

I/2390/2018

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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 &amp; Appraisal-I Division

**-As per list enclosed-**

विषय: पश्चिमी क्षेत्र की ट्रांसमिशन पर स्थायी समिति की 05.09.2018 को हुई पहली बैठक की कार्यवृत्ति

**Sub: Minutes of the 1<sup>st</sup> Meeting of Western Region Standing Committee on Transmission (WRST) held on 05.09.2018**

Sir/ Madam,

The minutes of the 1<sup>st</sup> meeting of Western Region Standing Committee on Transmission held on 05.09.218 at NRPC, Katwaria Sarai, New Delhi is available on CEA website ([www.cea.nic.in](http://www.cea.nic.in)) at the following link: <http://cea.nic.in/compsplanningwr.html> i.e. Home page - Wings - Power Systems -PSP&A-I - Standing Committee on Power System Planning- Western Region.

Yours faithfully,

  
(Awdhesh Kumar Yadav)  
Director, PSPA-1

1.	Member Secretary, WRPC, F-3, MIDC Area, Andheri (East), Mumbai – 400093 Fax – 022-28370193	2.	#Managing Director, CSPTCL, Dangania, Raipur (CG)-492013 Fax - 0771 - 2574246/ 4066566	3.	#Executive Engineer, Administration of Daman & Diu (U.T.), Department of Electricity, Moti Daman-396220
4.	#Executive Engineer (Projects), UT of Dadra & Nagar Haveli, Department of Electricity , Vidyut Bhavan, Amli, Silvassa - 396230	5.	#Chief Engineer, Electricity Department, Government of Goa, Vidyut Bhavan, 3rd Floor, Panaji - 403001 Fax – 0832-2222354	6.	Managing Director, GETCO, 9 <sup>th</sup> Floor, Sardar Patel Vidyut Bhawan, Race Course, Vadodara-390007 Fax - 0265-2338152
7.	Chief Engineer (Planning & Design), MPPTCL, Block No.- 2, Shakti Bhawan, Rampur, Jabalpur-482008 Fax – 0761-2660908	8.	#Director (Operation), MAHATRANSCO, Plot No.C-19, E- Block, Bandra-Kurla Complex, Bandra (E), Mumbai - 400051 Fax : 022-26591254	9.	CEO, POSOCO B-9, Qutub Institutional Area, Katwaria Sarai New Delhi – 110010 Fax – 011-2682747
10.	COO (CTU) POWERGRID, Saudamini, Plot no. 2, Sector -29, Gurgaon-122 001 Fax-0124-2571809				

# - State Transmission Utilities (STUs) which have not intimated the details of their WRSCT member in line with the MoP order no. 15/3/2017–Trans dated 13.4.2018

## **Minutes of the 1<sup>st</sup> meeting of Western Region Standing Committee on Transmission (WRSCT) held on 05.09.2018 at NRPC, Katwaria Sarai, New Delhi**

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The list of participants is attached as **Annexure-1**.

Member (Power System), CEA welcomed the participants to the 1<sup>st</sup> Meeting of Western Region Standing Committee on Transmission (WRSCT). He requested Chief Engineer, CEA to take up the agenda.

Chief Engineer (PSPA-I), CEA stated that Govt. of India had set a target for establishing 175 GW renewable capacity by 2022 which, interalia, includes 100 GW Solar, 60 GW Wind generation capacity. Gestation period of RE project was short in comparison to development of its transmission facilities. Therefore, transmission implementation need to be taken up in advance so that it can match with renewable generation. The agenda mainly included the transmission scheme associated with Solar/Wind Energy Zones (REZs) in Gujarat, Maharashtra & Madhya Pradesh. He requested Director (PSPA-I), CEA to take up the agenda items for discussions.

### **1. Confirmation of Minutes of 43<sup>rd</sup> meeting of Standing Committee on Power System Planning of Western Region (SCPSPWR)**

1.1. CEA stated that the minutes of the 43<sup>rd</sup> meeting of SCPSPWR held on 11.05.2018 were issued vide CEA letter No.CEA-PS-11-23(19)/1/2018-PSPA-I Division I/1241/2018 dated 21.06.2018.

1.2. MPPTCL vide their letter no. 04-02/N-171/1822 dated 08.08.2018 has requested for the following corrigendum in the para 4.3 (ii) of the minutes:

Para 4.3(ii): Morena (TBCB)–Bhind 220 kV D/C along with 2 no. 220 kV line bays at both ends of this line would be implemented by MPPTCL at its own cost.

1.3. MPPTCL clarified that the two nos. 220 kV bays at Morena TBCB 400/220 kV for termination of 220 kV D/C line to Bhind would be owned by MPPTCL (STU system) and MPPTCL has proposed its implementation through tariff based competitive bidding process by intra-state transmission licensee.

1.4. To facilitate MPPTCL, the following modification/corrigendum was agreed in para 4.3(ii) :

Para 4.3(ii): Morena (TBCB)–Bhind 220 kV D/C along with 2 nos. of 220 kV line bays at both ends of this line would be implemented by Intra-State Transmission Licensee of Madhya Pradesh (to be selected through intra-state TBCB bidding process)

1.5. With the above modification minutes of the 43<sup>rd</sup> meeting of Standing Committee on Power System Planning of Western region was confirmed.

## 2. Evolution of transmission scheme for integration of envisaged RE generation capacity in Solar & Wind Energy Zones and Transmission System plan for potential wind energy zones (WEZs) in Western Region

2.1. CEA stated that 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. The report of sub-committee is enclosed as **Annexure-2**. 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	Tota l	State/ District		Ph- 1	Ph- 2	Total
		202 0	202 1				202 0	202 1	
		GW	GW	GW			GW	GW	GW
<b>Rajasthan</b>					<b>Tamil Nadu</b>				
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					
<b>Subtotal</b>		10	10	20	<b>Subtotal</b>		1.5	1.5	3
<b>Andhra Pradesh</b>					<b>Andhra Pradesh</b>				
Kurnool	Gooty	2.5	0	2.5	kurnool		2	1	3
Ananthpura m	Urvakonda	0	2.5	2.5					
<b>Subtotal</b>		2.5	2.5	5	<b>Subtotal</b>		2	1	3
<b>Karnataka</b>					<b>Karnataka</b>				
Gadag		0	2.5	2.5	Koppal		2.5	0	2.5
Bidar		0	2.5	2.5					
<b>Subtotal</b>		0	5	5	<b>Subtotal</b>		2.5	0	2.5
<b>Gujarat</b>					<b>Gujarat</b>				
Kutch	Rapar	3	2	5	Kutch	Bhuj	0	2	2

Solar Energy Zone (SEZ)					Wind Energy Zone (WEZ)				
Banaskantha	Vav/Tharad	0	2.5	2.5		Lakadiya	2	0	2
Jamnagar	Lalpur	1	1.5	2.5	Dwarka		1	1	2
<b>Subtotal</b>		4	6	10	<b>Subtotal</b>		3	3	6
<b>Maharashtra</b>					<b>Maharashtra</b>				
Solapur		1	1.5	2.5	Osmanabad		0	2	2
Wardha		0	2.5	2.5					
<b>Subtotal</b>		1	4	5	<b>Subtotal</b>		0	2	2
<b>Madhya Pradesh</b>									
Raigarh		2.5	0	2.5					
Khandwa		0	2.5	2.5					
<b>Subtotal</b>		2.5	2.5	5					
<b>Total</b>		<b>20</b>	<b>30</b>	<b>50</b>	<b>Total</b>		<b>9</b>	<b>7.5</b>	<b>16.5</b>

The cost of the transmission scheme for 66.5 GW RE generations projects has been estimated about 43,235 Cr. For arriving at tentative transmission tariff implications, it has been assumed that the envisaged solar (50 GW) & wind (16.5 GW) generation capacity would generate about 115 billion units of renewable energy per annum (wind CUF @ 25%, Solar CUF @ 18%). Various options like no Government grant/upfront payment from RE generation developers and with upfront payment of Rs 25 lakh/MW, 35 lakh/MW, 50 lakh/MW from RE generation developers for development of proposed transmission system indicates the following tariff implications

S.No	Attribute	Option 1	Option 2 (25 lakh/MW Bid incl.)	Option 3 (35 lakh/MW Bid incl.)	Option 4 (50 lakh/MW Bid incl.)
1	Envisaged RE Capacity	<b>66500 MW</b>			
2	Units Generated (Wind CUF@25%, Solar CUF @18%)	115 Billion units/Year			
3	Transmission Cost	Rs 43,235 Cr	Rs 26,610 Cr	Rs 19,960 Cr	Rs 9,985 Cr
4	Annual transmission charges (@18%)	Rs 7782 Cr	Rs 4790 Cr	Rs 3593 Cr	Rs 1797 Cr
5	Tentative Transmission Tariff	Rs 0.67/Unit	Rs 0.42/Unit@	Rs 0.31/Unit	Rs 0.16/Unit

\*\* D: E- 70:30

@ Generation tariff increase by 14-18 (25 lakh/MW Bid incl.) , 21-25 paise/unit (35 lakh/MW Bid incl.) & 32-36 paise/unit (50 lakh/MW Bid incl.)

**2.2.** CEA, further stated that the sub-committee constituted by MNRE, in its meeting held on 18.07.2018, to facilitate development of the transmission system had solicited decisions on the following aspects from the competent authority:

- i) Amount of upfront payment from RE generation developers at the time of bidding and grant from Government.
- ii) Finalization of transmission system implementation mode and transmission implementing agency i.e. TBCB or RTM.
- iii) Site specific bidding for RE generation addition in accordance to the transmission plan.
- iv) CERC to expedite enabling provision in connectivity regulation so that SECI can apply for Connectivity & LTA.

**2.3.** SECI stated that CERC has already issued draft Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) (Seventh Amendment) Regulations, 2018. The last date for comments by stakeholders is 14.09.2018. In the 7th amendment, it has been proposed to include any company or entity designated by the Central Government or State Government as Implementing Agency on behalf of the Renewable Power Developers who are eligible for grant of connectivity, as an applicant. This enabling provisions provision would enable SECI to apply for connectivity and LTA on behalf of the RE developers.

SECI further stated that in the GOI initiative of 175 GW installed capacity of RE by 2021-22 also includes State plans of RE capacity addition. Towards fulfilment of this, Ultra Mega Solar parks of about 20 GW was undertaken but out of that only 4-5 Solar parks have been successful. In implementation of these large scale Solar parks, development of the common facilities like land, roads, connectivity is being carried out by SPPDs (Solar Park Project Developers)/SNAs (State Nodal Agencies). Many of these Solar parks are delayed due to land issues, thus increasing the development costs. To overcome this, pan-India basis bids has been successfully carried out for 6 GW wind RE generations and connectivity has been granted to these RE developers in the system planned by CEA and CTU. And further all future bids are also proposed to be carried out on pan-India basis.

**2.4.** MNRE stated that even though the sub-committee constituted by them, to facilitate development of the transmission system, has suggested various options of upfront payment from RE generation developers at the time of bidding/ grant from Government for reducing the implications on transmission tariff, Government was envisaging for providing any grant/ upfront payment from RE developers. Any upfront payments on RE project developers for development of transmission system would increase the generation tariff of RE projects

- 2.5. CEA stated that the RE potential zones in Western Region is spread out in 3 states (namely Gujarat, Maharashtra and Madhya Pradesh). Similarly, in Southern Region also it is spread out in three states (namely Tamil Nadu, Andhra Pradesh and Karnataka) but in Northern region it is concentrated in Rajasthan only (that too only Solar potential).

