duburi 400kV D/c line (*formed after Shifting of Duburi – Meramundali 400kV D/c line from Meramundali to Meramundali-B*) at Khuntuni
- (ii) LILO of Meramundali – Mendhasal 400kV D/c line at Khuntuni
- (iii) Khuntuni – Dhenkanal (New) 220kV D/c line
- (iv) Khuntuni – Bidanasi 220kV D/c line

Note: OPTCL informed that with commissioning of Khuntuni S/s, one unit of Lanco Babandh (2X660 MW) shall be connected to Khuntuni through a 400kV D/c line.

(b) 2021-22 time-frame

Odisha informed that they are envisaging a Petrochemical plant near Paradeep with expected demand of about 800MW. Accordingly, to feed the load centres in Bhadrak and Paradeep areas, construction of following two nos. of new 400/220kV substations and 400kV lines in Odisha as intra state system has been proposed.

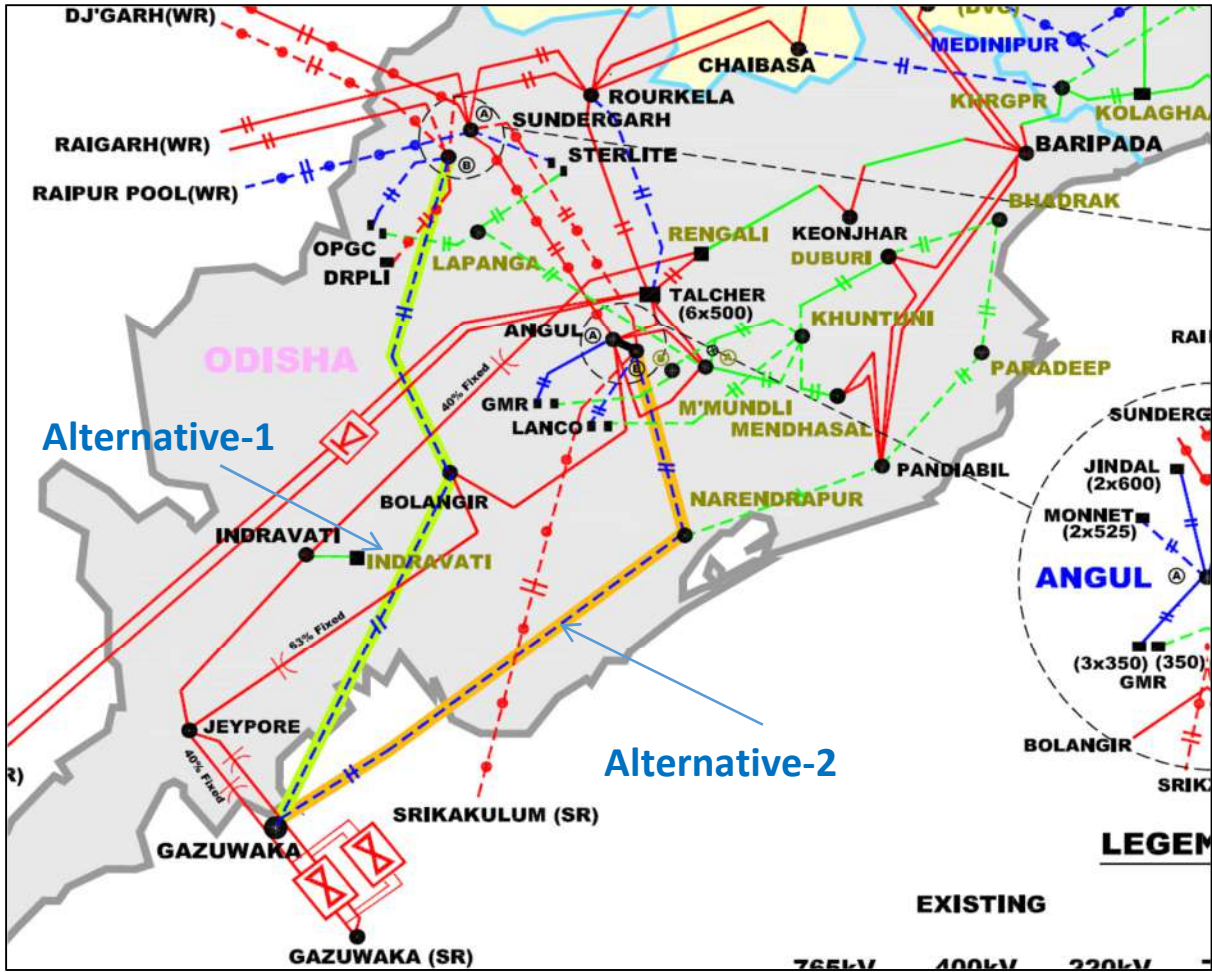
- (i) New 2x500MVA, 400/220kV sub-station at Bhadrak
- (ii) New 3x500MVA, 400/220kV sub-station at Paradeep
- (iii) Duburi – Bhadrak – Paradeep – Pandiabil 400kV D/c line

220kV system for power dispersal from the Bhadrak and Paradeep substations may be identified by OPTCL.

The above systems for Bhadrak and Paradeep substations are tentative and would be reviewed at a later date depending upon load growth in Odisha.

