

File No. CC-CE-11-11/0004/2019/CE Grp1

# पावर ग्रिड कार्पोरेशन ऑफ इंडिया लिमिटेड

( भारत सरकार का उद्यम )

केन्द्रीय कार्यालय / CORPORATE CENTRE

Engineering-Cost Group1

## SUBJECT

**Main Category** :**Sub Category** :

**Description** : राजस्थान में सौर ऊर्जा क्षेत्र के लिये पारेषण पणाली पर विस्तृत परियोजना प्रतिवेदन (परियोजना ई.डी. - 201817)  
DETAILED PROJECT REPORT FOR TRANSMISSION SYSTEM FOR SOLAR ENERGY ZONES IN RAJASTHAN (Project ID: TR-201817)

## OTHER DETAILS

**Retention** :**Priority** :**Language** : English**Remarks** :

No correspondence is attached in this file.

**Note No. #1**

पावर ग्रिड कारपोरेशन ऑफ इन्डिया लिमिटेड  
कारपोरेट लागत अभियांत्रिकी विभाग

सन्दर्भ: C/CE/P-471/NR (SEZ in Rajasthan)

दिनांक: 22/02/2019

विषय: राजस्थान में सौर ऊर्जा क्षेत्र के लिये पारेषण पणाली पर विसृत परियोजना प्रतिवेदन (परियोजना आई.डी. - 201817)

**DETAILED PROJECT REPORT FOR TRANSMISSION SYSTEM FOR SOLAR ENERGY ZONES IN RAJASTHAN (Project ID: TR-201817)**

Government of India has set a target of establishing 175 GW renewable capacity by 2022, which includes 100 GW from Solar and 60 GW from Wind. In this direction, a number of ultra-mega solar Power parks are being developed in western Rajasthan for which Inter-state transmission is already under development.

Solar Energy Corporation of India (SECI) has envisaged development of 20 GW solar generation potential in western Rajasthan covering Jaisalmer, Jodhpur and Bikaner districts by December 2021. SECI, NTPC and MSEDCL have already concluded solar bids for 2600MW, 2000MW & 1000MW respectively and most of them are envisaged in western Rajasthan. SECI has also projected approximately 18 GW Solar and 10 GW Wind projects bidding in the near future.

In Bhadla/Fatehgarh complex, a number of applications (St-II connectivity/LTA) for solar project/solar power park are for transmission system viz. 765kV Bhadla-Bikaner-Moga/Ajmer high capacity transmission corridor including transformer capacity augmentation at Bhadla which is already under construction as part of Solar Park/Green Energy Corridor transmission system. Additionally, new LTA application has also been received (about 3100 MW) in above complexes.

Accordingly, the subject system viz. Transmission system for Solar Energy Zones in Rajasthan was identified to cater to the power transfer requirement from LTA applicants (about 3100 MW) as well as to cater to future potential generation (5800 MW) in the complexes of Fatehgarh, Bhadla/Phalodi & Bikaner. Cumulatively, proposed scheme caters to power transfer requirement of 8900 MW Solar generation from western Rajasthan.

The present DPR covers Transmission scheme for renewable energy zones in Rajasthan.

Transmission scheme associated with Solar Energy Zones (8.9 GW) in Rajasthan was technically agreed in the 2nd meeting of Northern Region Standing Committee on Transmission held on 13.11.18 by the stakeholders. Subsequently, the scheme was discussed in the 3rd meeting of Empowered Committee on Transmission held on 21.12.2018, wherein it was decided that part of comprehensive scheme may be implemented by POWEGRID under regulated tariff mechanism.

Schematic of transmission system in Northern Regional Grid is shown in **Exhibit -1**.

## 2. JUSTIFICATION

Western Rajasthan with its huge solar generation potential, is already witnessing development of various ultra-mega solar Power parks in Rajasthan viz. Sauyra Urja [Bhadla-III] (500 MW), Adani Renewable [Bhadla-IV] (250 MW), Essel Saurya (750 MW) and Fatehgarh UMSP (1000 MW) for which Inter-state transmission is already under development.