As far as western region is concerned, out of total 20GW solar and 8 GW wind potential in WR, 7.5 GW solar & 3 GW wind projects has been planned in Phase-I (upto Dec'2020) and 12.5 GW solar & 5 GW wind has been planned for Phase-II (December '2021).

MNRE vide its letter dated 3.8.2018 has forwarded the proposal made by sub-committee to MoP to undertake the planning and implementation including financing of transmission system for evacuation of renewable energy and its grid connectivity.

- 2.6. CEA added that in the 43rd meeting of SCPSPWR held on 11.05.2018, the following transmission system were discussed:

- i) Transmission system for evacuation of power from 6050MW wind projects whose bidding has already been done by SECI on pan India basis). Majority of bids have been received in Kutch district of Gujarat (3900MW at Bhuj and 600MW at Bhachau) and balance in Tamil Nadu (950MW at Tirunelveli, 300MW at Pugalur and 300MW at Palakkad).
- ii) Transmission system for evacuation of power from potential wind energy zones in Western Region 2000 MW (additional) in Bhuj , 2000MW near Bhachau/Lakadia area, 2000 MW in Devbhumi Dwarka region of Gujarat and 2000 MW in Osmanabad region of Maharashtra. That is, the entire 8 GW wind RE potential in WR indicated in the sub-committee report has been considered.

The transmission system for evacuation of power from Bhuj and other potential areas in Western Region was broadly agreed by the members. During the meeting, Members advised to hold a joint study meeting amongst CEA, CTU, POSOCO, GETCO and MSETCL for further deliberations and finalization of the transmission system.

- 2.7. In line with the decision of the 43<sup>rd</sup> meeting of SCPSPWR, a joint study meeting with CTU, POSOCO, MSETCL and GETCO was convened by CEA on 05.06.18 & 06.06.18 at POWERGRID Office, Gurgaon. Based on the joint studies for Gujarat WEZs, the following schemes were technically agreed:

**PHASE-I:**

**A. Injection from 4000MW RE projects under SECI bids (Tranche I to IV) at Bhuj PS (by April 2020):**

- i) In addition to existing 2x500MVA 400/220 kV & 2x1500MVA 765/400 kV ICTs at Bhuj, the following augmentation in transformation capacity would

be required for evacuation of 4000MW RE projects under SECI bids (Tranche-I to IV)

- 6x500MVA 400/220kV ICTs (addl)\*
  - 2x1500MVA 765/400kV (addl)
- ii) For injection from any addl RE project (other than the above 4000MW) in existing Bhuj PS, 1x500MVA 400/220kV (9<sup>th</sup>) ICT is required.
- iii) Bhachau – Varsana 400kV D/c line remains critically loaded. It was observed that the line remains loaded even without the RE injection at Bhuj PS. Further, the short circuit levels at Bhachau and Varsana exceed 40kA design rating as they contribute heavily to each other.

\*On account of space constraints at Bhuj PS, all future 220kV as well as 400kV line / ICT bays at Bhuj PS need to be implemented as GIS

**B. Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system:**

- i) 3x1500MVA, 765/400kV Lakadia PS#
- ii) Lakadia – Vadodara 765kV D/c line (~350km) along-with 330MVA switchable line reactors at both ends
- iii) LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS
- iv) 1x330MVA, 765kV Bus reactor & 1x125MVA, 420kV Bus reactor at Lakadia PS

# with provision for creation of 220 kV level

With the above proposed transmission system, loading on Bhachau – Varsana 400kV D/c line eases out significantly. However, the fault levels at both Bhachau & Varsana substations further increase to over 50kA. Accordingly, it was decided that the line may be kept normally open and may be utilized under contingency conditions. GETCO may make proposal of bus splitting at Varsana to keep Bhachau–Varsana 400kV D/c line normally in service.

**PHASE-II**

**C. Transmission System Plan for RE generations at Potential wind energy zones in Gujarat [Bhuj-II (2000MW), Lakadia (2000MW) & Dwarka (2000MW)]:**

- i) Establishment of 2x1500MVA (765/400kV), 4x500MVA (400/220kV) Bhuj-II PS (GIS) along-with space for 8 nos. 220kV bays for wind farms' integration
- ii) Establishment of 4x500MVA, 400/220kV ICTs at Lakadia PS (GIS) along-with space for 8 nos. 220kV bays for wind farms' integration
- iii) Establishment of 4x500MVA, 400/220kV Jam Khambhaliya PS (GIS) along-with space for 8 nos. 220kV line bays
- iv) Extension of Essar–Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS along-with 63MVA Line Reactor at both ends (i.e.



Lakadia & Jam Khambhaliya ends). Further, the existing line reactor (63MVAR) on Bhachau end of EPGL – Bhachau line shall be converted into switchable Line Reactor.

- v) Interconnection of 765kV Bhuj S/s with the proposed Bhuj-II (GIS) S/s through bus extension or 765kV D/c line
- vi) Bhuj-II PS – Lakadia PS 765kV D/c line (~120km)
- vii) Lakadia PS – Banaskantha PS 765kV D/c line along-with 240MVAR switchable LR at Lakadia PS (~150km)
- viii) 1x330MVAR, 765kV Bus reactor at Bhuj-II PS & 1x125MVAR, 420kV Bus reactor each at Bhuj-II PS & Jam Khabhaliya PS

The above system for Jam Khambhaliya PS shall be able to cater RE injection to the tune of 1500MW in Dwarka area. For any additional RE injection, additional system would need to be planned subsequently. Further, it is observed that loading on *Ranchhodpura – Dehgam 400kV D/c line is beyond 850MW thermal limit*. Accordingly, it was decided to study the same separately.

The following scheme was technically agreed **for evacuation of power from about 2000MW RE expected to come up in the Osmanabad area in Maharashtra:**

- i) Establishment of 4x500MVA, 400/220kV near Kallam PS along-with 8 nos. 220kV line bays
- ii) 1x125MVAR bus reactor at Kallam PS
- iii) LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS along-with:
  - a. Conversion of 50MVAR fixed Line Reactors on each ckt of Parli (PG) – Pune (GIS) 400kV D/c line at Parli(PG) end into switchable.
  - b. Provision of new 50MVAR switchable line reactor at Kallam PS end of Kallam – Pune(GIS) 400kV D/c line

**2.8.** CEA, further stated that National Committee on Transmission (NCT) in its 1<sup>st</sup> meeting held on 27.07.2018 has recommended the following scheme for implementation through RTM by POWERGRID under compressed time schedule:

**Transmission system for injection of power from 4000MW RE projects under SECI bids (Tranche I to IV) at Bhuj PS**

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	2x1500MVA,	147

& 400kV GIS bays	765/400kV	
Total Rs (in Crore)		356

The above scheme was required urgently for evacuation of power from 4000MW RE projects at Bhuj PS as the wind power generation projects, which have been successful in SECI bids of tranche 1, 2, 3 & 4 are scheduled to be commissioned by Oct, 2018, May, 2019, Nov, 2019 and April 2020 respectively.

Empowered Committee on Transmission (ECT) in its 2<sup>nd</sup> meeting held on 06.08.2018 has also 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" through RTM by POWERGRID under works to cater to urgency.

CEA requested that member's may kindly note the recommendation made by NCT & ECT and may kindly approve the transmission system planned for potential wind energy zones in Gujarat and Maharashtra.

- 2.9.** CTU stated that in Western Region, the developable Solar potential indicated by SECI was Gujarat (10 GW), Maharashtra (5 GW) and MP (5 GW) by end of 2021 time frame. In Gujarat, Rapar (Kutch distt), Vav/Tharad (Banakantha distt), Lalpur (Jamnagar distt) has got solar potential of 5 GW, 2.5 GW and 2.5 GW respectively. Accordingly, considering above identified transmission scheme for Wind Energy Zones, a consolidated scheme for Solar Energy Zones (SEZ) for the state of Gujarat has been proposed.

Further, due to proximity of Lakadiya WEZ & Rapar SEZ (35-40 kms), initially, with the proposed strengthening in WR joint study meeting as well as proposed transmission for WEZ (Lakadiya-2 GW), above system may be utilized for injection from part capacity of Rapar SEZ (Ph-1: 2 GW) with augmentation of transformation capacity & provision of 220kV line bays at Lakadiya PS. For total envisaged capacity of Rapar (5 GW) SEZ, an additional high capacity transmission corridor from Rapar PS- Patan – Ahmedabad- Indore/Vadodra was proposed. Vav/Tharad (Banakantha distt), SEZ capacity was also proposed to be integrated at above High capacity corridor after pooling at Banaskantha-II PS.

Similarly, due to proximity of Dwarka WEZ & Lalpur SEZ (40-50 kms), transmission system identified for Dwarka WEZ (2 GW) may be utilized by Lalpur SEZ (2.5 GW) for its partial capacity (1GW), in case Dwarka WEZ wind capacity comes up lesser in phase-I (upto 1GW). For total envisaged capacity of Lalpur-Jamnagar SEZ, a high capacity transmission corridor from Jamnagar PS- Jasdhan – Vadodra-Dhule is proposed.

Accordingly, following transmission system is proposed for various Solar Energy Zones (20 GW) in Western Region.

**A. Solar Energy Zones in Gujarat (10000 MW)**

**Phase-I (3000 MW):**

**Kutch (Rapar) SEZ 2000 MW@**

- i) Augmentation of transformation capacity by 1x1500MVA (4<sup>th</sup>), 765/400kV & 4X500MVA, 400/220kV transformer at Lakadia PS
- ii) Space for additional 220kV line bays for interconnection of solar projects at Lakadiya PS (7 nos)

*\*Kutch Rapar Ph-I SEZ (2000 MW) shall utilize Lakadiya PS & onward system (765kV Lakadiya- Vadodra, Lakadiya- Banaskantha & LILO of Bhachau-EPGL at lakadia PS) for injection identified as part of transmission strengthening in Gujarat*

*@ Kutch (Rapar) SEZ Phase-1 capacity is considered 2 GW instead of 3 GW due to feasibility of evacuation from Lakadiya System*

**Lalpur, Jamnagar SEZ 1000 MW**

Following Transmission identified for Dwarka WEZ (Ph-1: 1 GW) to be utilized for Lalpur SEZ (Ph-1: 1 GW)

- i) Establishment of 4x500MVA, 400/220kV Jam Khambhaliya PS (GIS) (near Jamnagar and Dwarka district border)
- ii) Extension of Essar – Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS
- iii) Space for 220kV line bays for interconnection of solar projects - 4 nos
- iv) 1X125 MVAR, 420 kV Bus Reactor at Jam Khambhaliya PS (GIS) & line reactive compensation

**Phase-II (7000 MW):**

**Kutch (Rapar) SEZ 3000 MW\* & Banskantha SEZ 2500 MW**

- i) Establishment of 400/220 kV 6X500 MVA Kutch Pooling Point (near Rapar)
- ii) Establishment of 400/220 kV, 5X500 MVA Banaskantha Pooling Point
- iii) Establishment of 400 kV switching station at Patan
- iv) Establishment of 765/400/220 kV, 3X1500 MVA & 3X500 MVA at suitable location near Ahmedabad
- v) Kutch/Rapar PP- Lakadiya 400 KV D/c line (Twin HTLS)
- vi) Kutch/Rapar PP- Patan 400 kV 2xD/c line (Twin HTLS-multi circuit)
- vii) Banaskantha PP - Patan 400 kV D/c line (Twin HTLS)
- viii) Banaskantha PP - Sankhari (GETCO) 400 kV D/c line (Twin HTLS)
- ix) Patan - Sami 400 kV D/c line (Twin HTLS)