C2. System strengthening for Gazuwaka HVDC – ISTS System

The Gazuwaka HVDC back to back converter station has a capacity of 2x500MW. Power is fed to this S/s through Jeypore – Gazuwaka 400kV D/c line. Presently, the flow through the HVDC station is restricted to 600-650 MW due to feeds to Gazuwaka and Jeypore substations through weak transmission network (comprising of long 400kV lines).



Jeypore S/s is fed from two 400kV lines viz. Angul/Bolangir – Jeypore and Indravati – Jeypore 400kV S/c lines (ACSR Twin Moose). Both lines have been constructed with thermal capacity of 874MVA. N-1 of any of these lines limits the power feed to Jeypore and Gazuwaka substations, thereby limiting the full utilisation of Gazuwaka HVDC.

Further, the Jeypore – Gazuwaka 400kV D/c line (AAAC Twin Moose) has been constructed with thermal capacity of 840MVA per circuit. Thus, under outage of one circuit of the D/c line Gazuwaka HVDC cannot be operated at its rated capacity of 1000MW.

Therefore, to fully utilize the capacity of HVDC station additional feed to Gazuwaka from a strong source like Angul or Jharsuguda 765/400kV substations, following alternative transmission systems were considered:

Alternative-1: From Jharsuguda S/s

- (i) Jharsuguda – Bolangir 400kV D/c (Triple Snowbird) line (~200km)
- (ii) Bolangir – Gazuwaka 400kV D/c (Triple Snowbird) line (~400km)

Alternative-2: From Angul S/s

- (i) Angul – Narendrapur (New) 400kV D/c (Triple Snowbird) line (~190km)
- (ii) Narendrapur (New) – Gazuwaka 400kV D/c (Triple Snowbird) line (~300km)

In the alternative-1, Bolangir – Gazuwaka line was found to be about 400km. Thus, due to longer line length low power flow and lesser enhancement in short circuit level in comparison to Alternative-2 was envisaged at Gazuwaka.

Fault Level (3-Phase) at Gazuwaka:

Base Case	:	3760MVA
Alternative-1	:	5550MVA
Alternative-2	:	6090MVA

In view of the above, Alternative-2 was studied for the strengthening of feeds to Gazuwaka HVDC substation.

D. System Study

Following scenarios have been studied considering the above identified transmission system and the corresponding load flow study results are attached at exhibits as listed below:

Exhibit No.	Case
1	Base case without Odisha strengthening
2	With proposed system strengthening
3	Bypassing LILo arrangement at 400kV at Angul S/s
4	Indravati – Jeypore S/c outage
5	Jeypore – Gazuwaka S/c outage
6	Bolangir – Jeypore S/c outage
7	Angul – Narendrapur S/c outage
8	Angul – Narendrapur D/c outage
9	Closure of Bus Sectionalisers at GMR, Lanco, Sterlite and OPGC

E. Observations from study

- (i) Angul – Meramundali 400kV 2xS/c lines (formed after LILO of Talcher – Meramundali and Meramundali – Bolangir 400kV lines at Angul) remain critically loaded in base case itself. Further, N-1 of any of the two lines shall lead to overloading to the other line.

A bypassing arrangement has already been planned for implementation at Angul S/s for bypassing these LILO's under critical scenarios.

- (ii) As the demand of the state of Odisha is expected to increase significantly, the state needs to tie-up for more power from existing/upcoming generation projects.

F. Final Transmission System

F1. Intra - State System

(d) New 2x500MVA, 400/220kV sub-station at Meramundali-B

- (iv) Shifting of Duburi – Meramundali 400kV D/c line from Meramundali to Meramundali-B
- (v) Shifting of GMR – Meramundali 400kV S/c line from Meramundali to Meramundali-B (*1x350MW unit of GMR shall be connected to Odisha grid through the subject line*)
- (vi) Shifting of Duburi – Meramundali 220kV D/c line from Meramundali to Meramundali-B

(e) New 2x500MVA, 400/220kV sub-station at Narendrapur (New)

- (iv) Pandiabil – Narendrapur (New) 400kV D/c line
- (v) Narendrapur (New) – Aska 220kV D/c line
- (vi) LILO of both the circuits of existing Therubali – Narendrapur 220kV D/c line at Narendrapur(New)

(f) New 2x500MVA, 400/220kV sub-station at Khuntuni

- (v) LILO of Meramundali-B – Duburi 400kV D/c line (*formed after Shifting of Duburi – Meramundali 400kV D/c line from Meramundali to Meramundali-B*) at Khuntuni
- (vi) LILO of Meramundali – Mendhasal 400kV D/c line at Khuntuni

- (vii) Khuntuni – Dhenkanal (New) 220kV D/c line
- (viii) Khuntuni – Bidanasi 220kV D/c line

Note: With commissioning of Khuntuni S/s, one unit of Lanco Babandh (2X660 MW) shall be connected to Khuntuni through a 400kV D/c line.

F2. Inter - State System

Following transmission system has been finalised for strengthening of feed to Gazuwaka HVDC. The same would be implemented as an ISTS system.

