



भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

केन्द्रीय विद्युत प्राधिकरण

Central Electricity Authority

विद्युत प्रणाली योजना एवं मूल्यांकन-I प्रभाग

Power System Planning & Appraisal-I Division

To,

1.	Chairperson, Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	2.	Member (Power System), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.
3.	Member (Economic & Commercial), Central Electricity Authority Sewa Bhawan, R.K. Puram, New Delhi – 110 066.	4.	Director (Trans) Ministry of Power Shram Shakti Bhawan, New Delhi-110001.
5.	Chief Operating Officer, Central Transmission Utility POWERGRID, Saudamini, Plot No. 2, Sector-29, Gurgaon – 122 001.	6.	Sh. Surinder Singh Sur, Joint Adviser (Energy) NITI Aayog, Parliament Street, New Delhi – 110 001.
7.	Shri P. K. Pahwa, Ex. Member (GO&D), CEA 428 C, Pocket -2, Mayur Vihar, Phase -1, Delhi – 110091.	8.	Shri Prabhakar Singh, Ex. Director (Projects), POWERGRID D 904, Tulip Ivory, Sector-70, Gurgaon – 122 001.

विषय: 4 दिसंबर 2018 को आयोजित "ट्रांसमिशन पर राष्ट्रीय समिति" (एनसीटी) की दूसरी बैठक- कार्यसूची


Subject: 2nd meeting of "National Committee on Transmission" (NCT) held on 4th December 2018 – Agenda note

Sir/Madam,

Agenda note for the 2nd meeting of the "National Committee on Transmission" (NCT) scheduled to be held on 4th December 2018 in CEA, New Delhi under the Chairmanship of Shri P. S. Mhaske, Chairperson, CEA is available on CEA website <http://www.cea.nic.in>.

Kindly make it convenient to attend the meeting.

Yours faithfully,


(Ravinder Gupta) 30/11/18

Chief Engineer(PSPA-I) & Member Secretary (NCT)

Copy to:

- (i) Joint Secretary (Trans), Ministry of Power, Shram Shakti Bhawan, New Delhi-110001
- (ii) Chief Engineer (PSPA-II), CEA
- (iii) CEO, RECTPCL, ECE House, 3rd Floor, Annexe - II, 28A, KG Marg, New Delhi - 110001
- (iv) PFC Consulting Ltd, First Floor, "Urjanidhi", 1, Barakhmba Lane, Connaught Place, New Delhi -110001

Agenda note for the 2nd meeting of National Committee on Transmission (NCT)

Date and Time: 4 December 2018, 1030 hrs

Venue: Conference Room of CEA (Manthan), 2nd Floor, Sewa Bhawan, R.K. Puram, New Delhi

1. Confirmation of the minutes of 1st meeting of National Committee on Transmission (NCT)

- 1.1. The minutes of 1st meeting of National Committee on Transmission held on 27th July, 2018 were issued vide CEA letter No. File No.CEA-PS-11-15(11)/1/2018-PSPA-I dated 2nd August 2018. No comment / observation has been received on the minutes of the meeting.
- 1.2. The minutes of the meeting may please be confirmed.

2. Notification / approval of transmission schemes approved in 1st meeting of National Committee on Transmission by MoP

- 2.1 The schemes recommended in the 1st meeting of NCT for implementation through RTM/TBCB were further deliberated in 2nd meeting of Empowered Committee on Transmission. Following transmission scheme was approved for implementation through Tariff Based Competitive Bidding (TBCB) :

S. No	Name of Scheme	Estimated Cost as per NCT (in Crore)	BPC
1.	400kV Udupi (UPCL)-Kasargode D/C line	620	RECTPCL

- 2.2 The transmission schemes approved for implementation through Regulated tariff mechanism in 2nd meeting of ECT are given at Annexure-I.
- 2.3 Members may please note.

3. Mode of implementation of augmentation works at existing substations:

- 3.1 In the 1st meeting of NCT held on 27.7.2018, the issue of mode of implementation of augmentation works at existing substations was deliberated and it was decided that the augmentation / modification at existing ISTS sub-stations may be done by the owner of the substation.
- 3.2 Subsequently, a meeting was held on 25.10.2018 in MoP under the chairmanship of Secretary(Power) regarding award of transmission projects under RTM to NER-II Transmission Limited (Sterlite), wherein, discussions were also held regarding recommendations of the transmission schemes for implementation through RTM or TBCB and following decisions were made;
 - i) In future, augmentation works at existing / under construction ISTS S/s may generally be awarded under TBCB, with exceptions in cases as envisaged in Tariff Policy, 2016.
 - ii) CEA in consultation with CTU would prepare a list of such cases, which may be awarded under RTM as per the tariff Policy i.e. under strategic importance, technical upgradation etc.
 - iii) MoP may obtain legal opinion on the issue raised by M/s Sterlite in their representation to Secretary on whether award of augmentation works on RTM basis

would be legally tenable or viewed by the Competition Commission of India (CCI”) as anti-competitive.

iv) CEA in consultation with CTU would develop guidelines/protocol/principles on the following:

- a. Coordination for augmentation works to be awarded under TBCB viz sharing of common resources, O &M charges etc. between owner of existing /new S/s and successful bidder, to whom augmentation work has been awarded/ to be awarded under TBCB
- b. Quality monitoring of projects awarded under TBCB

3.3 Members may pl. note.

4. Status of transmission schemes under bidding process - briefing by BPCs

PFCCCL and RECTPCL may give brief about the status of transmission projects awarded through TBCB route by them.

4.1 Members may pl. note.

5. New Inter-State Transmission Schemes

5.1. Govt. of India had set a target for establishing 175 GW renewable capacity by 2022 which includes 100 GW Solar, 60 GW Wind generation capacity. To identify ISTS connectivity of renewable energy projects from potential solar energy zones (SEZs) and potential wind energy zones (WEZs) of about 50 GW and 16.5 GW respectively, MNRE vide its order dated 08.06.2018 had constituted a Sub-Committee. SEZs and WEZs envisaged in 7 RE rich states (Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Rajasthan, Maharashtra and Madhya Pradesh) were identified by SECI in association with MNRE in consultation with RE power developers.