- x) Patan - Ahmedabad 400 kV 2xD/c line-Twin HTLS M/c
- xi) Ahmedabad – Pirana 400 kV D/c line (Twin HTLS)
- xii) Ahmedabad – Indore 765 kV D/c line
- xiii) Ahmedabad – Vadodara 400 kV D/c line (Twin HTLS )
- xiv) Vadodra - Dhule 765 kV D/c line
- xv) 220 kV line bays for interconnection of solar projects at Kutch Pooling Point (near Rapar) (7 nos)
- xvi) 220 kV line bays for interconnection of solar projects at Banaskantha Pooling Point (9 nos)
- xvii) 2x125 MVar, 420 kV Bus reactors each at Kutch Pooling Point (near Rapar), Banaskantha Pooling Point and Patan
- xviii) 1x330 Mvar, 765kV & 1x125 Mvar , 420kV Bus reactor at Ahmedabad SS
- xix) Associated Reactive Compensation (Line)

### **Jamnagar SEZ 1500 MW**

- i) Establishment of 400/220 kV, 5X500 MVA substation at Lalpur (Jamnagar)\*
  - ii) Establishment of 400/220 kV, 2X500 MVA substation at Jasdan
  - iii) Lalpur (Jamnagar) Pooling station - Jasdan PS 400 kV D/c line (Twin HTLS)
  - iv) Lalpur (Jamnagar) Pooling station – Kalavad (GETCO) 400 kV D/c line (Twin HTLS)
  - v) Lalpur (Jamnagar) Pooling station – Jam Khmabliya 400 kV D/c line (Twin HTLS)
  - vi) Jasdan- Hadala (GETCO) 400kV D/c (Twin HTLS)
  - vii) Jasdan – Vadodara 400 kV D/c line (Twin HTLS)
  - viii) 220 kV line bays for interconnection of solar projects (9 nos)
  - ix) 1x125 MVar , 420kV Bus reactor each at Jamnagar & Jasdan PS
  - x) Associated Reactive Compensation (Line)
- \*Including for Dwarka (WEZ) 1000 MW*

## **B. Solar Energy Zone in Maharashtra (5000 MW)**

### **Phase-I(1000 MW):**

#### **Solapur SEZ 1000 MW**

- i) Establishment of 400/220 kV, 2X500 MVA at Solapur PP (near Mohol)
- ii) Solapur pooling point - Solapur PS 400 kV D/c line (twin HTLS)
- iii) 220 kV line bays for interconnection of wind & solar projects (3 nos)
- iv) 1X125 MVAR, 420 kV Bus Reactor at Solapur PP

### **Phase-II (4000 MW):**

#### **Solapur SEZ 1500 MW**

- i) Solapur pooling point - Solapur (MSETCL) 400 kV D/c line (twin HTLS)

- ii) Augmentation of transformation capacity by 400/220kV, 3X500 MVA transformer at Solapur PP
- iii) 220 kV line bays for interconnection of solar projects(5 nos)

#### **Wardha SEZ 2500 MW**

- i) Establishment of 400/220 kV, 5X500 MVA at Wardha PS
- ii) Wardha PS - Warora Pool 400 kV D/c line (Twin HTLS)
- iii) Wardha PS - Warora (MSETCL) 400 kV D/c line (Twin HTLS)
- iv) 220 kV line bays for interconnection of Solar projects (8 nos)
- v) 1x125MVAR bus reactor at Wardha PS

### **C. Solar Energy Zone in Madhya Pradesh (5000 MW)**

#### **Phase-I(2500 MW):**

##### **Rajgarh SEZ 2500 MW**

- i) Establishment of 400/220 kV, 5X500 MVA substation near Rajgarh
- ii) Rajgarh PS -Bhopal 400 kV D/c line (HTLS)
- iii) Rajgarh PS –Shujalpur 400 kV D/c line (HTLS)
- iv) 220 kV line bays for interconnection of solar & wind projects (8 nos)
- v) 1X125 MVAR, 420 kV Bus Reactor at Rajgarh PS

#### **Phase-II(2500 MW):**

##### **Khandwa SEZ: 2500 MW**

- i) Establishment of 400/220 kV, 5X500 MVA at Khandawa PS
- ii) Khandwa PS - Khandwa Pool D/c line (Twin HTLS)
- iii) Khandwa PS - Chehgaon (MPPTCL) D/c line (Twin HTLS)
- iv) 220 kV line bays for interconnection of solar projects (8 nos)
- v) 1X125 MVAR, 420 kV Bus Reactor at Rajgarh PS
- vi) Associated Reactive Compensation

**2.10.**MPPTCL representative stated that the transmission system proposed for evacuation of 2.5 GW in Khandwa SEZ needs to be reviewed as it includes interconnection with Chegaon (MPPTCL) 400 kV substation. Chegaon substation was already connected with nearby generating stations and there would be no margins for evacuation of any additional power.

**2.11.**GETCO representative stated that the 400 kV interconnections with Gujarat system (Lalpur (Jamnagar) Pooling station – Kalavad (GETCO) 400 kV D/c line) proposed for evacuation of power Lalpur SEZ under phase-II needs to be reviewed.

GETCO further stated that during the joint study meeting held on 05.06.18 & 06.06.18 at POWERGRID loading on *Ranchhodpura – Dehgam 400kV D/c line* was observed beyond 850MW thermal limit during contingency (N-1), accordingly, it was decided to study the same separately. No further studies has been done to overcome the constraint.

- 2.12.** SECI stated that it has been planned to bid about 18 GW Solar capacity this year. Tender of 10,000 MW solar RE capacity was going to be closed in Sep'18. Further, this tender for 10 GW RE generation was linked with manufacturing of solar panels in India. The SPDs (Solar Park Developers) would be allowed PPAs for about 3.3 times of the capacity of solar manufacturing plants that would be set up by them in India. This is an important initiative for Make in India programme. Therefore, this 10 GW of tendering would also create solar panels manufacturing plants of about 3 GW capacity. Apart from these initiatives, new schemes like RTC (round the clock) RE power, which was basically a combination of Solar/Wind/Pumped Storage/Battery Storage/other technologies that would provide RE power on continuous basis was also under consideration by MNRE.

As per the existing guidelines, solar project could be installed within 24 months and for wind projects 18 months was the construction period. Therefore, the proposed transmission schemes need to be finalized at the earliest for providing ISTS connectivity to these RE projects. Implementation of these schemes were required to be taken up on urgent basis as the gestation period for implementation of RE projects was shorter as compared to that of transmission.

- 2.13.** CEA stated that intra-state system strengthening proposal has been received from Gujarat under GEC-II that has been proposed by GETCO to overcome the existing constraints as well to integrate the RE projects from their RE potential zones. Overloading of Ranchhodpura – Dehgam 400kV D/c line needs to be studied along with proposal received from Gujarat.

Regarding the observations made by MPPTCL and GETCO on the transmission scheme proposed for evacuation of power from potential solar energy zones in Western Region, CEA stated that proposed scheme could be further jointly studied with the constituents.

CEA further stated that the transmission system for 8 GW potential WEZ in Western Region (6 GW in Gujarat and 2 GW in Maharashtra) already finalised through joint studies could be agreed. This scheme could be used for evacuation of 3 GW solar projects (2 GW from Kutch/Rapar SEZ through Lakadiya pooling station and 1 GW from Jamnagar SEZ through Jam Khambaliya pooling station). At Lakadiya pooling station additional transformation of 2000 MW could be provided to accommodate injection from solar projects in Rapar. Similarly, in the system planned from Jam Khambaliya for evacuation of 2000 MW wind projects, 1000 MW could be used for evacuation by solar projects. Therefore, under phase-I the proposed

transmission system in Gujarat under ISTS would cater to evacuation requirement of 5 GW wind projects and 3 GW solar projects.

- 2.14.** POSOCO stated that as per power flow exhibits, there is some power flow on Bhuj-CGPL line even in case where full dispatch has been taken from CGPL UMPP. CTU stated that during the joint study meeting, low dispatch scenario at CGPL UMPP was also studied and no overloading was observed on Bhuj-CGPL line.
- 2.15.** POSOCO further stated that they have raised the issue of transient stability with new corridors proposed for RE projects in Gujarat, however the studies have not yet been carried out. CTU stated that they have carried out the studies and they would share the results with CEA and POSOCO.
- 2.16.** Member Secretary, WRPC stated that as per CEA Transmission Planning Criteria the maximum substation capacity of 765/400 kV and 400/220 kV has been specified as 9000 MVA and 2000 MVA respectively whereas at Bhuj pooling station 4000 MVA, 400/220 kV transformation capacity has been agreed. CTU clarified that multiple sections has been created at 400 and 220 kV voltage level at Bhuj pooling station as given below:
- i) 220kV level: 3 sections (A, B & C) and space for 4th Section D. Each section (A,B,C) has provision for 6 nos. line bays & 3 nos. 400/220kV ICTs & Section-D only has future provision for 5 Nos. Line Bays & 2 Nos. of ICT bays. Bus sectionalisers have been provided between the sections.
  - ii) 400kV level: 2 sections (one AIS & one GIS). Section A has Mundra - Bhuj 400kV D/c line bays, 2x1500MVA ICTs, 2x500MVA ICTs and provision for 3 nos. addl. 400/220kV ICTs. Section B has provision for 4 nos. 400/220kV ICTs and 3 nos. 765/400kV ICTs. The two sections are electrically connected to each other through bus-section circuit breakers.
  - iii) 765kV level: Single section & space for future expansion

The single line diagram is enclosed at Annexure-3.

- 2.17.** Member Secretary, WRPC requested CEA to include their representative in the meetings of joint system studies, whenever they are carried out on issues related to Western Region. CEA agreed for the same.
- 2.18.** CTU stated that the Bhuj-II –Lakadia 765 kV D/C line proposed with potential WEZ in Gujarat may be included in the Transmission system strengthening proposed for relieving over loading observed in Gujarat intra-state system.
- 2.19.** CEA stated that Bhuj-II –Lakadia 765 kV D/C line has been proposed along with Bhuj-II 765/400/220 kV pooling station that would be developed in time frame of future wind energy projects in Bhuj area of Gujarat whereas implementation of Transmission system strengthening for relieving over loading observed in Gujarat intra-state system is independent of any future RE projects. So there would be time mismatch.

**2.20.**CTU stated that the 765 kV interconnection could be initially established between existing Bhuj 765/400/220 kV and Lakadia pooling station (as a transmission system strengthening scheme) and in the time frame of implementation of Bhuj-II pooling station it could be reconfigured by LILO of the D/C interconnection at Bhuj-II so as to establish Bhuj-II –Lakadia 765 kV D/C line as well as Bhuj-Bhuj-II 765kV D/C line as envisaged in the scheme proposed.