SECI in association with MNRE and in consultation with RE power developers identified 20 GW Solar generation potential that is envisaged to be developed in Western Rajasthan by December 2021 which involves 10 GW Solar generation each in Phase-I & Phase-II.

The subject scheme viz. Transmission system for Solar Energy Zones in Rajasthan was identified to cater to the power transfer requirement from LTA applicants (about 3100 MW) as well as to cater to future potential generation (5800 MW) in the complexes of Fatehgarh, Bhadla/Phalodi & Bikaner.

Considering above requirements of Power Transfer from LTA applicants as well as Solar potential of various complexes in western Rajasthan, i.e. Fatehgarh, Bhadla/Phalodi & Bikaner, the technically agreed transmission system included establishment of 765/400/220kV pooling station near Phalodi/Bhadla in Jodhpur (Bhadla-II) and Fatehgarh in Jaisalmer district (Fatehgarh-II). For interconnection of above new pooling stations with existing/under construction transmission system, LILO of Ajmer-Bikaner 765kV D/c line at Bhadla-II, Bhadla-II - Bhadla (PG) 400kV D/c transmission line, LILO of Fatehgarh (TBCB) - Bhadla (PG) D/c (765kV line operated at 400kV level) line at Fatehgarh-2 with charging of Fatehgarh-II - Bhadla-II section at 765kV level is identified to be implemented through RTM by

POWERGRID.

For onward dispersal of power, high capacity corridors viz. 765kV Fatehgarh-II - Bhadla-II D/c line, 765kV Ajmer- Phagi (RVPN) D/c line and 765kV Bikaner- Khetri - Jhatikara D/c lines were technically agreed, which are being implemented through tariff based competitive bidding route and therefore not covered in the present DPR.

Suitable reactive compensation in the form of bus reactors at above substations as well as switchable line reactors on EHV AC lines are also proposed.

### 3. SCOPE OF WORKS

#### Transmission Lines

1. LILO of both circuits of Ajmer – Bikaner 765kV D/c line at Bhadla-II PS – **300 km**
2. Bhadla-II PS – Bhadla (PG) 400kV D/c Line (Twin HTLS) – **24.4 km**
3. LILO of both circuits of Fatehgarh (TBCB) – Bhadla (PG) 765 kV D/c line (operated at 400kV) at Fatehgarh-II PS so as to establish Fatehgarh (TBCB) – Fatehgarh-II 765 kV D/c line (to be operated at 400kV) and Fatehgarh-II-Bhadla (PG) 765kV D/c line – **18.4 km**
4. Charging of Fatehgarh-II PS –Bhadla section at 765kV level

#### Substation

##### a) 765/400/220kV Bhadla – II Pooling Station

##### 765kV

- |   |          |
|---|----------|
| • Line Bays                             | : 4 nos. |
| • Transformer bays                      | : 2 nos. |
| • 1500MVA, 765/400kV transformer        | : 2 nos. |
| • Bus reactor bays                      | : 2 nos. |
| • 240 MVAR Bus reactors                 | : 2 nos. |
| • 330 MVAR Switchable Line Reactors     | : 2 nos. |
| • 330 MVAR Switchable Line Reactor bays | : 2 nos. |
| • 240 MVAR Switchable Line Reactors     | : 2 nos. |
| • 240 MVAR Switchable Line Reactor bays | : 2 nos. |

400kV

- Line Bays : 2 nos.
- Transformer bays : 2 nos.
- Bus reactor bay : 1 nos.
- 125MVAR Bus reactor : 1 nos.

**b) 765/400kV Fatehgarh-II Pooling Station**765kV

- Line Bays : 2 nos.
- Transformer bays : 3 nos.
- 1500MVA, 765/400kV transformer : 3 nos.
- Bus reactor bays : 2 nos.
- 240MVAR Bus reactors : 2 nos.