- (iii) Angul – Narendrapur (New) 400kV D/c (Triple Snowbird) line
- (iv) Narendrapur (New) – Gazuwaka 400kV D/c (Triple Snowbird) line

G. List of Participants in the Joint Meeting

- | | | |
|-----|---------------------|------------------------------|
| 1. | Shri Pardeep Jindal | Chief Engineer (PSPA-2), CEA |
| 2. | Shri Ravinder Gupta | Director (PSPA-2), CEA |
| 3. | Smt. Rishika Sharan | Director (PSPA-2), CEA |
| 4. | Shri Ashok Pal, | GM (CTU-Plg), PGCIL |
| 5. | Shri Anupam Kumar, | Engr (CTU-PLG), PGCIL |
| 6. | Shri M. R. Mohanty | CLD, SLDC, OPTCL |
| 7. | Shri N.C. Swain | Sr. Er. Manager, OPTCL |
| 8. | Shri C.R. Mishra | AGM (Elect.), OPTCL |
| 9. | Shri Arup Banerjee | AGM (Elect.), OPTCL |
| 10. | Shri Shiba S. Nayah | GM, EA to Dir(Cord.), GRIDCO |

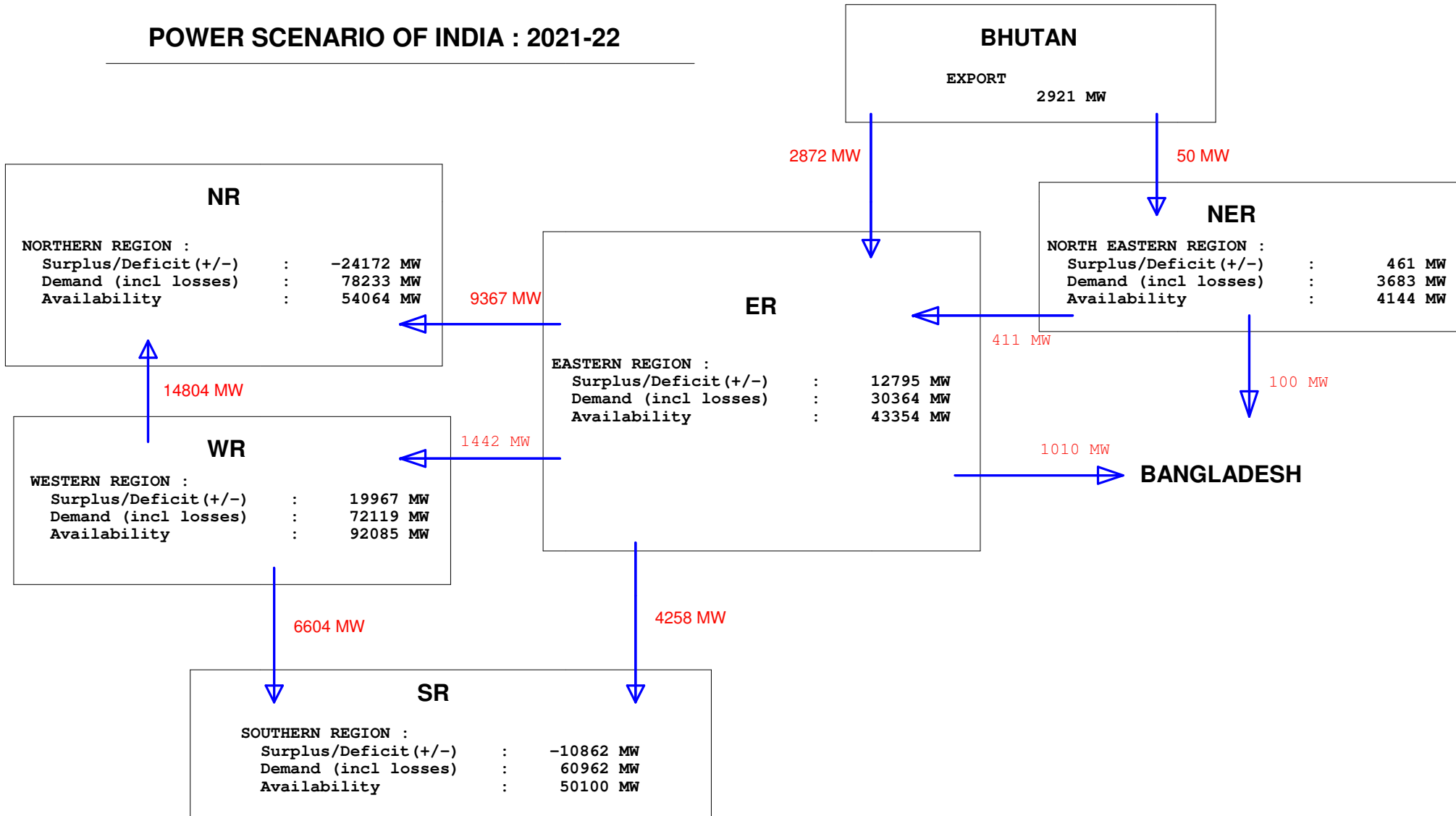
Appendix – 1

List of Generation Projects in Odisha

SI. No.	FUEL TYPE	PROJECT NAME	UNIT	CAPACITY (MW)	YEAR OF COD	SECTOR	DEVELOPER	Connected to	Share of Odisha
1	Coal	Darlipalli STPP	U-1	800	2018-19	Central	NTPC	ISTS	400
2	Coal	Darlipalli STPP	U-2	800	2018-19	Central	NTPC	ISTS	400
3	Coal	Derang TPP	U-1,2	1200	Existing	Private	JIPL	ISTS	144
4	Coal	lb valley TPP	U-3	660	2018-19	State	OPGCL	ISTS	330
5	Coal	lb valley TPP	U-4	660	2018-19	State	OPGCL	STU	330
6	Coal	lb valley TPS	U-1,2	420		State		STU	420
7	Coal	Ind Barath Energy Pvt. Ltd.	U1	350	2015-16	Private	Ind Barath Power Ltd	ISTS	42
8	Coal	Kamalanga TPP	U-2,3	700	Existing	Private	GMR Energy	ISTS	175
9	Coal	Kamalanga TPP U-1	U-1	350	Existing	Private	GMR Energy	STU	262.5
10	Coal	KVK Nilanchal TPP	U-1	350	2018-19	Private	KVK Nilanchal	ISTS	87.5
11	Coal	Lanco Babandh TPP	U-1	660	2016-17	Private	Lanco Babandh	STU	165
12	Coal	Lanco Babandh TPP	U-2	660	2017-18	Private	Lanco Babandh	ISTS	165
13	Coal	Malibrahmani TPP	U-2	525	2018-19	Private	MPCL	ISTS	131.25
14	Coal	Malibrahmani TPP	U-1	525	2017-18	Private	MPCL	ISTS	131.25
15	Coal	Sterlite TPP	U-4	600	Existing	Private	STERLITE ENERGY	STU	600
16	Coal	Sterlite TPP	U-1,2,3	1800	Existing	Private	STERLITE ENERGY	ISTS	0
17	Coal	Talcher (old) TPS	U-1,2,3,4	240	Existing	Central	NTPC	STU	0
18	Coal	Talcher (old) TPS	U-5,6	220	Existing	Central	NTPC	STU	0
19	Coal	Talcher STPS	U-1 to 6	3000	Existing	Central	NTPC	ISTS	0
20	Hydro	Balimela HPS	U-1 to 8	510	Existing	State		STU	510

SI. No.	FUEL TYPE	PROJECT NAME	UNIT	CAPACITY (MW)	YEAR OF COD	SECTOR	DEVELOPER	Connected to	Share of Odisha
21	Hydro	Hirakund HPS	U-1 to 10	347.5	Existing	State		STU	347.5
22	Hydro	Machkund HPS	U- 1to 4	114.75	Existing	State		STU	57.375
23	Hydro	Rengali HPS	U-1 to 5	250	Existing	State		STU	250
24	Hydro	Upper Indravati HPS	U-1,2,3,4	600	Existing	State		STU	600
25	Hydro	Upper Kolab HPS	U-1,2,3,4	320	Existing	State		STU	320