To ease the implementation of transmission infrastructure, it has been proposed to bifurcate these requirements in two phases. A total of 20GW solar & 9 GW wind projects has been planned in Phase-I (upto Dec’2020) and 30 GW solar & 7.5 GW wind has been planned for Phase-II (December ‘2021). The state wise and phase wise details of SEZ and WEZ are as given below:

Solar Energy Zone (SEZ)					Wind Energy Zone (WEZ)				
State/ District	Taluk/ Tehsil	Ph-1	Ph-2	Total	State/ District		Ph-1	Ph-2	Total
		2020	2021				2020	2021	
		GW	GW	GW			GW	GW	GW
Rajasthan					Tamil Nadu				
Jaisalmer	Ramgarh	2.5	1.5	4	Karur		1.5	1	2.5
	Fatehgarh	2.5	1.5	4	Tirunelveli		0	0.5	0.5
Jodhpur	Phalodi	2	1	3					
Bikaner	Koyalat/ Pugal	3	1	4					
Barmer	Barmer	0	5	5					
Subtotal		10	10	20	Subtotal		1.5	1.5	3
Andhra Pradesh					Andhra Pradesh				
Kurnool	Gooty	2.5	0	2.5	kurnool		2	1	3
Ananthpuram	Urvakonda	0	2.5	2.5					
Subtotal		2.5	2.5	5	Subtotal		2	1	3
Karnataka					Karnataka				
Gadag		0	2.5	2.5	Koppal		2.5	0	2.5

Solar Energy Zone (SEZ)					Wind Energy Zone (WEZ)				
Bidar		0	2.5	2.5					
Subtotal		0	5	5	Subtotal		2.5	0	2.5
Gujarat					Gujarat				
Kutch	Rapar	3	2	5	Kutch	Bhuj	0	2	2
Banaskantha	Vav/ Tharad	0	2.5	2.5		Laka- diya	2	0	2
Jamnagar	Lalpur	1	1.5	2.5	Dwarka		1	1	2
Subtotal		4	6	10	Subtotal		3	3	6
Maharashtra					Maharashtra				
Solapur		1	1.5	2.5	Osmanabad		0	2	2
Wardha		0	2.5	2.5					
Subtotal		1	4	5	Subtotal		0	2	2
Madhya Pradesh									
Raigarh		2.5	0	2.5					
Khandwa		0	2.5	2.5					
Subtotal		2.5	2.5	5					
Total		20	30	50	Total		9	7.5	16.5

Broad Transmission schemes were evolved for integration of envisaged RE generation capacity in Solar & Wind Energy Zones. Transmission System evolved from potential renewable energy zones were discussed in the meetings of Regional Standing Committees on Transmission.

In the 1st meeting of Western Region Standing Committee on Transmission (WRSCOT) held on 5.9.2018, transmission system for evacuation of power from 10.5 GW (7.5 GW wind and 3 GW solar) of RE generations has been agreed.

Transmission system for 8.5 GW (6 GW wind and 2.5 GW solar) RE projects in Southern region was agreed in 2nd meeting of SRSCT held on 7.9.2018.

Transmission system for 8.9 GW of solar RE projects from Rajasthan in Northern region was agreed in 2nd meeting of NRSCT held on 13.11.2018.

The schemes agreed in the regional standing committee on transmission are as follows:

5.2. Name of Scheme: Additional 1x500MVA 400/220kV (9th) ICT, for injection from any additional RE project (other than the above 4000MW) at Bhuj PS:

5.2.1 Empowered Committee on Transmission (ECT) in its 2nd meeting held on 06.08.2018 has recommended the implementation of scheme “Transmission system for injection of power from 4000MW RE projects under SECI bids (Tranche I to IV) at Bhuj PS” with following scope of works for implementation through RTM by POWERGRID under compressed time schedule:

Sl. No.	Scope of the Transmission Scheme	Capacity (MVA)	Estimated Cost (Rs.) Cr.
1	Installation of additional 3x500MVA, 400/220kV ICTs along with 400kV AIS & 220kV AIS bays	3x500MVA 400/220kV	102

2	Installation of additional 3x500MVA, 400/220kV ICTs along with 400kV GIS & 220kV AIS bays	3x500MVA 400/220kV	107
3	Installation of additional 2x1500MVA, 765/400kV ICTs along with 765kV AIS & 400kV GIS bays	2x1500MVA, 765/400kV	147
Total Rs (in Crore)			356

Note: The existing transformation capacity at Bhuj pooling station is 2x500MVA 400/220 kV & 2x1500MVA 765/400 kV ICTs

5.2.2 The scheme was further discussed in 1st meeting of WRSCT held on 5.9.2018, wherein, in addition to above following was also agreed:

- i) Additional 1x500MVA 400/220kV (9th) ICT, for injection from any additional RE project (other than the above 4000MW) in existing Bhuj PS with associated 400 kV GIS bay and 220 AIS bay.
- ii) 220 kV line bays to be implemented as AIS bays or Hybrid/MTS (Mixed Technology Switchgear) bays.

5.2.3 The scope of the scheme is as under:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Additional 1x500MVA 400/220kV (9 th) ICT, for injection from any additional RE project (other than the above 4000MW) in existing Bhuj PS with associated 400 kV GIS bay and 220 AIS bay.	1x500MVA, 400/220kV 400kV ICT bay-1 230kV ICT bay-1	
Total Rs (in Crore)			37

5.2.4 Members may like to deliberate.

5.3. **Name of Scheme: Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system:**

Sl. No.	Scope of the Transmission Scheme	Capacity /km	Estimated Cost (Rs.) Cr.
1.	Establishment of 2x1500MVA, 765/400kV Lakadia PS [#]	2x1500MVA, 765/400kV 400kV ICT bay-2 765kV ICT bay-2 400kV line bay-4 765kV line bay-4	257.5
2.	Lakadia – Vadodara 765kV D/c line	350km	1619
3.	330MVAR switchable line reactors at both ends of Lakadia – Vadodara 765kV D/c line	2x330 MVAR 765kV Reactor bay -4	172.5
4.	Bhuj PS – Lakadia PS 765kV D/c line	100km	463
5.	LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS	10km	37

6.	Conversion of existing 2x63MVAR line reactors at Bhachau end of Bhachau – EPGL 400kV D/c line to switchable line reactors	400kV Reactor bay -2	19
7.	1x330MVA, 765kV Bus reactor & 1x125MVA, 420kV Bus reactor at Lakadia PS	1x330MVA, 765 kV, 1x125MVA, 420 kV 765kV Reactor bay- 1 400kV Reactor bay -1	61
8.	2 nos of 765kV bays at Vadodara for Lakadia – Vadodara 765kV D/c line		37
9.	2 nos of 765kV bays at Bhuj PS for Bhuj PS – Lakadia PS 765kV D/c line		37
Total Rs (in Crore)			2703

with future provision for another 2X1500 MVA 765/400 kV ICTs, establishment of 4000 MVA, 400/220 kV transformation capacity and 400/220 kV line bays for providing connectivity to RE developers.

Note:

- a. The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- b. Powergrid to provide space for 2 nos of 765kV bays at Vadodara for Lakadia – Vadodara 765kV D/c line
- c. Powergrid to provide space for 2 nos of 765kV bays at Bhuj PS for Bhuj PS – Lakadia PS 765kV D/c line
- d. Powergrid to provide space for Conversion of existing 2x63MVAR line reactors at Bhachau end of Bhachau – EPGL 400kV D/c line to switchable line reactors

Gujarat - Solar Energy Zones



Members may deliberate.