**2.21.**GETCO stated that instead of providing new 63 MVAR line reactors in the Lakadia-Jam Khambaliya 400 kV D/C lines and converting the existing 63 MVAR reactors at Bachau (associated with Bachau- Essar 400 kV D/C line) into switchable line reactors, the existing 63 MVAR line reactors at Bachau could be shifted to Lakadia. CTU clarified that existing line reactors are owned by POWERGRID and Lakadia-Jam Khambaliya 400 kV D/C lines ( by LILO) could be owned by different transmission licensee, therefore, shifting may not be feasible.

**2.22.**After further deliberations the following was agreed by the members:

**A. Transmission system for injection of power from 4000MW RE projects under SECI bids (Tranche I to IV) at Bhuj PS\_**

- i) In addition to existing 2x500MVA 400/220 kV & 2x1500MVA 765/400 kV ICTs at Bhuj pooling station, augmentation in transformation capacity required for evacuation of 4000MW RE projects under SECI bids (Tranche-I to IV)
  - Installation of additional 3x500MVA, 400/220kV ICTs along with 400kV AIS & 220kV AIS bays
  - Installation of additional 3x500MVA, 400/220kV ICTs along with 400kV GIS & 220kV AIS bays
  - Installation of additional 2x1500MVA, 765/400kV ICTs along with 765kV AIS & 400kV GIS bays
- ii) Additional 1x500MVA 400/220kV (9<sup>th</sup>) 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.
- iii) 220 kV line bays to be implemented as AIS bays or Hybrid/MTS (Mixed Technology Switchgear) bays.

**B. Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system:**

- i) Establishment of 2x1500MVA, 765/400kV Lakadia PS#
- ii) Lakadia – Vadodara 765kV D/c line (~350km) along-with 330MVA switchable line reactors at both ends



- iii) Bhuj PS – Lakadia PS 765kV D/c line
- iv) LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS & conversion of existing 2x63MVAR line reactors at Bhachau to switchable line reactors.
- v) 1x330MVAR, 765kV Bus reactor & 1x125MVAR, 420kV Bus reactor at Lakadia PS

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

**C. High loading on Bhachau – Varsana 400kV D/c line**

The Bhachau – Varsana 400kV D/c line remains highly loaded even without the RE injection at Bhuj PS. The short circuit levels at Bhachau and Varsana exceed 40kA design rating as they contribute heavily to each other. With the scheme B, loading on Bhachau – Varsana 400kV D/c line eases out significantly. However, the fault levels at both Bhachau & Varsana substations further increase to over 50kA.

Accordingly, Bhachau – Varsana 400kV D/c line may be kept normally open and may be utilized under contingency conditions. GETCO to make proposal of bus splitting at Varsana to keep Bhachau–Varsana 400kV D/c line normally in service.

**D. Transmission System associated with RE generations from potential wind energy zones in Gujarat [Bhuj-II (2000MW), Lakadia (2000MW) & Dwarka (1500MW)]**

- i) Establishment of 2x1500MVA (765/400kV), 4x500MVA (400/220kV) Bhuj-II PS (GIS) along-with space for 8 nos. 220kV bays for integration of wind farms
- ii) Establishment of 4x500MVA, 400/220kV ICTs at Lakadia PS (GIS) along-with space for 8 nos. 220kV bays for wind farms' integration
- iii) Establishment of 4x500MVA, 400/220kV Jam Khambhaliya PS (GIS) along-with space for 8 nos. 220kV line bays
- iv) Extension of Essar–Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS along-with 63MVAR Line Reactor at both ends (i.e. Lakadia & Jam Khambhaliya ends).
- v) 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.
- vi) Lakadia PS – Banaskantha PS 765kV D/c line along-with 240MVAR switchable LR at Lakadia PS (~150km)
- vii) 1x330MVAR, 765kV Bus reactor at Bhuj-II PS & 1x125MVAR, 420kV Bus reactor each at Bhuj-II PS & Jam Khabhaliya PS

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.

**E. High loading on Ranchhodpura – Dehgam 400kV D/c line**

The loading beyond thermal limit (of 850MW) in one circuit of Ranchhodpura – Dehgam 400kV D/c line, observed in the studies, during outage of other circuit would be studied further. CEA has received intra-state transmission system strengthening proposal from Gujarat under GEC-II that has been proposed by GETCO to overcome the existing constraints as well to integrate future RE projects from their RE potential zones. Overloading of Ranchhodpura – Dehgam 400kV D/c line would be jointly studied incorporating the proposal received from Gujarat.

**F. Transmission system associated with RE generations from potential wind energy zones in Osmanabad area of Maharashtra**

- i) Establishment of 4x500MVA, 400/220kV near Kallam PS along-with 8 nos. 220kV line bays
- ii) 1x125MVAr bus reactor at Kallam PS
- iii) LILO of both circuits of Parli(PG) – Pune(GIS) 400kV D/c line at Kallam PS along-with:
  - a. Conversion of 50MVAr fixed Line Reactors on each ckt of Parli (PG) – Pune (GIS) 400kV D/c line at Parli (PG) end into switchable.
  - b. Provision of new 50MVAr switchable line reactor at Kallam PS end of Kallam – Pune(GIS) 400kV D/c line

**G. Transmission system associated with RE generations from potential Solar Energy Zone in Maharashtra (1000 MW under Ph-I)**

- i) Establishment of 400/220 kV, 2X500 MVA at Solapur PP (near Mohol)
- ii) Solapur pooling point - Solapur PS 400 kV D/c line (twin HTLS)
- iii) 220 kV line bays for interconnection of wind & solar projects
- iv) 1X125 MVAR, 420 kV Bus Reactor at Solapur PP

While parts A, B and C were agreed for immediate implementation, it was decided that Parts D, F and G shall be taken up only upon receipt of Stage-II connectivity applications

**3. Intra state transmission system strengthening in Maharashtra for evacuation of power beyond Warora, transmission line overloading and ICT overloading.**

**3.1.** CEA stated that as per the decision taken in the 42<sup>nd</sup> and 43<sup>rd</sup> meetings of SCPSPWR, a joint study meeting was held among CEA, CTU, POSOCO and MSETCL on 18.06.2018 & 19.06.2018 at CEA, New Delhi to study the following issues in Maharashtra:

- (i) Evacuation of power beyond Warora – 42<sup>nd</sup> SCM
- (ii) Overloading of 2x315 ICTs at Wardha (PG) – 43<sup>rd</sup> SCM
- (iii) Overloading of 400 kV Chandrapur-I – Chandrapur-II D/c line during less/nil generation at Chandrapur-I complex – 43<sup>rd</sup> SCM

In the meeting following intra state – transmission system strengthening in Maharashtra was agreed:

**I. Evacuation of power beyond Warora:**

- (i) LILO of Chandrapur-I – Parli 400 kV S/c line at Warora(M)
- (ii) LILO of one circuit of Warora Pool – Parli(PG) D/c line at Warora(M) or Warora (M) – Warora Pool 400 kV D/c line
- (iii) Wardha – Warora Pool 400 kV D/c line to be kept normally open

**II. Overloading of 2x315 ICTs at Wardha (PG):**

- (i) No 400/220 kV ICT augmentation at Wardha(PG) is required at present and any future requirement of augmentation would be taken up when required.

**III. Overloading of 400 kV Chandrapur-I – Chandrapur-II D/c line during less/nil generation at Chandrapur-I complex**

- (i) LILO of one circuit of Chandrapur-I – Bhadravati 400 kV 2xD/c line at Chandrapur-II

**3.2.** MSETCL enquired whether the scheme proposed for evacuation of power beyond Warora is to be implemented under InSTS or ISTS. CEA clarified that the scheme has been proposed to eliminate the constraints in evacuation of power from intra state generating plants in eastern part of Maharashtra, therefore the scheme would be implemented as intra state transmission scheme.

**3.3.** MSETCL stated that LILO of Chandrapur-I – Parli 400 kV S/c line at Warora(M) has been already planned as a part of Intra state and they are taking the implementation. But for other line namely LILO of one circuit of Warora Pool – Parli(PG) D/c line at Warora(M) or Warora (M) – Warora Pool 400 kV D/c line, MSETCL would further study the proposal before finalization.

**3.4.** Regarding 400/220 kV ICTs augmentation at Wardha, CEA stated that no augmentation was required at present as per the joint studies carried out on 18.06.2018 & 19.06.2018. Future requirement of ICT augmentation at Wardha (PG) would be taken up when required.

**3.5.** Regarding the issue of overloading of Chandrapur-I – Chandrapur-II 400 kV D/c line during less/nil generation at Chandrapur-I complex, MSETCL stated that with implementation of LILO of Chandrapur-I – Parli 400 kV S/c line at Warora(M) there would be no overloading issues, however, its implementation would take time.

MSETCL further stated that Chandrapur-I – Bhadravati 400 kV 2xD/c line is passing nearby Chandrapur-II S/s and LILO of one circuit of this line at Chandrapur-II would provide additional circuit between Chandrapur-I and Chandrapur-II and solve the overloading issue. Also, the scheme would be implemented in lesser time as it involves erection of one or two towers only. MSETCL requested members to concur the proposal.

**3.6.** POSOCO enquired the status of this LILO i.e. it will be interim or permanent arrangement. MSETCL clarified that the arrangement would be permanent.

**3.7.** After deliberation, following intra state proposal of MSETCL was agreed:

- (i) LILO of one circuit of Chandrapur-I – Bhadravati 400 kV 2xD/c line at Chandrapur-II

**4. MSETCL proposal for STU connectivity of M/s GWEL generation plant situated at Warora:**

- 4.1.** CEA stated that M/s GWEL, which was an ISGS with 2x300 MW of installed capacity has total PPA of 550 MW (200 MW to MSEDCL, 200 MW to Dadra & Nagar Haveli and 150 MW to TANGEDCO). Currently, M/s GWEL was connected with ISTS network through dedicated GWEL-Bhadravati 400 kV D/c line and all the beneficiaries were drawing their share of power through ISTS network and paying the respective ISTS charges. Now, Maharashtra wanted to draw their share of power through STU network to avoid the ISTS charges. As per CERC order dated 09.03.2018, an ISGS can be connected to both STU network and ISTS network for supply of powers to the beneficiaries within and outside the home state respectively. In such cases, the ISTS charges shall not be applicable on the conveyance of power on the State network.

Accordingly, MSETCL had proposed LILO of one circuit of GWEL – Bhadravati 400 kV D/c line at Warora(M) to provide STU connectivity to M/s GWEL (ISGS generation) as per the CERC order dated 27.03.2018 on the petition no. 245/MP/2016,

- 4.2.** CEA added that a meeting to discuss the connectivity proposal was held in CEA on 19.07.2018 with participation from MSEDCL, MSETCL, M/s GWEL, CTU and POSOCO. In the meeting the following was agreed:

- (i) MSETCL to convey their views regarding the proposal for installation of 400/220, 1x315 or 500 MVA ICT at GWEL generation switchyard along with associated ICT bays for drawl of MSEDCL share from GWEL through 220 kV lines.
- (ii) M/s GWEL and MSETCL to jointly explore the availability of space for creation of 220 kV level in GWEL generation switchyard.

- 4.3.** MSETCL representative stated that the connectivity proposal agreed in the meeting held on 19.07.2018 includes installation of 2 nos. of 400/220 kV ICTs at GWEL switchyard which was as good as establishment new 400/220 kV s/s and there were severe RoW issues near Warora. The proposal of interconnection at 220 kV level was not acceptable to MSETCL.