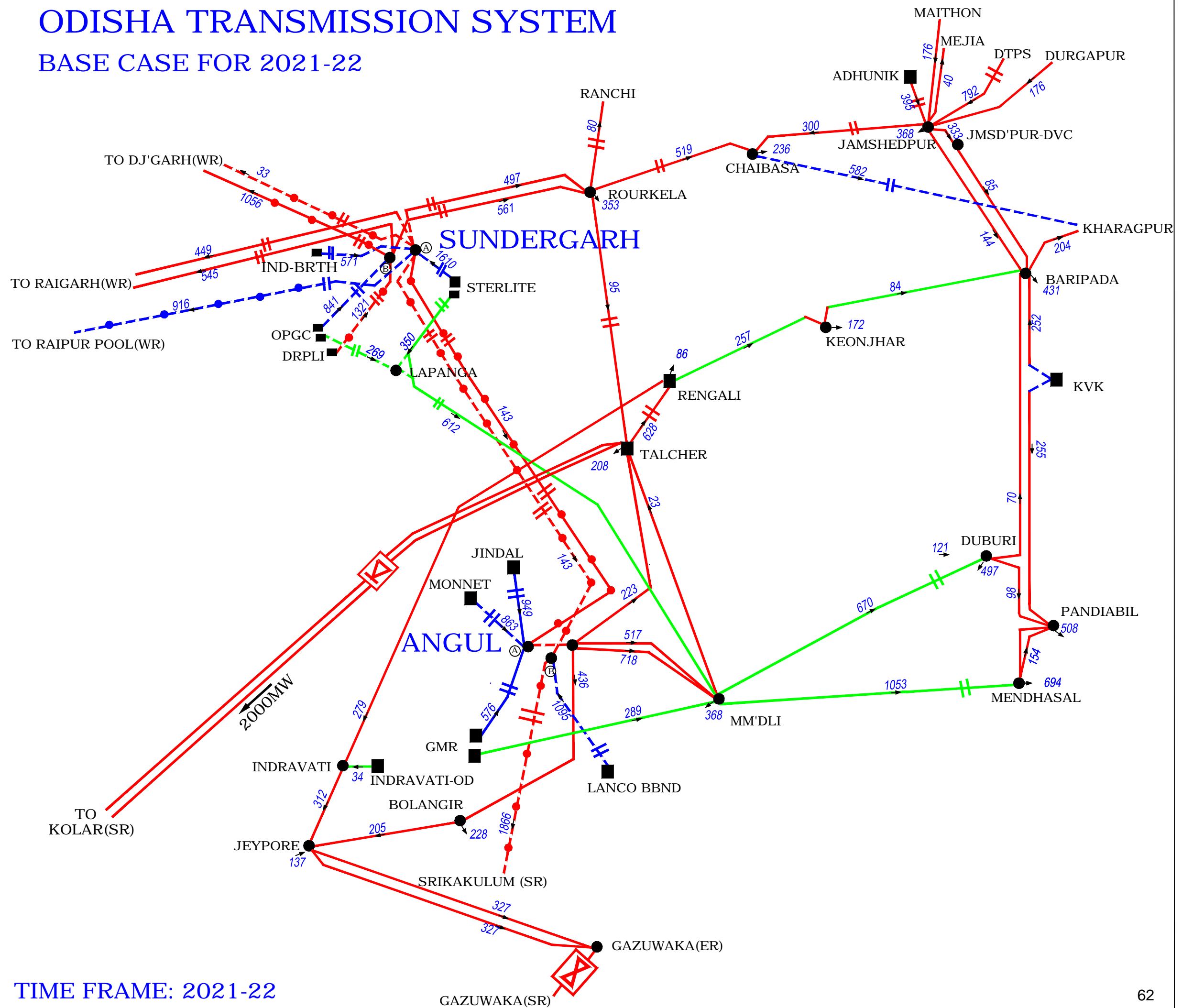
POWER SCENARIO OF INDIA : 2021-22



ODISHA TRANSMISSION SYSTEM