5.4. Name of Scheme: Transmission System associated with RE generations from potential wind energy zones in Gujarat [Bhuj-II (2000MW), Lakadia (2000MW) & Dwarka (1500MW) :

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 2x1500MVA (765/400kV), 4x500MVA (400/220kV) Bhuj-II PS (GIS) space for 8 nos. 220kV bays for integration of wind farms	2x1500MVA, 765/400kV, 4x500MVA (400/220kV) 400kV ICT bay-6 765kV ICT bay-2 220kV ICT bay- 4 765kV line bay-4	443
2.	Establishment of 4x500MVA, 400/220kV ICTs at Lakadia PS (GIS) space for 8 nos. 220kV bays for wind farms' integration	4x500MVA, 400/220kV 400kV ICT bay-4 220kV ICT bay- 4	151
3.	Establishment of 4x500MVA, 400/220kV Jam Khambhaliya PS (GIS) space for 8 nos. 220kV line bays	4x500MVA, 400/220kV 400kV ICT bay-4 220kV ICT bay- 4 400kV line bay-2	174

4.	Extension of Essar–Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS	40km	75
5.	63MVAR Line Reactor at both ends of Lakadia/Bhachau - Jam Khambhaliya 400kV D/c line	4x 63 MVAR	27
6.	Reconfiguration of Bhuj PS – Lakadia PS 765kV D/c line so as to establish Bhuj-II –Lakadia 765 kV D/C line as well as Bhuj-Bhuj-II 765kV D/C line	Bays- 4 bays 20 kms	93
7.	Lakadia PS – Banaskantha PS 765kV D/c line	200km	925
8.	765kV Bays at Lakadiya and Banaskantha for Lakadia PS – Banaskantha PS 765kV D/c line	4 nos. 765kV Bays	74
9.	240MVAR switchable Line reactor at Lakadia PS end of Lakadia PS – Banaskantha PS 765kV D/c line	2x240 MVAR 765kV reactor Bays -2	76.
10	1x330MVAR, 765kV Bus reactor at Bhuj-II PS & 1x125MVAR, 420kV Bus reactor each at Bhuj-II PS & Jam Khabhaliya PS along with reactor bays	1x330MVAR, 765kV, 2x125MVAR, 420kV 765kV reactor Bays -1 400kV reactor Bays -2	84
Total Rs (in Crore)			2122

Note:

- The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- Powergrid to provide space for 765kV Bays Banaskantha for Lakadia PS – Banaskantha PS 765kV D/c line Powergrid to provide space for 2 nos of 765kV bays at Bhuj PS for Bhuj PS – Lakadia PS 765kV D/c line

The above system for Jam Khambhaliya PS shall be able to cater RE injection to the tune of 1500MW in Dwarka area. This could be utilized for injection of power from wind or solar projects in the area. For any additional RE injection, additional system would need to be planned subsequently.

Members may deliberate.

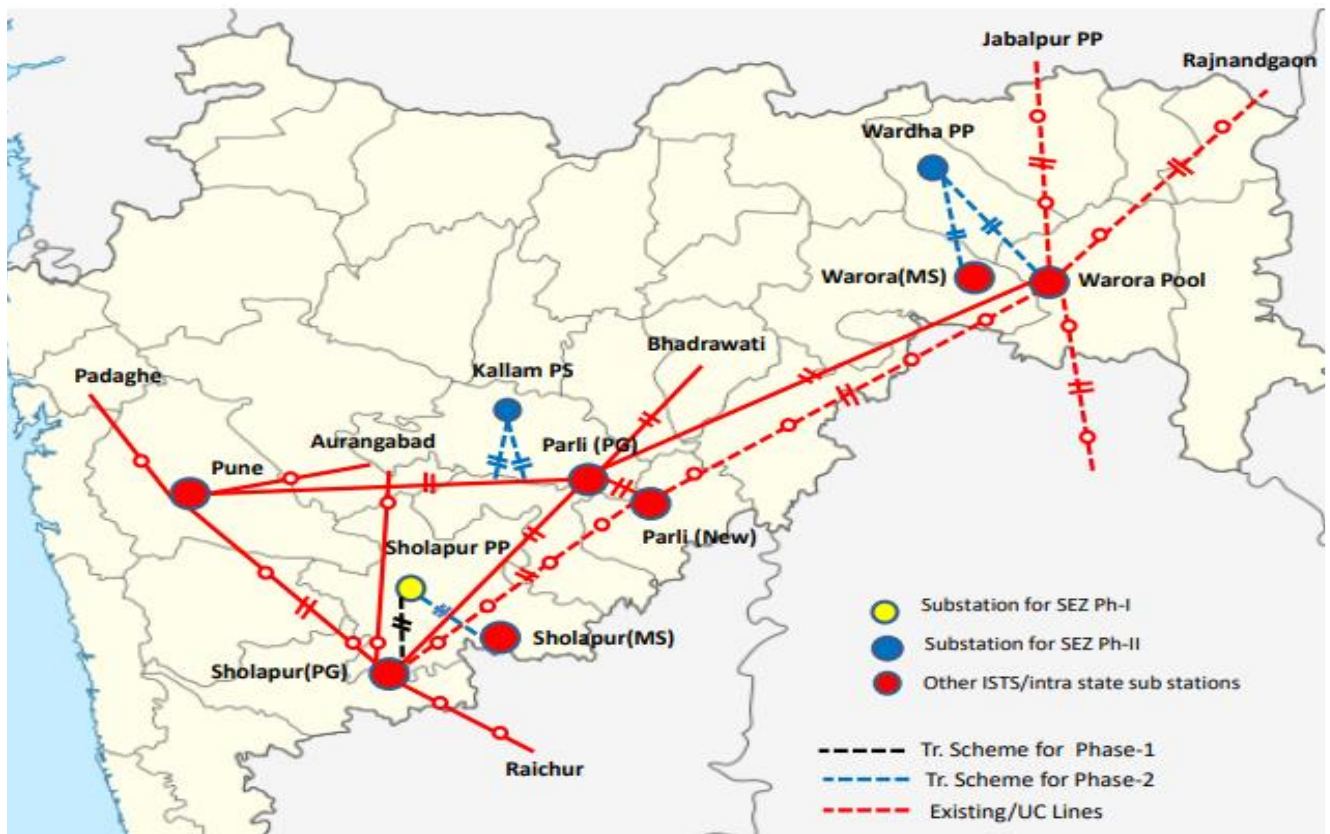
5.5. Name of Scheme: Transmission system associated with RE generations from potential wind energy zones in Osmanabad area of Maharashtra

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 4x500MVA, 400/220kV near Kallam PS	4x500MVA, 400/220kV 400kV ICT bay-4 220kV ICT bay-4 400kV line bay-4 220kV line bay- 8	179
2.	1x125MVAR bus reactor at Kallam PS	1x125 MVAR 400kV reactor bay -1	18
3.	LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS	10km	55

4.	Conversion of 50MVA fixed Line Reactors on each ckt of Parli (PG) – Pune (GIS) 400kV D/c line at Parli (PG) end into switchable.	400kV Reactor bays -2	19
5.	Provision of new 50MVA switchable line reactor at Kallam PS end of Kallam – Pune(GIS) 400kV D/c line	2x50 MVA 400kV Reactor bays -2	30
Total Rs (in Crore)			301

Note:

- The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- Powergrid to provide space at Parli (PG) for Conversion of 50MVA fixed Line Reactors on each ckt of Parli (PG) – Pune (GIS) 400kV D/c line at Parli (PG) end into switchable.