- 4.4.** CEA state that for establishing STU connectivity at M/s GWEL generation switchyard, three options were studied namely, LILO of one circuit of GWEL – Bhadravati 400 kV D/c line at Warora(M), GWEL – Warora(M) 400 kV D/C line and drawl at 220 kV by installing 400/220 ICTs at GWEL switchyard. There would be injection of power from MSETCL system into the ISTS in case of connectivity at 400 kV level and in case of connectivity at 220 kV level there would be drawl of power from ISTS, which was also the intent of direct STU connectivity with GWEL switchyard. The 400 kV interconnection between GWEL switchyard and Warora (M) becomes floating in time frame of implementation of LILO of Chandrapur-I – Parli 400 kV S/c line at Warora(M) by MSETCL.

- 4.5. CEA enquired about the joint visit of M/s GWEL and MSETCL to explore the availability of space for creation of 220 kV level in GWEL generation switchyard to which MSETCL clarified that the visit was yet to take place.
- 4.6. Chief Engineer, CEA stated that based on studies the alternative for STU connectivity at GWEL has already been suggested. If it was not acceptable to then may suggest alternative proposal which was acceptable to all the constituents.
- 4.7. MSETCL stated that they would further deliberate on the issue and would revert back.

**5. Creation of 400/220 kV intra-state S/s at Guna (Distt-Guna) through TBCB process**

- 5.1. CEA stated MPPTCL had proposed the following scheme to meet the load demand of Guna and nearby areas and also to reduce the loading of 400/220 kV ICTs at 400 kV Bina (MP) S/s.
  - i. Establishment of Guna 400/220 kV S/s with 2x500 MVA, 400/220 kV transformer and 1x125 MVAR bus reactor
  - ii. 400 kV DCDS (Quad Moose) line from Bina (MP) 400 to Guna 400 alongwith associated feeder bays (120 km) with 2x80 MVAR, 400 kV line reactor at Bina (MP) 400 kV end
  - iii. 220 kV DCDS line from Guna 400 to Guna 220 alongwith associated feeder bays (15 km)
  - iv. 220 kV DCDS line from Guna400 to Shivpuri220 alongwith associated feeder bays (100 km)
- 5.2. MPPTCL stated that Madhya Pradesh peak demand had already reached 12,240 MW in FY 2017-18 and was expected to grow up to 15,000 MW by FY 2021-22. Bina (MP) 3x315 MVA, 400/220 kV substation, feeding the load of Bina, Vidisha, Ganjbasoda, Datiya and Gwalior areas, has already recorded maximum loading of 782 MVA (82% of the full capacity) in FY 2017-18. To take care of the ICT overloading, 1x315 MVA, 400/220 kV (4<sup>th</sup>) ICT has already been planned and the same is under implementation at Bina(MP).
- 5.3. MPPTCL presented the studies regarding requirement of 400/220 kV Guna S/s and stated that scheme would be developed through intra-state TBCB process (studies are attached as Annexure-4).
- 5.4. After deliberation, MPPTCL proposal of establishment of 400/220 kV intra-state S/s at Guna ( mentioned at 5.1), to be implemented by Intra-State Transmission Licensee of Madhya Pradesh (to be selected through intra-state TBCB bidding process was agreed.

**6. Establishment of 132/33 kV Sironcha Substation, Tal. – Sironcha, District – Gadchiroli – Agenda by MSETCL**

- 6.1. CEA stated that MSETCL has proposed the following scheme for approval of the standing committee on transmission as it involves a 132 kV between two states and two regions also:
  - i) Establishment of 2x25 MVA,132/33 kV substation at Sironcha.

ii) 132 kV SCDC line from Kistampeth (Telangana State) with end bays each at Kistampeth and Sironcha S/s – 32 km

- 6.2.** MSETCL stated that presently existing 66/33/11 kV Sironcha S/s (having load of about 17 MW) was getting feed from 132/66 kV Ashti S/s (about 132 km away) via 66 kV Allapalli S/s. The entire 66 kV line from Ashti to Sironcha passes through dense forest area, therefore, it was not feasible to connect 132 kV Sironcha S/s from 132 kV Allapalli S/s (under construction). Also there was no redundant supply available and voltage profile was very poor. They have planned 132/33 kV Sironcha S/s at existing 66 kV Sironcha S/s to increase the redundancy of supply and improve the voltage profile and quality of power supply. The proposal to connect 132 kV Sironcha S/s with 132 kV Kistampeth S/s of Telangana State Transmission Company Limited through 132 kV line involves only 32 km line length and was forest free terrain.
- 6.3.** CEA informed that the above proposal has also been earlier discussed in the 33<sup>rd</sup> meeting of SCPSPWR held on 21.10.2011 and 33<sup>rd</sup> meeting of SCPSPSR held on 20.10.2011, wherein APTRANSCO had not agreed to the proposal.
- 6.4.** MSETCL stated that Telangana State Transmission Company Limited (TSTCL) already given their in principle consent to extend supply from 132 kV Kistampeth S/s to the proposed 132 kV Sironcha S/s (letter enclosed as Annexure-5).
- 6.5.** Member Secretary, WRPC stated that the proposed line was a natural interstate line, which would facilitate MSETCL in providing reliable supply to Sironcha area and the line should be operated in radial mode. He further stated that MSETCL should not take up conversion of this to an ISTS line in future.
- 6.6.** In view of the in principle consent given by TSTCL to extend supply to 132 kV Sironcha S/s from their 132 kV Kistampeth S/s, MSETCL proposal at 6.1 was agreed by the members with the conditions that Sironcha 132/33 kV substation would operate in radial mode from 132 kV Kistampeth S/s.

MSETCL needs to finalise the implementation and operational modalities with TSTCL and submit a proposal to CEA so that the same could be referred to Southern Region Standing Committee on Transmission for the approval of Southern Region constituents.

## **7. Installation of 400/220 kV ICT along with associated bays at M/s CGPL Switchyard**

- 7.1.** CEA state that in the 43<sup>rd</sup> meeting of SCPSPWR held on 11.05.2018, members agreed to install 1x500 MVA 400/220 kV ICT at M/s CGPL switchyard to provide the startup power during the black start. The startup power would be provided through Nanikhakhar-CGPL 220 kV S/C line. The line would remain open from CGPL end. The scope of work to be implemented under ISTS was:
- 1x500 MVA, 400/220 kV ICT at CGPL Mundra to be installed at CGPL Switchyard along with one no. of 400 kV bay and one no. of 220 kV bay at CGPL Mundra.

CEA further stated that the matter was discussed in the 1<sup>st</sup> meeting of National Committee on Transmission (NCT) held on 27<sup>th</sup> July, 2018, wherein, it was deliberated that already the CGPL generation is connected to the grid and the utility of the transformer is only to provide the startup power during black start. NCT opined to review the scheme again in the next meeting of WRSCT. Accordingly, the scheme has been included in the agenda for deliberations.

- 7.2. POSOCO stated that this scheme has been under deliberation in the WRPC meetings for over two years before deciding that the work would be implemented as ISTS scheme and again it has been put up for review. Over the years the National Grid has become robust as well the systems have become more complex, uncertainties have increased a lot, particularly in terms of weather and natural calamities. This leads to low probability high impact incidents impacting pockets of the grid and leading to prolonged power supply outages. Cyclones Phailin (Oct 2013), Hudhud (Oct 2014) and Vardah (Dec 2016) in India are notable examples in the recent past which has impacted the power supply infrastructure. Therefore, Resilience in the grid becomes important. This is an attribute being discussed worldwide in the context of electricity grids

A resilient system recognizes the fact that there can be failures in the system but has well proven systems for quick revival and the ability to learn and continuously improve through learning from such events.

The CEA Manual on Transmission Planning Criteria 2013 specifies that 'In case of transmission system associated with a nuclear power station there shall be two independent sources of power supply for the purpose of providing start-up power.' The main criteria here have been safety notwithstanding the fact that there is a backup Diesel Generating (DG) set at the nuclear power stations to take care of complete failure. The Rajasthan Atomic Power Station (RAPS-A) has had a 220/132 kV ICT (charged from one side only) continuously in operation for many years with two infeeds at 132 kV from RPS and GS hydro power stations. These ICTs have been loaded only during an emergency situation of local grid collapse and black start of RPS hydro station and extending supply to RAPS-A through this ICT.

The same principle needs to be extended to large power plants like the Ultra Mega Power Projects (UMPPs) and other large power stations from the viewpoint of resilience. In the cyclone Vardah case, absence of any 220 kV level at the Vallur and North Chennai thermal power plants had led to delay in extending start up supply to these plants as the 400 kV system was facing very high voltages. Similar issue would be faced for generation complex like CGPL Mundra which has already suffered two blackouts viz. on 12th Mar 2014 and 13th July 2016. While the startup supply in the first event was extended within few minutes, in the second incident, the startup supply extension took nearly an hour. In case the 400 kV voltages had been high and the substations adjacent to CGPL Mundra been dead, the restoration would have been even more delayed.

POSOCO suggested that the 500 MVA, 400/220 kV ICT at CGPL Mundra may be agreed by the members and same needs to be commissioned at the earliest from the viewpoint of having a resilient system in place. The no-load losses,

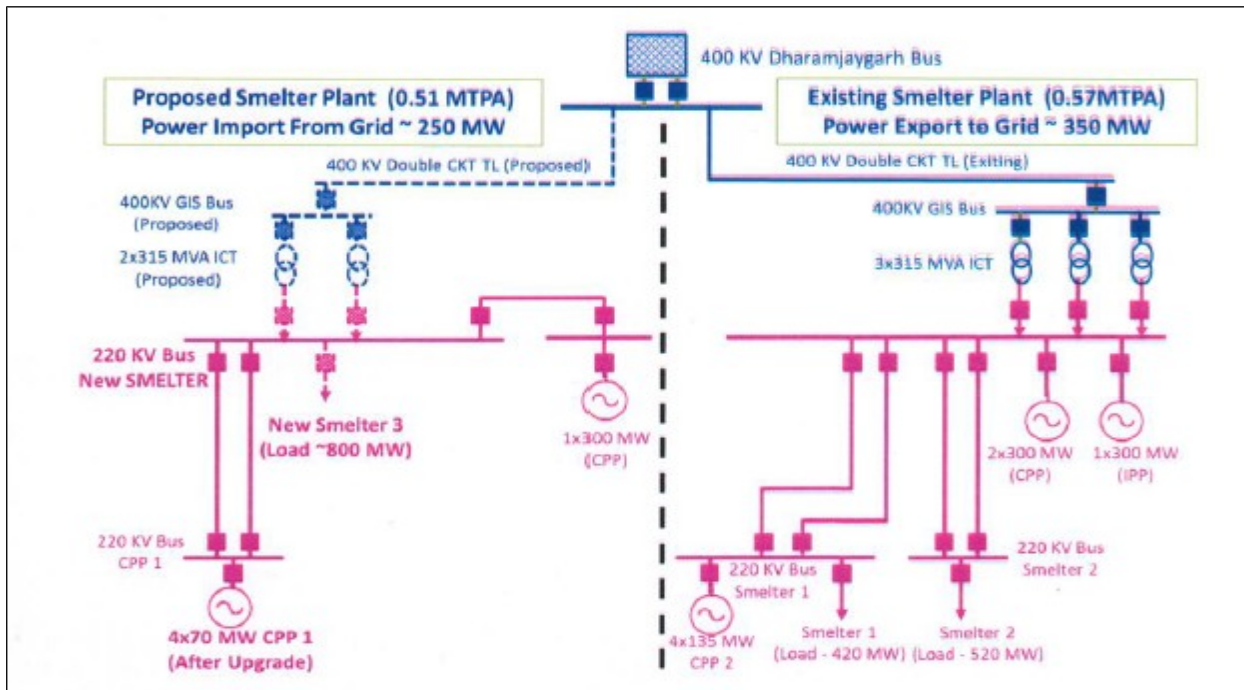
transformation losses on this ICT would be negligible, and accordingly the losses can be treated as part of ISTS losses.