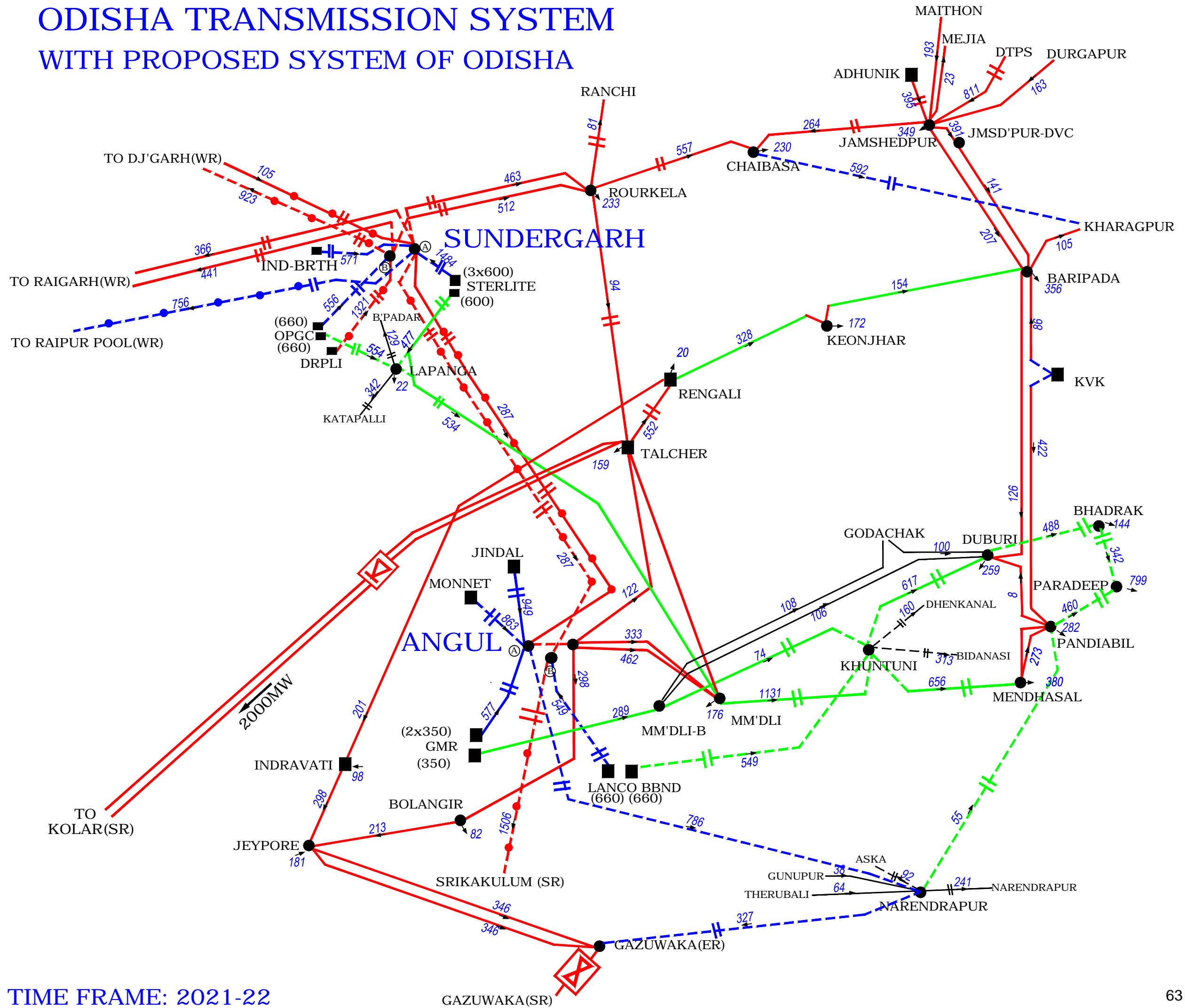
BASE CASE FOR 2021-22

Exhibit-1

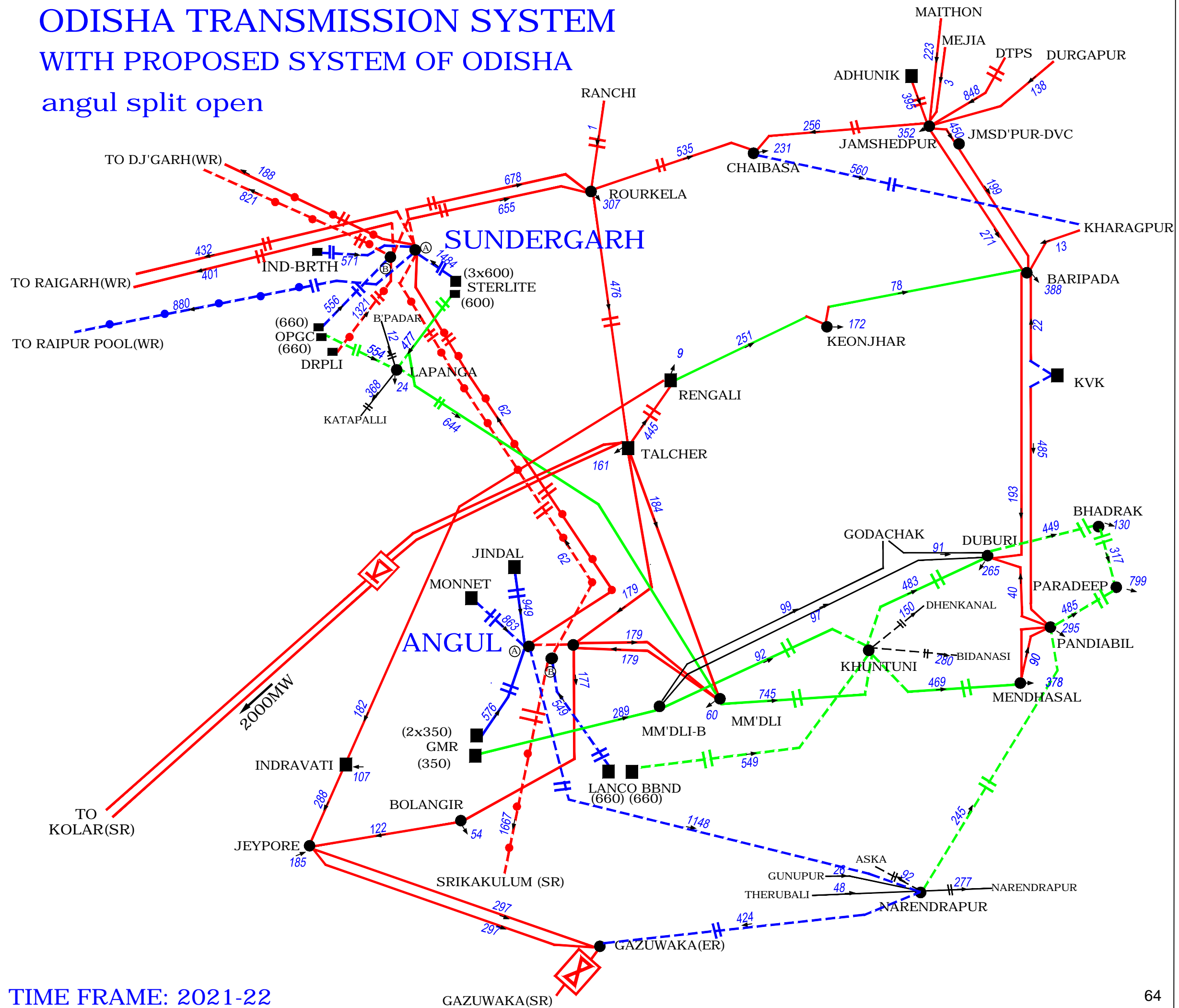