Members may deliberate.

5.6. Name of Scheme: Transmission system associated with RE generations from potential Solar Energy Zone in Maharashtra (1000 MW under Ph-I)

Sl. No.	Scope of the Transmission Scheme	Capacity /km	Estimated Cost (Rs.) Cr.
1.	Establishment of 400/220 kV, 2x500 MVA at Solapur PP (near Mohol)	500MVA, 400/220kV ICT -2 400kV ICT bay -2 220kV ICT bay -2 400kV line bay -2	89
2.	Solapur pooling point - Solapur PS 400 kV D/c line (twin HTLS)	50	94

3.	2 nos. of 400kV bays at Solapur PS for Solapur pooling point - Solapur PS 400 kV D/c line	400kV line bay -2	19
4.	Space for 8 nos. of 220 kV line bays for interconnection of wind & solar projects		0
5.	1x125 MVAR, 420 kV Bus Reactor at Solapur PP	1x125 MVAR, 420kV bus reactor 420kV reactor bay	18
Total Rs (in Crore)			220

In the 1st meeting of WRSCT held on 5.9.2018, it was decided that Schemes mentioned at item no 5.4, 5.5 & 5.6 shall be taken up only upon receipt of Stage-II connectivity applications.

Members may deliberate.

5.7. Name of Scheme: Transmission system for evacuation of power from the Renewable energy generation projects in Phalodi/Bhadla(4 GW), Fatehgarh (3 GW)& Bikaner complex (1.85 GW)(for which Stage-II/LTA has been received as well as some part of future potential in above locations):

The details of substation wise applications received in NR are as follows:

S. No	Substation	Stage –I Connectivity		Stage –II Connectivity		LTA	
		Applied (MW)	Granted (MW)	Applied (MW)	Granted (MW)	Applied (MW)	Granted (MW)
1	Bhadla PS	8214 (18 nos.)	8214	3380 (13 nos.)	3380*	4110 (13 nos.)	2330+800%
2	Bikaner	5000 (10 nos.)	5000	850 (3 nos.)	850	850 (3 nos.)	850%
3	Fatehgarh	8900 (13 nos.)	8900	2200 (5 nos.)	2200#	2200 (5 nos.)	1000+600%+600@

*Including 1500MW deemed STAGE – II grant.

including 1000MW deemed STAGE – II grant.

% LTA agreed for grant in 15th Connectivity/LTA meeting of NR held on 11.09.2018.

@ LTA agreed for grant in 17th Connectivity/LTA meeting of NR held on 26.11.2018.

Based on the above following transmission scheme is proposed for implementation:

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 765/400/220kV, 3x1500MVA (765/400kV), 5x500 MVA (400/220kV) pooling station at suitable location near Phalodi/ Bhadla in Jodhpur (Bhadla-II) space for 8 nos. 220kV bays for integration of wind farms	3x1500MVA, 765/400kV, 5x500MVA (400/220kV) 765kV ICT bay-3 400kV ICT bay-8 220kV ICT bay-5 400kV line bay-2	523

		765kV line bay-6	
2.	Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Khetri	2x1500MVA, 765/400kV, 765kV ICT bay-2 400kV ICT bay-2 765kV line bay-4	240
3.	Augmentation of transformation capacity at Bhadla (PG) by 400/220kV, 2x500MVA (6 th & 7 th) transformers space for 8 nos. 220kV line bays	2x500MVA, 400/220kV 220 kV ICT bay-2 400kV ICT bay-2 400kV line bay-2* 765kV line bay-2	70
4.	Creation of 220 kV level at Bikaner (PG) with transformation capacity of 2x500MVA, 400/220kV transformers space for 8 nos. 220kV line bays	2x500MVA, 400/220kV 220 kV ICT bay-2 400kV ICT bay-2	70
5.	LILO of both circuits of Ajmer – Bikaner 765kV D/c line at Bhadla-II	135km	1250
6.	Bhadla-II – Bhadla (PG) 400kV D/c Line (Twin HTLS)	30km	56
7.	Bikaner(PG) – Khetri S/s 765kV D/c line	220km	1018
8.	765kV Bays at Bikaner(PG) for Bikaner(PG) – Khetri S/s 765kV D/c line	765kV line bay-2	37
9.	Khetri – Sikar (PG) 400kV D/c line (Twin AL59)	70km	150
10.	400kV line bays at Sikar (PG) for Khetri – Sikar (PG) 400kV D/c line (Twin AL59)	400kV line bay-2	20
11.	Augmentation with 765/400kV, 1x1500MVA transformer (3 rd) at Moga S/s	1x1500MVA, 765/400kV 765kV ICT bay-1 400kV ICT bay-1	73
12.	Augmentation with 765/400kV, 1x1000MVA, transformer (3 rd) at Bhiwani (PG) S/s	1x1000MVA, 765/400kV 765kV ICT bay-1 400kV ICT bay-1	65
13.	Establishment of 765/400/220kV, 4x1500MVA (765/400kV), 5x500 MVA (400/220kV) pooling station at suitable location near Fatehgarh in Jaisalmer Distt (Fatehgarh-II)	4x1500MVA (765/400kV), 5x500 MVA (400/220kV) 765kV ICT bay-4 400kV ICT bay-9 220kV ICT bay-5 400kV line bay-2	558