- 7.3. With respect to delay in implementation, CEA stated that this scheme was initially agreed for which implementation modalities was to be decided by WRPC. In the last Standing Committee meeting only it was agreed to implement as ISTS scheme and accordingly, it was put before NCT to decide its mode of implementation either by POWERGRID on nomination basis or through TBCB route.
- 7.4. Member Secretary, WRPC suggested that other alternatives could also be explored for interconnection of Adani TPS and CGPL UMPP. CEA clarified that all the feasible options were explored before while finalization of the above option.
- 7.5. After deliberations members again recommended the proposal already agreed in the 43<sup>rd</sup> SCM to be implemented as an ISTS scheme.

#### **8. Connectivity application of 250 MW as Bulk Consumer for BALCO TPS (4x300+4x67.5+4x135MW)**

- 8.1. CTU stated that BALCO has already been granted connectivity of 2010MW [1200MW (4x300) as IPP and 810MW (4x67.5+4x135) as CPP] through BALCO – Dharamjaygarh 400kV D/c line. The total LTA granted to M/s BALCO is 350MW [200(TN) + 95(KSEB) +55(CSPTTrCL)]. Further the following developments has taken place:
  - i) BALCO had submitted application for 250MW connectivity as a bulk consumer with following arrangement through segregation of units as under:
    - 580MW [1x300MW (CPP) + 4x70MW (up gradation of 4x67.5MW) (CPP)] units on one bus with New Smelter Load of 800MW] for which BALCO now seeks connectivity to the tune of 250MW for meeting the average demand of the smelter load
    - 1440MW [1x300 (IPP) + 2x300MW (CPP) + 4x135MW (CPP)] units on the other bus with existing smelter load of 940MW. Accordingly, the exportable capacity on this bus shall be about 385MW out of which LTA of 350MW is already granted.
  - ii) Details regarding proposed connectivity arrangement sought for 250 MW as Bulk Consumer are given below:





**Installed capacity** - **580 MW**  
**Aux. Consumption** - **45 MW**  
 (Considering max. 8%)  
**Ex- bus capacity** - **535 MW**  
**Load** - **800 MW**  
**Deficit** - **265 MW**

**Installed capacity** - **1440 MW**  
**Aux. Consumption** - **115 MW**  
 (Considering max. 8%)  
**Ex- bus capacity** - **1325 MW**  
**Load** - **940 MW**  
**Exportable Capacity** - **385 MW**

iii) The application was discussed in the 43<sup>rd</sup> meeting of SCPSPWR as well as in the 26<sup>th</sup> WR Connectivity/LTA meeting held on 11.05.2018, wherein the following was decided:

- Grant of connectivity to BALCO for 250 MW, as a bulk consumer, subject to submission of supporting documents with regard to status of IPP/CPP units (conversion of 3x300MW units from IPP to CPP).
- The connectivity was agreed through BALCO-Dharamjaygarh 400kV (2<sup>nd</sup>) D/c line (new) along with associated 400kV bays at both ends to be implemented by M/s BALCO at its own cost. M/s BALCO, being a bulk consumer, may approach CERC regarding construction modalities for the 400kV D/c line.

iv) M/s BALCO vide e-mail dated 20.07.2018 has submitted a letter from Chief Electrical Inspector to Govt. (CEIG) of Chhattisgarh dated 17.07.2018 in which CEIG has acknowledged that M/s BALCO has submitted the status of its 3x300MW units as CPP for FY 2017-18. CEIG has further stated in the letter that the captive status as reported above has been forwarded to Chhattisgarh SERC vide CEIG letter dated 05.07.2018 and that the status of units shall be finalized only after concurrence of the SERC.

**8.2.** CTU further suggested that connectivity may be granted on the basis of supporting documents submitted and declaration given by BALCO. CTU will accept CPP/IPP status based on declaration furnished by BALCO and provide

the connectivity. Accordingly the final arrangement of the BALCO after segregation of units will be as follows:

- 580MW [1x300MW (CPP) + 4x70MW (up gradation of 4x67.5MW) (CPP)] units on one bus with New Smelter Load of 800MW] for which BALCO seeks connectivity to the tune of 250MW for meeting the average demand of the smelter load
- 1440MW [1x300 (IPP) + 2x300MW (CPP) + 4x135MW (CPP)] units on the other bus with existing smelter load of 940MW. Accordingly, the exportable capacity on this bus shall be about 385MW out of which LTA of 350MW is already granted.

M/s BALCO, being a bulk consumer, may approach CERC regarding construction modalities for the 400kV D/c line.

**8.3.** Members agreed with the CTU proposal.

**9. Optimization of bay requirement at 400/220 kV Banaskantha (Radhanesda) S/s**

**9.1.** CEA stated that the scheme for evacuation of power from 700 MW Radhanesda and 500 MW Harshad Solar Park already agreed was as given below:

- i) Establishment of 2x500MVA, 400/220kV pooling station at Banaskantha (Radhanesda) [GIS] along with 1x125MVA bus reactor
- ii) 2 nos. 400 kV line bays at 400/220 kV at Banaskantha (Radhanesda) Pooling Station for termination of Banaskantha (Radhanesda) Pooling Station - Banaskantha (POWERGRID) 400 kV D/C line
- iii) 4 nos. 220kV line bays at 400/220kV at Banaskantha (Radhanesda) pooling station for Solar Park Interconnection
- iv) Provision of space for 8 nos. 220 kV bays (4 nos. for solar injection and 4 nos. of GETCO drawal)
- v) Provision of space for future 400/220kV, 1X500 MVA ICT along with bays

As per the agreed scheme, total 8 nos. of 220 kV feeder bays were planned (4 nos. each for Radhanesda & Harshad solar parks), out of which 4 nos. of 220 kV feeder bays were to be implemented for Radhanesda solar park and space were to be reserved for additional 4 nos. of 220 kV feeder bays for Harshad solar park.

Now, GPCL has proposed to construct only one 220 kV D/C line (with AL-59 conductor) from each solar park i.e. Radhanesda & Harshad solar parks. Therefore, only 4 nos. of 220 kV feeder bays for both solar parks (2 nos. each for Radhanesda & Harshad solar parks) are required instead of 8 nos. of 220 kV feeder bays at 400/220 kV Banaskantha (Radhanesda) S/s were required.

**9.2.** POWERGRID informed that the 400/220 kV Banaskantha (Radhanesda) S/s has already been awarded including the 4 nos. of 220 kV line bays for Radhanesda solar parks with commissioning schedule of June 2019.

**9.3.** GETCO stated that Radhanesda solar parks Banaskantha Solar Park was scheduled for the commissioning by December 2019. MNRE has already given

the in-principle approval for Harshad Solar Park. The time schedule for Harshad Solar Park was not yet finalized.

- 9.4.** CTU stated that 400/220kV Banaskantha (Radhanesda) Pooling station (GIS) was awarded in Dec'17 and detailed engineering for the package was in advanced stage. Further, procurement of the material has already been completed and the contractor has already started manufacturing the GIS modules. , Hence, it was not possible to delete 2 nos. bays out of the 4 nos. of 220kV line bays which were already under implementation for Radhanesda solar park. Accordingly, GPCL would be liable to pay the transmission charges of the remaining 2 bays from the commissioning date till the time it is utilized.
- 9.5.** CEA stated that space for future 220 kV bays for drawal of power by GETCO has also been included in the Banaskantha (Radhanesda) 400/220 kV S/s. GETCO could explore the option to utilize the balance 2 nos. of 220 kV bays at Banaskantha (Radhanesda) S/s, which was already under implementation. GETCO stated that they would explore the possibilities and revert back.

## **10. Finalization of switching Scheme for GIS substations**

- 10.1.**CTU stated that generally double circuit lines are terminated in separate diameter to avoid tripping of both lines under tie breaker stuck condition (if terminated in the same diameter). This guideline was also being specified in RFP documents for Inter State transmission system under TBCB projects. In line with above, for 765 & 400kV substations, one & half CB switching scheme was being followed by POWERGRID.

In the 42<sup>nd</sup> meeting of SCPSPWR held on 17.11.2017, members had decided that in view of the complexities involved in the interfacing of GIS modules of different manufacturers, the complete diameter (with 3 CB bays) shall be installed in the beginning itself even though the third CB would be used for an upcoming feeder in future.

- 10.2.**CTU further stated that recently in Nagapattinam 400kV GIS substation case, CERC has not allowed the capitalization of unutilized (future) GIS bays. The matter was again taken up with CERC to allow capitalization considering complexities involved in GIS substations. In this respect, a meeting was held on 18.01.2018 with CERC and complexities involved in any GIS installations were discussed. CERC suggested that full diameter (Present-Tie-Future bay) may be constructed only if there is concrete plan for utilization of future bay.

In view of the above, CTU proposed use of Double CB switching scheme for 400kV & 765kV GIS substations in all such cases where there is no plan in near future to utilize the bays.

- 10.3.**CEA stated that as per the clause 15.7 of CEA Manual on Transmission Planning Criteria, 'One and half breaker' scheme should be used for 400kV and 765kV sub-stations and it should be continued to be used for all the 400 kV and 765 kV S/s. Also it would be very difficult to determine in the planning horizon that there would be no further expansion in a proposed 765/400 kV substation.
- 10.4.**After deliberations, members reiterated their views already agreed in the 42<sup>nd</sup> SCM of WR on the above issue that in view of the complexities involved in the interfacing of GIS modules of different manufacturers, the complete diameter (with 3 CB bays) shall be installed in the beginning itself even though the third CB would be used for an upcoming feeder in future.

**11. Stage-II connectivity granted to RE applicants in WR in the 28th and 29th WR Connectivity/LTA meetings held on 12.07.18 & 17.08.18 respectively**

**11.1.**CEA stated that CERC on 15.05.2018 had notified the detailed Procedure for Grant of connectivity to projects based on renewable sources to ISTS as per which all connectivity applications based on renewable energy sources are to be processed through a two stage connectivity process viz. Stage-I & II. As per the procedure, the new substation/location for connectivity, if needed is to be established, shall be planned in consultation with CEA, MNRE and other stakeholders.

CTU has received 18 applications for grant of Stage-II connectivity and 9 nos. of LTA application that were discussed and processed in the 28th and 29th WR Connectivity/LTA meetings held on 12.07.18 & 17.08.18 respectively.

Out of 18 stage-II connectivity applications, 15 have been granted Stage-II connectivity at under implementation Bhuj PS, one applicant has been granted Stage-II connectivity at the existing Solapur substation and two applicants has been granted connectivity at a new pooling station proposed near Jam Khambhaliya.