400kV

- Line Bays : 2 nos.
- Transformer bays : 3 nos.
- Bus reactor bay : 1 nos.
- 125MVAR Bus reactor : 1 nos.

**c) 765/400/220kV Bhadla (PG) Substation Extn**765kV

- Line Bays : 2 nos.

400kV

- Transformer bays : 2 nos.

- 500MVA, 400/220kV transformer : 2 nos.

#### 220kV

- Transformer bays : 2 nos.

*Note: i. 220kV side shall be implemented with hybrid (AIS+GIS) technology.*

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

#### **d) 765/400kV Moga (PG) Substation Extn**

##### 765kV

- 1500MVA, 765/400kV transformer : 1 nos.
- Transformer bay (GIS) : 1 nos.

##### 400kV

- Transformer bay (GIS) : 1 nos.

*Note: 1500MVA ICT at Moga will be installed considering outdoor 765kV and 400kV GIS and GIB interconnection.*

#### **e) 765/400kV Bhiwani (PG) Substation Extn**

##### 765kV

- 1000MVA, 765/400kV transformer : 1 nos.
- Transformer bay : 1 nos.

##### 400kV

- Transformer bay : 1 nos.

#### **Reactive Compensation**

• Line Reactors

S.No.	Transmission Line	Line reactor on each circuit (MVar)	
		From End (each ckt)	To end (each ckt)
1	Ajmer-Bhadla-II PS 765kV D/c line (after LILO)	1x240 (Switchable) (each ckt) <i>(already under implementation in GEC Part-D)</i>	1x330 (Switchable) (each ckt)
2	Bikaner-Bhadla-II PS 765kV D/c line (after LILO)	1x330 (Switchable) (each ckt) <i>(already under implementation in GEC Part-D)</i>	1x240 (Switchable) (each ckt)

• Bus Reactors

S.No	Bus	765 kV Reactor (MVar)	420 kV Reactor (MVar)
1	765/400/220 kV Bhadla-II PS	2X240 MVar	1x125 MVar
2	765/400/220 kV Fatehgarh-II PS	2X240 MVar	1x125 MVar

#### 4. PROJECT HIGHLIGHTS

a)	Project	Transmission System for Solar Energy Zones in Rajasthan
b)	Location of the Project	Northern Region
c)	Project Cost	<b>Rs. 2807.10 Crores at September 2018</b> Price Level (including IDC)

		of Rs. 126.17 Crores)
d)	Monthly Fixed Charges	<b>Rs 4469.17 Lakhs</b> on Base cost <b>Rs 4627.00 Lakhs</b> on Projected Completed cost
e)	Commissioning schedule	The project is scheduled to be commissioned within <b>18 months</b> from date of investment approval

## 5. PROJECT APPROVAL BY CONSTITUENTS/SHARING OF TRANSMISSION CHARGES

5.1.1 The Prior approval of the Government of India under Section 68 of the Electricity (Supply) Act, 2003 for the subject project has been applied for with Ministry of Power.

5.1.2 The scheme was discussed and agreed in the 2nd meeting of Northern Region Standing Committee on Transmission held on 13.11.18. Subsequently, the scheme was discussed in the 3<sup>rd</sup> meeting of Empowered Committee on Transmission held on 21.12.18, wherein it was decided that part of comprehensive scheme may be implemented by POWEGRID under regulated tariff mechanism (Copies of the minutes of meetings enclosed at **Annexure - 8.0.**)

5.1.3 Ministry of Power vide letter dated 30.01.2019 intimated PGCIL for taking up of subject scheme on compressed time schedule basis as approved in the 3rd ECT meeting. (Copy of the above letter is enclosed at **Annexure - 9.0.**)

5.1.4 The subject scheme shall be taken up in the upcoming Northern Region Power Committee (NRPC) meeting.

## 5.2 SHARING OF TRANSMISSION CHARGES

The transmission charges for this project shall be shared by the beneficiaries in line with the Sharing Regulations notified by CERC from time to time.