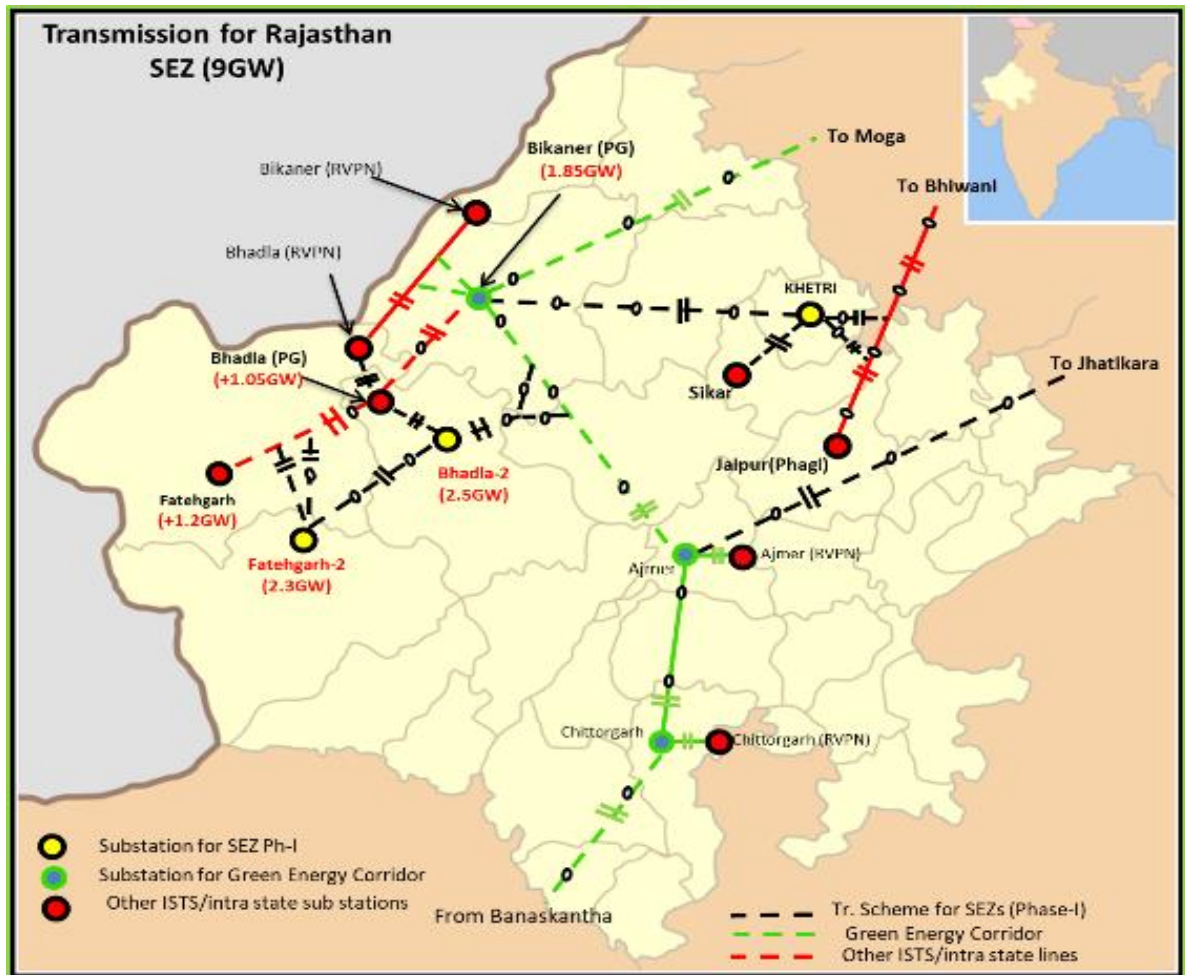
		765kV line bay-4	
14.	Fatehgarh-II – Bhadla -II 765kV D/c line	130km	601
15.	LILO of both circuits of Fatehgarh (TBCB) – Bhadla (PG) 765 kV D/c line (op. at 400kV) at Fatehgarh-II so as to establish Fatehgarh (TBCB) – Fatehgarh -II 765 kV D/c line (to be op. at 400kV) and Fatehgarh-II-Bhadla (PG) 765kV D/c line*	10km	106
16.	Ajmer (PG)– Phagi 765kV D/c line	110km	509
17.	765kV bays at Ajmer(PG) and Phagi for Ajmer (PG)– Phagi 765kV D/c line	765kV line bay-4	74
18.	Khetri –Jhatikara 765kV D/c line	170km	786
19.	765kV bays at Jhatikara for Khetri – Jhatikara 765kV D/c line	765kV line bay-2	37
20.	1x125 MVAR (420kV), 2x240 MVAR (765kV) Bus Reactor each at Fatehgarh-II, Bhadla-II & Khetri Substation along with reactor bays	240 MVAR (765kV) Bus Reactor -6 125 MVAR (765kV) Bus Reactor -3 Reactor bay -6 (765kV) -3 (400kV)	280
21.	1x240 MVAR Switchable Line reactors for each circuit at each end of Khetri – Jhatikara 765kV D/c line along with reactor bays	240 MVAR Line reactor -4 Reactor bay -4 (765kV)	153
22.	1x240 MVAR Switchable line reactor for each circuit at each end of Bikaner – Khetri 765kV D/c line along with reactor bays	1x240 MVAR Line reactor -4 Reactor bay -4 (765kV)	153
23.	1x330 MVAR Switchable line reactor for each circuit at Bhadla-II end for Ajmer-Bhadla-II 765kV line (after LILO) along with reactor bays	330 MVAR Line reactor -2 Reactor bay -2 (765kV)	86
24.	1x240 MVAR Switchable line reactor for each circuit at Bhadla-II end for Bikaner-Bhadla-II 765kV line (after LILO) along with reactor bays	1x240 MVAR Line reactor -2 Reactor bay -2 (765kV)	76
25.	Space for 220kV line bays for interconnection of solar projects at Fatehgarh-II (9 nos), Bhadla-II (9 nos) and Bikaner (4 nos) S/s		0
	Total Rs (in Crore)		6991

*, with charging of Fatehgarh-II –Bhadla section at 765kV level, 2nos. of 400kV bays would be spared at Bhadla S/s, which could be utilized for Bhadla-II – Bhadla (PG) 400kV D/c line.

Note:

- The line lengths mentioned above are approximate as the exact length shall be obtained after the detailed survey.
- Powergrid to provide space for 765kV bays(2nos) at Ajmer(PG) and Phagi for Ajmer (PG)– Phagi 765kV D/c line

- c. RVPNL to provide space for 765kV bays at Phagi for Ajmer (PG)– Phagi 765kV D/c line
- d. Powergrid to provide space for 765kV bays(2nos) at Jhatikara for Khetri –Jhatikara 765kV D/c line



Further, based on present Stage-II/LTA applications in Bhadla/Fatehgarh/Bikaner complexes as well as future solar potential of these complexes, scheme was agreed to be implemented in two parts, viz. Part-A and Part-B which is as under:

Transmission system for Solar Energy Zones in Rajasthan

Part A

- i) Establishment of 765/400kV, 2x1500MVA pooling station at suitable location near Phalodi/ Bhadla in Jodhpur (Bhadla-II PS)**
- ii) Establishment of 765/400kV, 2x1500 MVA S/s at suitable location near Khatri
- iii) Augmentation of transformation capacity at Bhadla (PG) by 400/220kV, 2x500MVA (6th & 7th) transformers
- iv) LILO of both circuits of Ajmer–Bikaner 765kV D/c line at Bhadla-II PS
- v) Bhadla-II PS–Bhadla (PG) 400kV D/c Line (Twin HTLS)
- vi) Bikaner(PG)–Khatri S/s 765kV D/c line
- vii) Khatri – Jhatikara 765kV D/c line
- viii) Khatri – Sikar (PG) 400kV D/c line (Twin AL59)
- ix) Augmentation with 765/400kV, 1x1500MVA transformer (3rd) at Moga S/s
- x) Augmentation with 765/400kV, 1x1000MVA, transformer (3rd) at Bhiwani (PG) S/s
- xi) Establishment of 765/400kV, 3x1500MVA pooling station at suitable location near Fatehgarh in Jaisalmer Distt (Fatehgarh-II PS)**
- xii) Fatehgarh-II PS– Bhadla -II 765kV D/c line