Out of the 9 nos. LTA applications, 8 nos. has been granted LTA with Bhuj PS as the injection point and one has been granted LTA with Bachau as injection point.

**11.2.**CEA further stated that, M/s Adani Green Energy MP Ltd. (AGEMPL) has submitted three nos. of stage-II connectivity application and they have been granted stage-II connectivity with a common system i.e., Dayapar- Bhuj PS 220 kV D/C line. Out of the three connectivity application for RE projects, one project is getting pooled at Dayapar whereas other two projects are getting pooled at two different locations and are getting further pooled at Dayapar through 220 kV S/C lines. Therefore, the individual 220 kV S/C lines also needs to be included in the stage-II connectivity intimation. CTU agreed for the same.

**11.3.**The summary of the Stage-II connectivity granted to RE projects in the 28th and 29th WR Connectivity/LTA meetings held on 12.07.18 & 17.08.18 respectively:

Sl	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	LOA details (as applicable)	Proposed location for Grant of Stage-II Connectivity	Tr System for Stage-II connectivity (under scope of applicant)
1.	Green Infra Wind Energy Ltd. (GIWEL-Bhuj)	1200001268	250	31/10/18	SECI Tr-II		<ul style="list-style-type: none"> <li>Green Infra Wind Energy Ltd. (GIWEL-Bhuj) - Bhuj PS 220kV S/c line along-with associated bays at both ends</li> </ul>
2.	Adani Green Energy MP Ltd. (AGEMPL-Dayapar)	1200001362	100	01/10/18	SECI Tr-I: 50MW; SECI Tr-II: 50MW;		<p><b>Common Transmission System for applications at Sl. 2, 3 and 14</b></p> <ul style="list-style-type: none"> <li>Establishment of 220kV Pooling Station at</li> </ul>

SI	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	LOA details (as applicable)	Proposed location for Grant of Stage-II Connectivity	Tr System for Stage-II connectivity (under scope of applicant)
3.	Adani Green Energy MP Ltd. (AGEML-Dayapar/Ratadiya)	1200001363	250	01/11/19	SECI Tr-III	Bhuj PS (Under Implementation)	Dayapar/Ratadiya, Chuggar and Murchbana/Mokhra <ul style="list-style-type: none"> <li>•Adani Green Energy (MP) Ltd. Dayapar Pooling Station - Bhuj PS 220kV D/c line (with ampacity of at least 725MW at nominal voltage) along-with associated bays at both ends</li> <li>•Adani Green Energy (MP) Ltd. Chuggar Pooling Station – Dayapar PS 220kV S/c line</li> <li>•Adani Green Energy (MP) Ltd. Murchbana/Mokhra Pooling Station – Dayapar PS 220kV S/c line</li> <li>•Adani Green Energy (MP) Ltd. would take care of operational and commercial issues in regard to power transfer from the projects at Sl. 2, 3 and 14</li> </ul>
4.	Torrent Power Ltd. (TPL-Lakhpat Bhuj)	1200001358	300	30/06/19	SECI Tr-III		<ul style="list-style-type: none"> <li>•Torrent Power Ltd.(TPL-Lakhpat Bhuj) - Bhuj PS 220kV S/c line along-with associated bays at both ends</li> </ul>
5.	Torrent Power Ltd.(TPL-Junachay Bhuj)	1200001369	199.5	30/06/19	SECI Tr-III		<p><b>Common Transmission System for Junachay (199.5MW) &amp; Nakhatrana (115MW) wind farms</b></p> <ul style="list-style-type: none"> <li>•Establishment of 220kV Pooling Station near Bhuj for pooling of power from Junachay (199.5MW) &amp; Nakhatrana (115MW) wind farms.</li> <li>•TPL Bhuj PS – Bhuj PS 220kV S/c line (with minimum capacity of 315MW) alongwith associated bays at both ends</li> <li>•TPL would take care of operational and commercial issues in regard to power transfer from both Nakhatrana &amp; Junachay wind projects</li> </ul>
6.	Alfanar Energy Private Limited (AEPL- Kotda Madh)	1200001357	300	30/06/19	SECI Tr-III		<ul style="list-style-type: none"> <li>•Alfanar Energy Private Limited (AEPL- Kotda Madh) - Bhuj PS 220kV S/c line along-with associated bays at both ends</li> </ul>
7.	Green Infra Wind Energy Ltd. (GIWEL-Roha)	1200001359	300	30/04/19	SECI Tr-III		<ul style="list-style-type: none"> <li>•Green Infra Wind Energy Ltd. (GIWEL-Roha) - Bhuj PS 220kV S/c line along-with associated bays at both ends</li> </ul>
8.	Vaayu Renewable	1200001371	250	01/01/20	NA		<ul style="list-style-type: none"> <li>•Vaayu Renewable Energy (Kaveri) Private Limited - Bhuj PS 220kV S/c line along-with</li> </ul>

Sl	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	LOA details (as applicable)	Proposed location for Grant of Stage-II Connectivity	Tr System for Stage-II connectivity (under scope of applicant)
	Energy (Kaveri) Private Limited						associated bays at generation end
9.	Vaayu Renewable Energy (Krishna) Pvt. Ltd.	1200001372	300	01/04/20	NA		<ul style="list-style-type: none"> <li>•Vaayu Renewable Energy (Krishna) Pvt. Ltd. - Bhuj PS 220kV S/c line along-with associated bays at generation end</li> </ul>
10	ReNew Wind Energy (TN) Private Limited	1200001426	265	15/01/20	SECI Tr-IV		<ul style="list-style-type: none"> <li>•ReNew Wind Energy (TN) Private Limited - Bhuj PS 220kV S/c line along-with associated bays at both ends</li> </ul>
11	ReNew Wind Energy (AP2) Private Limited	1200001427	300	15/06/19	SECI Tr-III		<ul style="list-style-type: none"> <li>•ReNew Wind Energy (AP2) Private Limited - Bhuj PS 220kV S/c line along-with associated bays at both ends</li> </ul>
12	Avikiran Solar India Private Limited	1200001423	285	29/02/20	SECI Tr-IV		<ul style="list-style-type: none"> <li>•Avikiran Solar India Private Limited - Bhuj PS 220kV S/c line along-with associated bays at both ends</li> </ul>
13	Vaayu Renewable Energy (Sironj) Private Limited	1200001433	300	01/04/20	NA		<ul style="list-style-type: none"> <li>•Vaayu Renewable Energy (Sironj) Private Limited - Bhuj PS 220kV S/c line along-with associated bays at generation end</li> </ul>
14.	Adani Green Energy (MP) Limited	1200001484	300	01.02.20	SECI Tr-IV	Bhuj PS (Under Implementation)	<p><b>Common Transmission System for applications at Sl. 2, 3 and 14</b></p> <ul style="list-style-type: none"> <li>•Establishment of 220kV Pooling Station at Dayapar/Ratadiya, Chuggar and Murchbana/Mokhra</li> <li>•Adani Green Energy (MP) Ltd. Dayapar Pooling Station - Bhuj PS 220kV D/c line (with ampacity of at least 725MW at nominal voltage) along-with associated bays at both ends</li> <li>•Adani Green Energy (MP) Ltd. Chuggar Pooling Station – Dayapar PS 220kV S/c line</li> <li>•Adani Green Energy (MP) Ltd. Murchbana/Mokhra Pooling Station – Dayapar PS 220kV S/c line</li> <li>•Adani Green Energy (MP) Ltd. would take care of operational and commercial issues in regard to power transfer from the projects at Sl. 2, 3 and 14</li> </ul>
15.	Torrent Power Limited	1200001569	115	01.07.2019	NA		<p><b>Common Transmission System for Junachay</b></p>

SI	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	LOA details (as applicable)	Proposed location for Grant of Stage-II Connectivity	Tr System for Stage-II connectivity (under scope of applicant)
							<p><b>(199.5MW) &amp; Nakhatrana (115MW) wind farms</b></p> <ul style="list-style-type: none"> <li>Establishment of 220kV Pooling Station near Bhuj for pooling of power from Junachay (199.5MW) &amp; Nakhatrana (115MW) wind farms.</li> <li>TPL Bhuj PS – Bhuj PS 220kV S/c line (with minimum capacity of 315MW) alongwith associated bays at both ends</li> <li>TPL would take care of operational and commercial issues in regard to power transfer from both Nakhatrana &amp; Junachay projects</li> </ul>
		<b>Subtotal</b>	<b>0</b>				
16	Vaayu Renewable Energy (Mevasa) Private Limited	1200001414	300	31/12/19	NA	<p>Jam Khambhaliya PS (GIS) (New)</p> <ul style="list-style-type: none"> <li>Establishment of Jam Khambhaliya 400/220kV PS (GIS) along with 1x500 MVA, 400/220kV ICT</li> </ul>	<ul style="list-style-type: none"> <li>Vaayu Renewable Energy (Mevasa) Private Limited - Jam Khambhaliya PS (GIS) 400kV S/c line (with ampacity equivalent to 1000MW at nominal voltage) along-with associated bays at generation end</li> </ul>
17	Airpower Windfarms Pvt Ltd	1200001554	250	01/12/19	NA	<ul style="list-style-type: none"> <li>Extension of Essar – Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS</li> <li>1X125MVAR, 420kV Bus Reactor at Jam Khambhaliya GIS PS</li> </ul>	<ul style="list-style-type: none"> <li>Airpower Windfarms Pvt. Ltd. (AWPL)-Jam Khambhaliya) - Jam Khambhaliya PS 220kV S/c line alongwith bays at generation end</li> </ul>
		<b>Subtotal</b>	<b>550</b>				
18	Toramba	1200001555	300	24.12.19	NA	765/400/220kV Solapur	<ul style="list-style-type: none"> <li>Toramba Renewable Energy Private Limited – Solapur</li> </ul>

Sl	Name of Applicant (Organization)	Stage-II Application No	Stage-II Conn Quantum (MW)	Date: Stage-II connectivity required	LOA details (as applicable)	Proposed location for Grant of Stage-II Connectivity	Tr System for Stage-II connectivity (under scope of applicant)
	Renewable Energy Pvt Ltd					(PG) (existing S/s)	(PG) 400kV S/c line (with minimum capacity of at least 900MW at nominal voltage) alongwith associated bays at generation end
		<b>Subtotal</b>	<b>300</b>				
		<b>Total</b>	<b>4665</b>				

Applicants from Sl. 1 to 15 have been granted Stage-II connectivity at the Bhuj PS while applicant at Sl. 18 has been granted Stage-II connectivity at the existing Solapur substation. However, for applicants at Sl. 16 & 17 (550MW), a new pooling station near Jam Khambhaliya has been proposed with following transmission system:

- Establishment of Jam Khambhaliya 400/220kV PS (GIS) along with 1x500 MVA, 400/220kV ICT
- Extension of Essar – Lakadia/Bhachau 400kV D/c (triple) line upto Jam Khambhaliya PS along with 63MVAR Line reactors on each ckt at Jam Khambhaliya end
- 1X125MVAR, 420kV Bus Reactor at Jam Khambhaliya GIS PS

As per para 5.3.1 of the detailed procedure for RE, the bays at ISTS substation for termination of dedicated lines from applicants at Sl. 8, 9, 13 at Bhuj PS, 16, 17 at Jam Khambhaliya PS and 18 at Solapur S/s are to be implemented by the ISTS transmission licensee owning the substation subject to compliance of the relevant provisions of tariff policy. Accordingly, the following bays are to be implemented under ISTS by the transmission licensee owning the substation:

- 3 nos. 220kV line bays at Bhuj PS
- 1 no. 400kV line bay and 1 no. 220kV line bay at Jam Khambhaliya PS
- 1 no. 400kV line bay at Solapur S/s

CTU stated that establishment of Jam Khambhaliya substation was agreed under Part D of para 2.2.3 above subject to receipt of Stage-II connectivity applications at the substations. Now that applications have been received at Jam Khambhaliya, the implementation of the same may be taken up along-with the requisite nos. of bays.