TIME FRAME: 2021-22

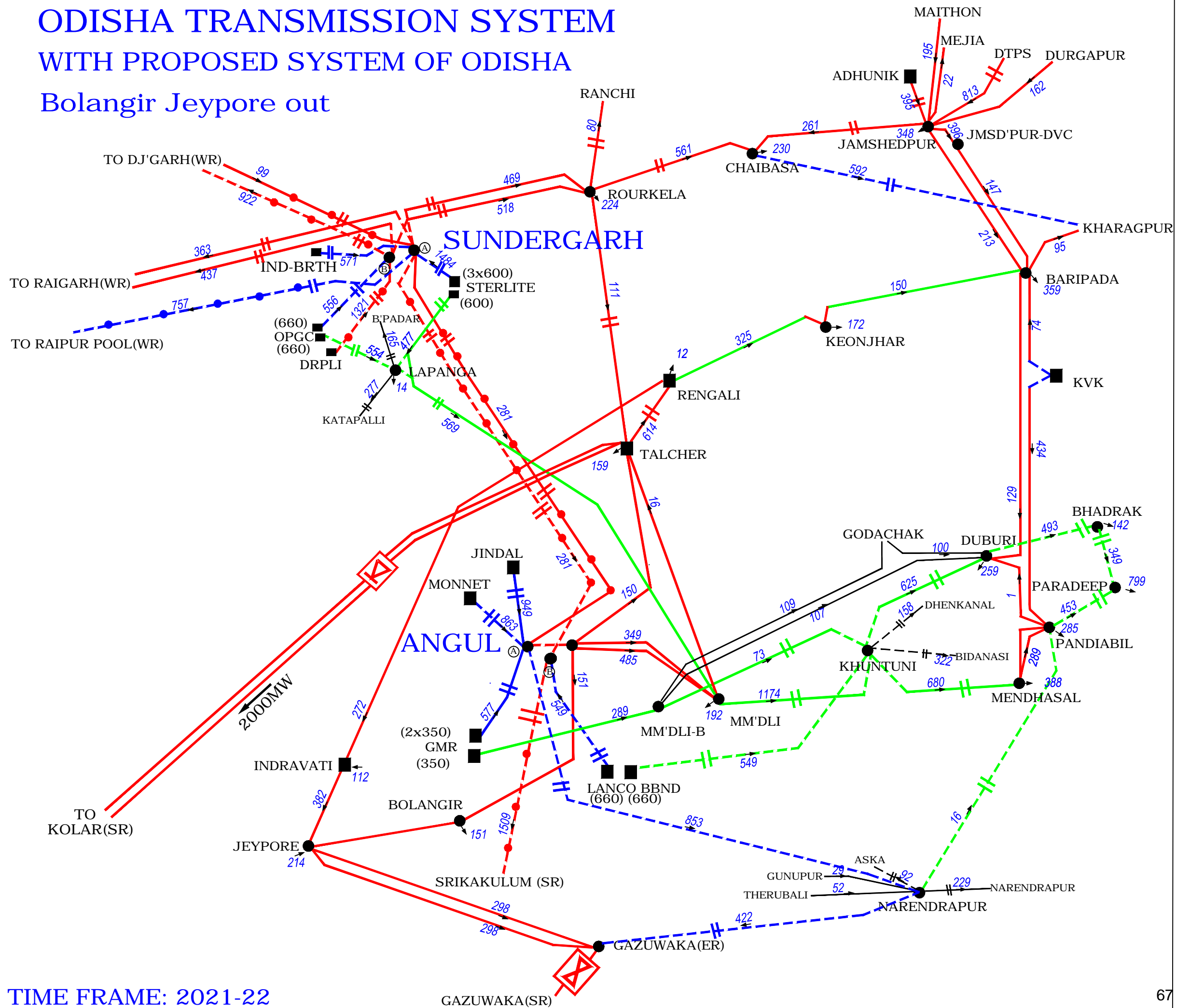
ODISHA TRANSMISSION SYSTEM WITH PROPOSED SYSTEM OF ODISHA