- xiii) LILO of both circuits of Fatehgarh (TBCB) – Bhadla (PG) 765 kV D/c line (op. at 400kV) at Fatehgarh-II PS so as to establish Fatehgarh (TBCB) – Fatehgarh -II 765 kV D/c line (to be op. at 400kV) and Fatehgarh-II-Bhadla (PG) 765kV D/c line
- xiv) Charging of Fatehgarh-II PS –Bhadla section at 765kV level
- xv) Ajmer (PG)– Phagi 765kV D/c line
- xvi) 1x125 MVA (420kV), 2x240 MVA (765kV) Bus Reactor each at Fatehgarh-II PS, Bhadla-II PS & Khetri Substation
- xvii) 1x240 MVAR Switchable Line reactors for each circuit at Jhatikara end of Khetri – Jhatikara 765kV D/c line
- xviii) 1x240 MVAR Switchable line reactor for each circuit at each end of Bikaner – Khetri 765kV D/c line
- xix) 1x330 MVAR Switchable line reactor for each circuit at Bhadla-II PS end for Ajmer-Bhadla-II PS 765kV line (after LILO)
- xx) 1x240 MVAR Switchable line reactor for each circuit at Bhadla-II PS end for Bikaner-Bhadla-II PS 765kV line (after LILO)

****Space provision to be kept for 220kV level**

Part B

Augmentation works to be taken up in above scheme after receipt of Stage-II connectivity/LTA applications at Fatehgarh-II PS, Bhadla-II PS & Bikaner (PG) S/s in Rajasthan (400/220kV ICT shall be taken up in progressive manner commensurate to stage-II connectivity/LTA applications on above pooling stations)

- i) Augmentation with 765/400kV, 1x1500MVA transformer (3rd) at Bhadla-II PS
- ii) Creation of 220 kV level at Bhadla-II PS with Installation of 400/220kV, 5x500MVA transformers at Bhadla-II PS
- iii) Augmentation with 765/400kV, 1x1500MVA transformer (4th) at Fatehgarh-II PS
- iv) Creation of 220 kV level at Fatehgarh-II with Installation of 400/220kV, 5x500MVA transformers at Fatehgarh-II PS
- v) Creation of 220 kV level at Bikaner (PG) with Installation of 400/220kV, 2x500MVA transformers at Bikaner (PG) 220kV line bays for interconnection of solar projects at Fatehgarh-II PS (9 nos), Bhadla-II PS (9 nos) and Bikaner (4 nos) S/s

Further following future scope/space provision to be kept at new substations/pooling stations was also agreed. This space provision scope is in addition to above Part A & Part-B scope.

- 1) 765/400/220kV Bhadla-II pooling station
 - 765/400kV, 1x1500MVA transformer
 - 400/220kV, 4x500MVA transformer
 - 4 nos. 765kV line bays with switchable Line reactor
 - 6 nos. 400kV line bays with switchable Line reactor
 - 7 nos. 220kV line bays
- 2) 765/400kV Khetri substation
 - 400/220kV, 4x500MVA transformer
 - 4 nos. 765kV line bays with switchable Line reactor
 - 4 nos. 400kV line bays with switchable Line reactor
 - 6 nos 220kV line bays
- 3) 765/400/220kV Fatehgarh -II pooling station
 - 400/220kV, 6x500MVA transformer
 - 4 nos. 765kV line bays with switchable Line reactor
 - 6 nos. 400kV line bays with switchable Line reactor
 - 10 nos. 220kV line bays

Members may deliberate.

5.8. Name of Scheme: Evacuation of power from RE sources in Tirunelveli and Tuticorin Wind Energy Zone (Tamil Nadu)(500MW)

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1	Addition of 1x500 MVA, 400/230kV ICT (4 th) at Tuticorin-II GIS sub-station.	1x500MVA, 400/230kV 400kV ICT bay-1 230kV ICT bay-1	37
Total Rs (in Crore)			37

Note: Powergrid to provide space for 400/230kV ICT (4th) at Tuticorin-II sub-station.

5.9. Name of Scheme: Evacuation of power from RE sources in Karur / Tiruppur Wind Energy Zone (Tamil Nadu)(2500MW)

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 5x500 MVA, 400/230 kV Karur Pooling Station (at a location in between Karur Wind zone and Tiruppur wind zone) Space for 9 Nos. of 230kV line bays for interconnection of wind projects	5x500MVA, 400/230kV 400kV ICT bay-5 230kV ICT bay-5 400kV line bay- 4 400kV reactor bay -2	233
2.	LILO of both circuits of Pugalur – Pugalur (HVDC) 400 kV D/c line (with Quad Moose ACSR Conductor) at Karur PS	50km	277
3.	2x125 MVAr,400kV bus reactor at Karur PS	125 MVAr reactor-2	17
Total Rs (in Crore)			527

5.10. Name of Scheme: Evacuation of power from RE sources in Koppal Wind Energy Zone (Karnataka) (2500MW)

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 5x500 MVA, 400/220kV pooling station near Munirabad /suitable location in Koppal distt. Space for 9 Nos of 220kV line bays for interconnection of wind projects	5x500MVA, 400/220kV 400kV ICT bay-5 220kV ICT bay-5 400kV line bay- 4 400kV reactor bay -2	233

2.	Pooling station (near Munirabad /suitable location in Koppal distt.) - Munirabad 400 kV D/c Line (with Quad Moose ACSR conductor)	50km	138
3.	Pooling station (near Munirabad /suitable location in Koppal distt.) - Narendra (New) 400 kV D/c Line (with Quad Moose ACSR conductor)	125km	346
4.	400kV lines bays at Munirabad (2 nos) and Narendra(new) (2 nos)	400kV line bay- 4	39
5.	2x125 MVA,400kV bus reactor at Pooling station (near Munirabad /suitable location in Koppal distt.)	125 MVA reactor-2	17
6.	Space provision for future expansion.		0
Total Rs (in Crore)			773

5.11. Name of Scheme: Evacuation of power from RE sources in Kurnool Wind Energy Zone (3000MW) /Solar Energy Zone (AP)(1500MW):

Sl. No.	Scope of the Transmission Scheme	Capacity /ckm	Estimated Cost (Rs.) Cr.
1.	Establishment of 765/400/220kV 3x1500 MVA, 9x500 MVA Pooling station at suitable location in Kurnool Distt (Kurnool-III) Space for 220kV line bays for interconnection of wind projects (15 nos)	3x1500 MVA, 765/400kV 9x500MVA, 400/220kV 765kV ICT bay-3 400kV ICT bay-12 220kV ICT bay-9 400kV reactor bay -2	642
2.	Kurnool –III PS - Kurnool(new) 765 kV D/c Line	100km	463
3.	Kurnool –III PS-Maheshwaram(PG) 765 kV D/c Line	250km	1156
4.	765kV lines bays at Kurnool(new) (2 nos) and Maheshwaram(PG) (2 nos)		74
5.	1x330 MVA (765kV) & 1x125MVA (400kV) bus reactor at Kurnool-III PS	125 MVA reactor-1 330 MVA reactor -1	33
6.	240 MVA Switchable line reactors at both ends of Kurnool-III PS – Maheshwaram(PG) 765 kV D/c Line along with bays	240 MVA line reactor - 4 Reactor bays -4	153
Total Rs (in Crore)			2521