Members agreed to implement the above substation on priority for providing connectivity to RE applicants in the vicinity of Dwarka. Further, members also agreed for implementation of the bays under ISTS at Bhuj PS, Jam Khambhaliya PS and Solapur substation.



11.4.The summary of the LTA granted to RE projects in the 28th and 29th WR Connectivity/LTA meetings held on 12.07.18 & 17.08.18 respectively:

**LTA granted with injection at Bhuj PS**

Sl	Name of Applicant (Organization)	Stage-II Connectivity Quantum (in MW)	LOA Quantum	Seeking LTA for (MW)	Date from which LTA required	Date upto which LTA required	LTA Application No	LTA processed for (MW)
2	Green Infra Wind Energy Ltd. (GIWEL-Bhuj)	250	250 (SECI Tr-II)	250 (200: ER; 50: NER)	03/11/18	02/11/43	1200001086	250 (200: ER; 50: NER)
3	Green Infra Wind Energy Ltd. (GIWEL-Roha)	300	300 (SECI Tr-III)	300 (200: NR; 100: ER)	30/04/19	29/04/44	1200001116	300 (200: NR; 100: ER)
4	Adani Green Energy MP Ltd. (AGEMPL- Dayapar)	100	SECI Tr-I: 50MW; SECI Tr-II: 50MW;	300 (300: NR)	01/09/18	01/09/43	1200000783	100 (100: NR(Firm))
5	Torrent Power Ltd. (TPL- Lakhpat Bhuj)	300	300.3 (SECI Tr-III)	300.3 (300.3: WR)	30/06/19	01/09/44	1200001085	300 (300: WR)
6	ALFANAR ENERGY PRIVATE LIMITED (AEPL- Kotda Madh)	300	300 (SECI Tr-III)	300 (250: NR; 50: ER)	30/06/19	29/06/44	1200001149	300 (250: NR; 50: ER)
7	Torrent Power Ltd. (TPL- Junachay Bhuj)	200	199.5 (SECI Tr-III)	199.5 (149.7: WR; 49.8: ER)	31/07/19	01/09/44	1200001118	199.5 (149.7:WR 49.8: ER)
8	Renew Wind Energy (AP2) Pvt. Ltd. [RWE(AP2)PL]	300	300 (SECI Tr-III)	300 (300: NR)	24/11/19	24/11/44	120000 1450	300 (300:NR)
9	Renew Wind Energy(TN) Pvt Ltd	265	SECI Tr-IV : 265	265 (NR: 150MW WR: 115MW)	28/02/20	28/02/45	1200001510	265 (NR: 150MW WR: 115MW)
	<b>Total</b>	<b>0</b>						<b>2014.5</b>

LTA was granted to transfer 2014.5 MW power (injection at 220 kV level of Bhuj PS) to various beneficiaries with the following transmission system:

**Augmentation in transformation capacity at Bhuj PS:**

- 6x500MVA 400/220kV ICTs\* [in addition to 2x500MVA, 400/220kV ICTs which are under implementation under GEC]
- 2x1500MVA 765/400kV (with 765kV AIS and 400kV GIS bays) [in addition to 2x1500MVA, 765/400kV ICTs which are under implementation under GEC]

*\*3x500MVA ICTs with 400kV AIS and 220kV AIS bays and balance 3x500MVA ICTs with 400kV GIS and 220kV AIS bays*

**LTA granted with injection at Bhachau**

Sl.	Name of Applicant (Organization)	Stage-II Connectivity Quantum (in MW)	LOA details (as applicable)	Seeking LTA for (MW) (Target)	Date from which LTA required	Date upto which LTA required	LTA Application No
1	Renew Power Ltd.	400	-	50 (NR)	23/11/19	23/11/44	1200001486

LTA was granted to Renew Power Ltd for transfer of power to NR with the following transmission system:

Green Energy Corridor – ISTS (Part system):

- Bhuj PS – Banaskantha 765kV D/c line
- Banaskantha – Sankhari 400kV D/c line
- Banaskantha PS – Chittorgarh 765kV D/c line
- Chittorgarh – Chittorgarh (RVPN) 400kV D/c (quad) line

Transmission System Strengthening associated with Mundra UMPP (Part B):

- Mundra UMPP – Bhuj PS 400kV D/c (Triple) line

**11.5.**Members concurred and noted the stage-II connectivity and LTA granted in the 28th and 29th WR Connectivity/LTA meetings held on 12.07.18 & 17.08.18 respectively.

**11.6.**The summary of the Stage-II connectivity/ enhancement of Stage-II connectivity / LTA agreed to RE projects in the 30<sup>th</sup> WR Connectivity/LTA meetings held along with 1<sup>st</sup> WRSCT on 05.09.2018 is attached as Annexure-6.

**Additional agenda points tabled in the meeting**

**12. Review of Reactive compensation on account of LILO of Satna – Bina ckt#3 at Sagar(MP) substation**

**12.1.** CTU stated that in 38<sup>th</sup> meeting of SCPSPWR held on 17.07.2015, the intrastate transmission scheme planned by MPPTCL for absorption of power from renewable energy sources in Madhya Pradesh under Green Energy Corridor (Intra-state) was noted. Phase-I of the project inter-alia included the following elements:

- Establishment of 2x315MVA, 400/220kV Sagar S/s (Upgradation)
- LILO of one circuit of Satna(PG) – Bina(PG) 400kV line at Sagar(MP) 400kV S/s – 35km LILO length

MPPTCL vide letter dated 08.03.2018 has submitted the proposal to POWERGRID for the above LILO arrangement (of LILO of Satna-Bina ckt#3 at Sagar S/s). After the implementation of LILO, the line lengths of the two sections would be as given below:

- Sagar(MP) – Satna 400kV section: 223.354km
- Sagar(MP) – Bina 400kV section: 97.641km.

**12.2.**CTU further stated that the length of Satna – Bina ckts 3 & 4 is 272.586km and both ends of the line have been provided with 420kV, 50MVAr line reactors. After the above LILO of ckt#3 at Sagar S/s, the Sagar(MP) – Satna 400kV line shall be left with a compensation of only about 40%. Further, % compensation on Sagar(MP) – Bina line section shall be about 100%.

In order to ensure adequate reactive compensation after the above LILO, CTU proposed the following:

- Installation of 50MVAr switchable line reactor at Sagar(MP) end of Sagar(MP) – Satna(PG) 400kV line – Under scope of MPPTCL
- Installation of 125MVAr bus reactor at Sagar (MP) S/s – Under scope of MPPTCL
- Conversion of 50MVAr fixed line reactor at Bina(PG) end of Sagar(MP) – Bina(PG) 400kV line into switchable line reactor. – Under scope of ISTS

**12.3.**MPPTCL stated that 125 MVAr bus reactor at 400 kV Sagar(MP) was already under implementation. As such adequate reactive compensation would be available at Sagar, Bina and Satna S/s and there would be no requirement of 50MVAr switchable line reactor at Sagar(MP) end of Sagar(MP) – Satna(PG) 400kV line. Also, there is space constraint at Sagar S/s for installation of this line reactor. He stated that studies may be carried out and as per the outcomes of studies, they would review the proposal.

**12.4.**After deliberations, it was agreed that CTU would carry out the studies with CEA and MPPTCL and the above proposal would be reviewed as per the study results.

### **13. Requirement of one no. additional bay at Boisar S/s by MSETCL**

**13.1.**CTU stated that MSETCL vide letter dated 10.04.2018 had made the following proposal at Boisar(PG) S/s for termination of Boisar(PG) – Nalasopara 200 kV S/C line:

- (i). Construction of a new 220kV bay adjacent to 220kV Tarapur line bay at Boisar(PG) and shifting of the Tarapur line to the new bay
- (ii). Termination of the proposed Nalasopara line into the existing Tarapur line bay (vacated due to shifting of the Tarapur line to the new bay)

- 13.2.**CTU informed that, there are 6 nos. 220kV line bays at Boisar(PG) S/s [3 nos.: Boisar (MH), 1 no.: Tarapur, 1 no.: Vasai (via Nalasopara), 1 no.: Borivali]. For the above proposal of MSETCL, 1 no. of additional 220kV line bay (7<sup>th</sup> line bay) needs to be constructed at Boisar(PG) S/s.
- 13.3.**After deliberations, the scheme proposed at 13.1 was agreed. The scheme would be implemented by MSETCL.

## Annexure-1

## List of participants of 1st meeting of Western Region Standing Committee on Transmission (WRST) held on 05.09.2018 at NRPC, Katwaria Sarai, New Delhi

S.No.	Name	Designation	Organization	Contact No.
1	PS Mhaske	Member	CEA	
2	Ravinder Gupta	Chief Engineer	CEA	9968286184
3	Awdhesh Kr. Yadav	Director	CEA	9868664087
4	Vikas Sachan	Asst. Director	CEA	7838263649
5	Kanhaiya S Kushwaha	Asst. Director	CEA	8334951500
6	Nitin Deswal	Asst. Director	CEA	9717818349
7	A.K. Balan	Member Secretary	WRPC	
8	L.K.S. Rathore	Asstt. Secretary	WRPC	9833371844
9	Girish Kumar	Director	MNRE	
10	Subir Sen	COO	CTU (Powergrid)	9650293185
11	Ashok Pal	GM	CTU (Powergrid)	9910378105
12	P.S. Das	DGM	CTU (Powergrid)	9433041837
13	Pratyush Singh	Sr. Engineer	CTU (Powergrid)	8826094863
14	Shashank Shekhar	Engineer	CTU (Powergrid)	9205287434
15	S.M. Fahad	Engineer	CTU (Powergrid)	9599814192
16	S.K. Mishra	Director (PS)	SECI	9717890222
17	Shibasish Das		SECI	7838032484
18	Abhinav Verma	DGM	Powergrid	9428504062
19	Kashish Bhambhani	CMC	Powergrid	9971399117
20	Chinmay Sharma	Sr. Engineer	Powergrid	8826094869
21	S.R. Narasimhan	ED	NLDC-POSOCO	9971117022
22	N. Nallarasam	DGM	NLDC-POSOCO	8527077022
23	Rahul Chakrabarti	Dy. Manager	NLDC-POSOCO	9599449975
24	Prabhakar Porwal	Engineer	NLDC-POSOCO	9971702157
25	Pushpa Seshadri	Asst. GM	WRLDC-POSOCO	9869404482
26	Pradeep Sanodiya	Sr. Engg.	WRLDC-POSOCO	8452045338
27	Shriram Bhopale	CE (STU)	MSETCL	9769006175
28	Deepak Joshi	SE (PSS)	MPPTCL, JBP	9425804907
29	Hitesh Kumar Tiwari	Assistant Engg.	MPPTCL, JBP	9425806882
30	Dipak Patel	DE (STU)	GETCO	9925213273