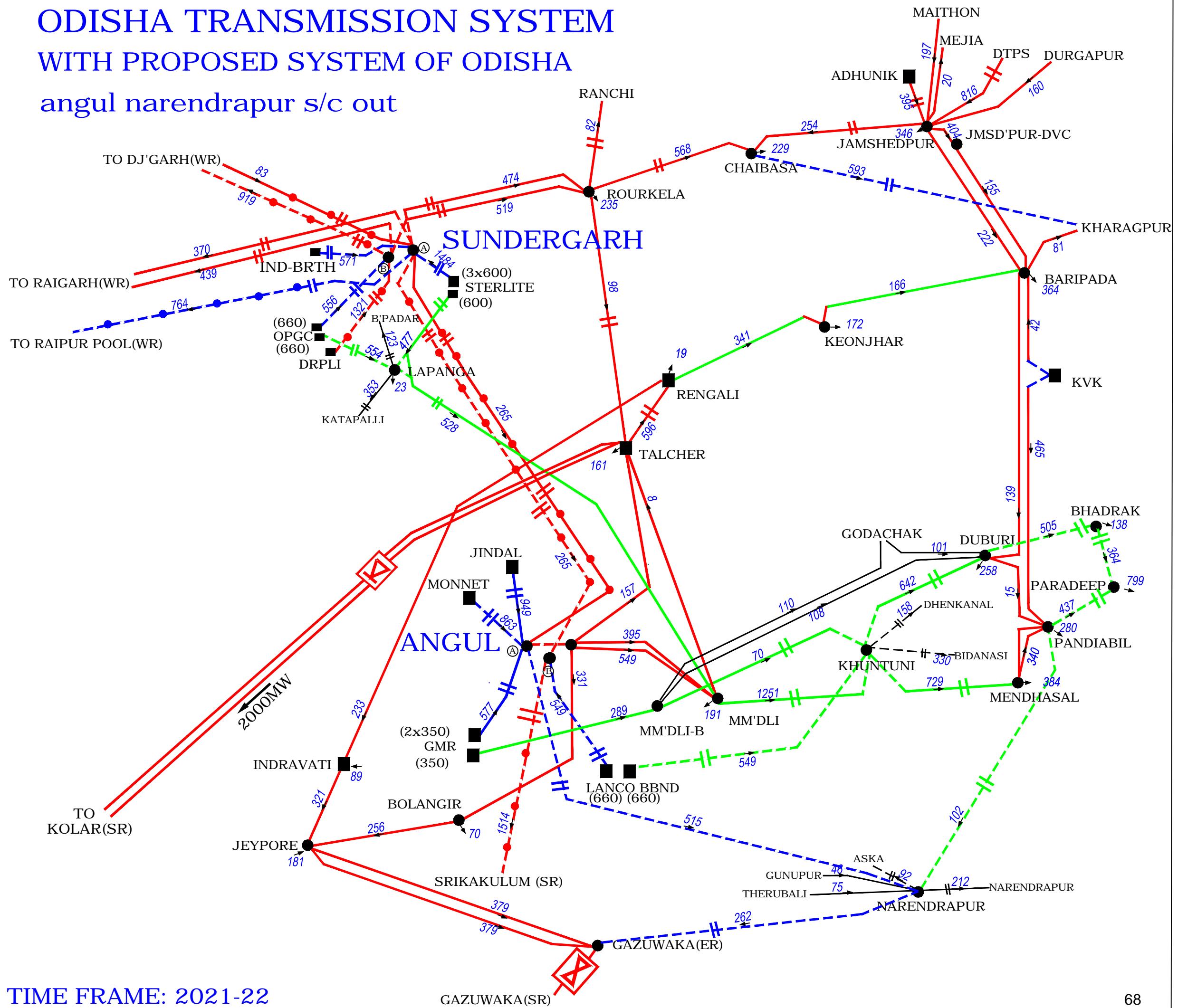
ODISHA TRANSMISSION SYSTEM WITH PROPOSED SYSTEM OF ODISHA angul split open