Note: (i) PGCIL to provide space for 2nos. of 765kV bays both at Kurnool(new) and Maheshwaram(PG) S/s

(ii) PGCIL to provide space at Maheshwaram(PG) for 765kV Switchable line reactors at Maheshwaram end of Kurnool-III PS –Maheshwaram(PG) 765 kV D/c Line

- 5.12. The transmission schemes mentioned at Item no 5.8- 5.11 above were agreed in 1st meeting of SRSCCT held on 7.9.2018 as a broad master plan to serve integration of RE generation potential assessed in Tamil Nadu, Karnataka and Andhra Pradesh for period upto 2021-22. As such it was agreed that the scheme would be implemented as ISTS, consequent to grant of LTA by the CTU. The transformation capacity at various stations and certain elements could be required to be reviewed based on LTA applications. Accordingly, this broad master plan would be implemented in stages to serve RE integration.**

Members may deliberate.

5.13. Name of Scheme: 125 MVAR bus reactor at Kala Amb substation

To control high voltage in the Northern grid, the provision of reactive compensation, was discussed and approved in the 39th meeting of Standing Committee on Power System Planning of Northern Region held on 29-30th May, 2017 which involved installation of bus reactors at various 220kV & 400kV buses. Further, in the 2nd ECT installation of bus reactors at various substations of Powergrid in Northern Region was recommended for implementation through RTM by Powergrid as a part of the scheme NRSS-XL. The scheme which was agreed in the 39th meeting of SCPSNR also involved installation of 125 MVAR bus reactor at Kala Amb substation. The kala Amb substation is under implementation through TBCB. Members may like to deliberate on the mode of implementation of the scheme, the scope of works is as follows:

Sl. No.	Scope of the Transmission Scheme	Capacity /km	Estimated Cost (Rs.) Cr.
1.	1x125 MVAR, 420 kV Bus Reactor at Kala Amb	1x125 MVAR, 420kV bus reactor 1 420kV reactor bay	16

Members may deliberate.

5.14. Name of Scheme: 12ohm series reactor at 400kV Mohindergarh S/s of M/s Adani:

The scheme to control Fault Level in Northern Region (Phase-II) was discussed and approved in the 39th meeting of Standing Committee on Power System Planning of Northern Region held on 29-30th May, 2017 and in the 2nd the scheme was recommended for implementation through RTM RTM by Powergrid. The scheme which was agreed in the 39th meeting of SCPSNR also involved installation of 12ohm Series Line reactors in Mohindergarh–Dhanonda 400kV D/c line Ckt I & II at Mohinder garh end. Mohindergarh substaion is owned by M/s Adani Power limited. Members may like to deliberate on the mode of implementation of the scheme, the scope of works is as follows:

Sl. No.	Scope of the Transmission Scheme	Estimated Cost (Rs.) Cr.
1	12ohm Series Line reactors in Mohindergarh–Dhanonda 400kV D/c line (Ckt I & II) at Mohinder garh end	50

Members may deliberate.

5.15. Name of Scheme: 2 Nos. of 220kV Bays at 3x315 MVA, 400/220kV Samba (Jatwal) (PG) S/s

Following lines providing 220kV outlets from 400/220kV ISTS substations viz Samba (Jatwal) (PG), Amargarh (Sterlite) and New Wanpoh (PG) were included under PMDP - 2015 for Jammu & Kashmir:

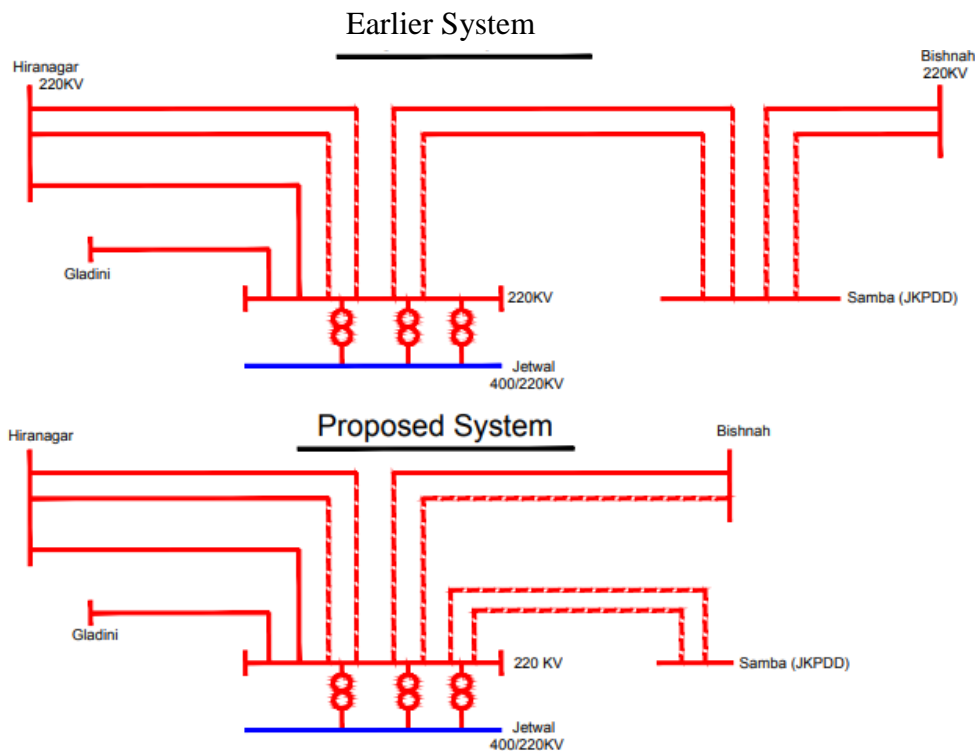
Jammu Region:

1. LILO of Hiranagar-Bishnah 220kV D/C line at 400/220kV Samba (Jatwal) (PG) S/s.

Kashmir Region:

1. New Wanpoh (PG) (400/220kV)-Mirbazar 220kV D/C line
2. Extension of MirbazarAlusteng 220kV D/C line up to 400/220kV New Wanpoh Sub-station (PG)
3. LILO of 220kV D/C Zainkote-Delina line at 2x315 MVA, 400/220kV Kunzar (Amargarh)S/s(Sterlite)

Further, LILO of both circuits of Samba (Jatwal) (PG) - Bishnah 220kV D/c line at Samba (JKPDD) along with establishment of Samba 220kV S/s was also included under PMDP 2015. JKPDD had proposed direct interconnection of Samba (JKPDD) with Samba (Jatwal) (PG) 400/220kV through a 220kV D/c line instead of LILO arrangement and the direct interconnection would require 220kV bays at Samba (Jatwal) (PG) 400/220kV S/s.



At Samba (Jatwal) (PG) 400/220kV S/s, there are 6 nos. of 220kV equipped bays, out of which 2 nos. has already been utilized for LILO of Hiranagar-Gladini 220 kV S/C line at Samba (Jatwal) (PG). Balance 4 nos. would be utilized for LILO of Hiranagar-Bishnah 220kV D/C line at 400/220kV Samba (PG) (Jatwal) S/s. Therefore, for establishment of direct link between Samba (JKPDD) and Samba (Jatwal) (PG), 2 nos. of 220kV bays would be required at Jatwal S/s.

The scheme was discussed in 1st meeting of NR Standing committee on Transmission (SCT) held on 11/09/2018 wherein it was agreed to provide 2 nos. of 220kV Bays at 3x315 MVA, 400/220kV Samba (Jatwal) (PG) S/s for Samba (Jatwal) (PG) –Samba (JKPDD) 220kV D/c line under ISTS.

The scope of works is as follows:

Sl. No.	Scope of the Transmission Scheme	Capacity/Ckm	Estimated Cost (Rs.) Cr.
1	2 nos. of 220kV line bays at Samba (Jatwal) (PG)	220 kV line bays- 2	10.00

Members may deliberate.

5.16. High loading of Nellore – Nellore (PS) 400kV (Quad) D/c line :

To address high loading on 400kV Nellore PS – Nellore PG line and high short circuit level at Nellore PG, it was agreed to bypass Nellore PS – Nellore PG 400kV D/c (Quad) line & Nellore PG – Thiruvalem 400kV D/c (quad) line at Nellore PG to form Nellore PS – Thiruvalem 400kV D/c (Quad) direct line, in the 42nd Standing Committee on Power System Planning in Southern Region held on 27/04/2018. It was also agreed to convert 2x50 MVAR fixed line reactors at Nellore PG on Nellore PG – Thiruvalem 400kV D/c (Quad) line as bus reactor at Nellore PG 400kV sub-station through suitable arrangement.

The scope of works is as follows:

Sl. No.	Scope of the Transmission Scheme	Estimated Cost (Rs.) Cr.
1	Bypassing of Nellore PS – Nellore PG 400kV D/c (Quad) line & Nellore PG – Thiruvalem 400kV D/c (quad) line at Nellore PG to form Nellore PS – Thiruvalem 400kV D/c (Quad) direct line	1.00
2	Conversion of 2x50 MVAR fixed line reactors at Nellore PG on Nellore PG – Thiruvalem 400kV D/c (Quad) line as bus reactor at Nellore PG 400kV sub-station	

Members may deliberate.

5.17. Additional 1X500 MVA, 400/220kV ICT (5th) at Bhadla Pooling Station

For evacuation of 1500MW of power from solar parks near Bhadla, 3 nos. of 500 MVA ICTs are being implemented at Bhadla Pooling Station. Further, in addition to this, 4th ICT of 500 MVA agreed in 39th SCM of NR held on 29-30th May, 2017, 1st NCT meeting held on 27/07/2018 and 2nd ECT held on 02/08/2018, is under implementation by POWERGRID. As of now, total LTA granted at Bhadla has become 2330 MW against already planned transformation capacity of 2000 MW.

Therefore to evacuate power from Bhadla, additional (5th) ICT of 500MVA is required at Bhadla. Accordingly augmentation of transformation capacity at Bhadla Pooling Station by additional 1x500 MVA, 400/220 ICT (5th) was agreed in 1st NR SCT held on 11/09/2018.

The scope of works is as follows:

Sl. No.	Scope of the Transmission Scheme	Capacity/Ckm	Estimated Cost (Rs.) Cr.
1	Additional 1x500 MVA, 400/220 5 th ICT at Bhadla Pooling station.	1x500 MVA, 400/220 kV 400 kV ICT bay-1 220 kV ICT bay-1	37

Members may deliberate.

7.0 Any other item, with permission of chair.

**Transmission schemes approved for implementation through Regulated tariff mechanism
in 2nd meeting of ECT**

1. Northern Region System strengthening Scheme –XL (NRSS-XL)
Part-A: System Strengthening Scheme in Northern Region
Part-B: Reactive Power Compensation in Northern Region
Part-C: System Strengthening Scheme in Northern Region for grant of LTA to M/s Essel Saurya Urja Company of Rajasthan Ltd
2. Replacement of 1x315 MVA ICT by 1x500 MVA along with two nos. of 220 kV line bays at Lucknow
3. 1x315 MVA, 400/220 kV ICT (to be shifted from Lucknow after refurbishment if required) with 2 nos. of 220 kV line bays at Gorakhpur
4. Western Region Strengthening Scheme –XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme – IX (NERSS-IX)

Note: TBCB - scheme already notified, Modification in scope of works of Package-2 to be notified.

5. Scheme to control Fault Level in Northern Region (Phase-II)
6. Measures to control fault level at Wardha Substation
7. System strengthening Scheme in Southern Region
8. Construction of 2 no. 400 kV GIS bays at 400/220 kV Chamera Pooling Station of PGCIL under Northern Region System Strengthening scheme
9. Additional 1x500 MVA, 400/220kV ICT at Saharanpur (PG) 400/220kV substation
10. Provision of Bus Reactors at High Voltage Nodes in Western Region
11. Augmentation of transformation capacity in Western Region
12. Provision of 400 kV 1x125 MVAr Bus Reactor at Champa Pool Split Bus Section –A
13. Conversion of 50 MVAr Fixed line reactor to Switchable reactors in Kankroli–Zerda 400 kV line at Kankroli S/S of POWERGRID
14. Transmission system for evacuation of 4000 MW of RE power in the Bhuj area under SECI bids (Tranche I to IV) at Bhuj PS
15. Transmission system for evacuation of 950 MW of RE power under SECI bids Tranche I to IV) at Tuticorin PS of POWERGRID
16. Construction of 2 no. 400 kV line bays at 400/220 kV Kozhikode (Areekode) substation of PGCIL for terminating North Trissur (Madakkathara)-Kozhikode (Areekode) 400kV D/C line of KSEBL
17. Implementation of 1x125 MVAr bus reactors at 400kV sub-stations of POWERGRID for reactive power compensation in SR
18. Termination of 400kV lines at Jeerat (WBSETCL) S/s under the ERSS-XV and ERSS-XVIII schemes
19. 500MW HVDC back to back station at North Comilla (Bangladesh) for transfer of power through Surjamaninagar (India)–North Comilla (Bangladesh) : Indian Portion
20. 2 no. 400kV line bays at Muzaffarpur (POWERGRID) S/s for operation of Muzaffarpur-Dhalkebar 400kV D/c line (presently operated at 132kV) at rated voltage level of 400kV
21. Indian portion of Dhalkebar (Nepal)–Muzaffarpur (India) 400kV D/c (Quad Moose) line associated with 900MW Arun-3 HEP in Nepal
22. Conversion of 50MVAR (3x16.67 MVAr) bus reactor at Farakka to switchable line reactor due to space constraints in termination of Farakka – Baharampur 400kV D/c (Twin HTLS) line