ODISHA TRANSMISSION SYSTEM WITH PROPOSED SYSTEM OF ODISHA Bolangir Jeypore out



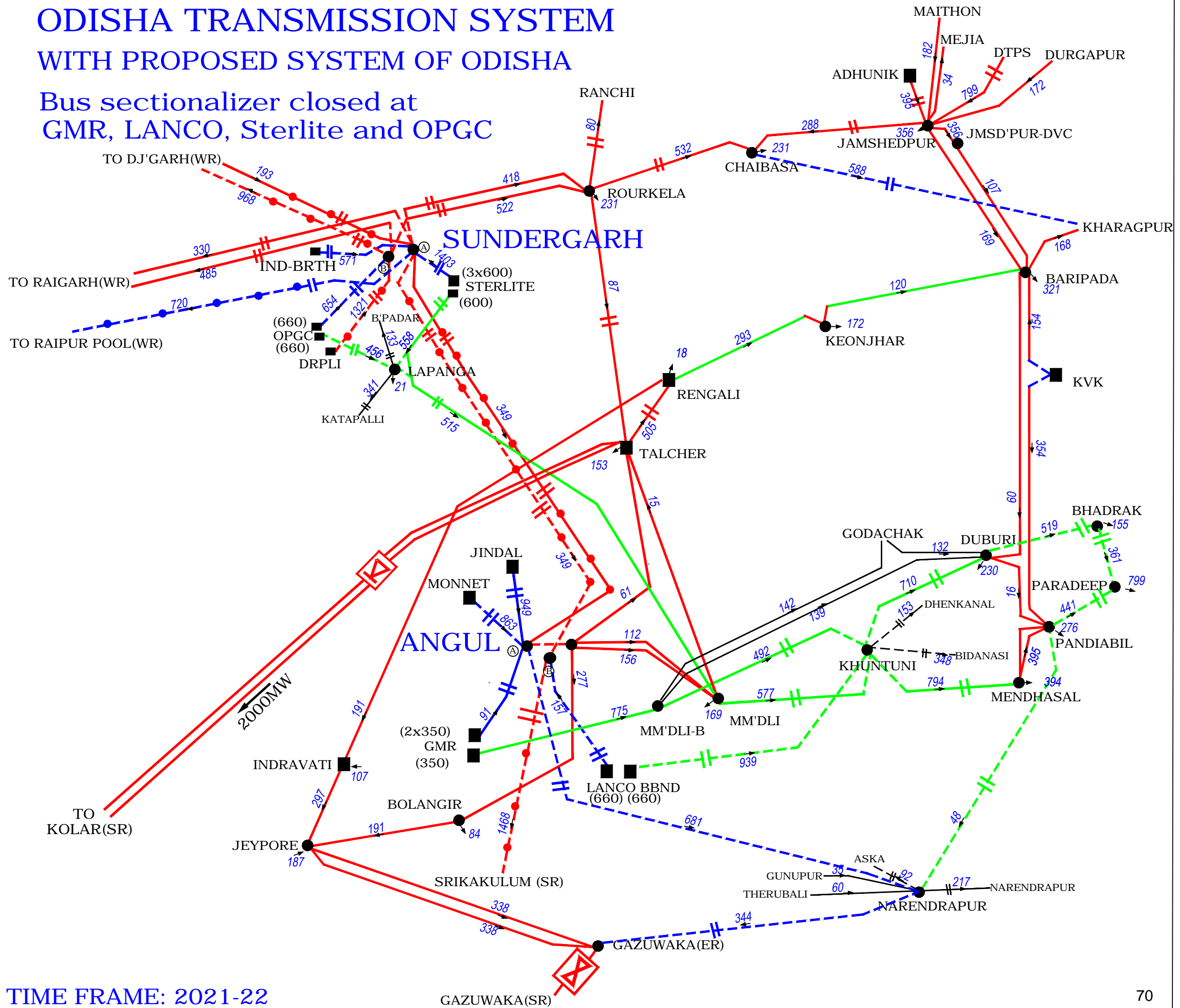
ODISHA TRANSMISSION SYSTEM WITH PROPOSED SYSTEM OF ODISHA angul narendrapur s/c out



TIME FRAME: 2021-22

ODISHA TRANSMISSION SYSTEM WITH PROPOSED SYSTEM OF ODISHA

Bus sectionalizer closed at
GMR, LANCO, Sterlite and OPGC



TIME FRAME: 2021-22