## 6. COST ESTIMATE

The estimated cost of the project as on **September 2018 price level** works out to **Rs. 2807.10 crores** including an IDC of **Rs. 126.17 crores**. Unit rates for 765kV & 400kV transmission lines and 765/400/220kV Substation Works & have been taken from *Schedule of Rates* (which has been prepared based on the average of unit rates of latest LOAs/Bids and/or from Raw material prices) for **September 2018 Price level**.

The cost estimate is inclusive of GST as applicable for various equipment (supply & services portion). F&I @ 4% has been considered in the Estimate for plain terrain. Customs duty @ 24.49% plus handling charges thereon @ 2% has been considered on imported equipment.

The completion cost of the project is expected to be **Rs. 2914.60 crores** including IDC of **Rs. 129.33 crores**.

## 7. MODE OF FINANCING

The project is proposed to be funded through POWERGRID's Internal Resources (IR) and through domestic borrowings/bonds/External Commercial borrowings. The equity component (30%) is proposed to be met through Internal Resources (IR) and the loan component (70%) through domestic borrowings/bonds/External Commercial borrowings.

The rate of interest has been considered @ 10.5% p.a. for the loan component. The interest during construction works out to **Rs. 126.17 crores**.

The interest during construction would however be based on the actual financial structure of the project and applicable terms of interest on loan(s) etc.

## 8. IMPLEMENTATION SCHEDULE

The project is scheduled to be commissioned within **18 months** from the date of investment approval. (Implementation schedule is given at **EXHIBIT-3.0**)

## 9. MONTHLY FIXED CHARGES

In line with the CERC norms, the tentative monthly fixed charges work out as **Rs. 4469.17 Lakhs on Base Cost and Rs. 4627.00 Lakhs on Projected Completed Cost**.

The salient norms considered are:

Rate of interest on Domestic Loan @ 10.5% .p.a., return on equity @ 15.5%, depreciation @ 0% for land, @ 3.34% for building, @ 5.28% for substations and @ 6.33% for PLCC, O&M charges for F.Y. 2020-21 as @ Rs.1.29 Lakhs per km for D/C line (with four or more conductors), @ Rs.0.86 Lakhs per km for D/C line (with twin conductors), @ Rs. 102.69 Lakhs per 765 KV bay, @ Rs.73.35 Lakhs per 400 KV bay, @ Rs.62.69 Lakhs per 400 KV GIS bay and @ Rs. 51.35 Lakhs per 220 KV bay for Substation, Debt: Equity ratio 70:30 & interest on working capital @ 12.20%.

## 10. IRR CALCULATION

The project IRR Equity IRR and Economic IRR on Projected Completed Cost have been calculated and the same is tabulated below:

	For Completed cost
Project IRR	12.67%
Equity IRR	18.59%
Economic IRR	15.25%

The details of calculation are furnished in **ANNEXURE - 7.0**.

## 11.0 FOREST INVOLVEMENT / CLEARANCE

As per the preliminary assessment based on Forest Atlas, toposheet and walk over survey of the area, certain forest stretches are likely to be encountered for this Transmission system comprising of the following lines:

	NAME OF TRANSMISSION LINE	<b><u>FOREST INVOLVEMENT</u></b> (Approx. area in Ha)
a)	LILO of both circuits of Ajmer – Bikaner 765kV D/c line at Bhadla-II PS	12.06 Ha
b)	400kV D/C Bhadla-II PS - Bhadla (Twin HTLS)	4.36 Ha
c)	LILO of both circuits of Fatehgarh (TBCB) – Bhadla (PG) 765 kV D/c line (operated at 400kV) at Fatehgarh-II PS	1.00 Ha

However, exact involvement of forest stretch shall be known only after detailed survey and finalization of route alignment.

As per the prevailing law, land below transmission line is not required to be acquired and compensation towards all damages is required to be paid. However, the land owners/farmers are now demanding cost of land for tower base area as well as diminution in land value for transmission line corridor area due to severe restriction imposed on land use. These demands of farmers were considered by a committee specifically constituted to resolve such issue and to develop a uniform policy / rules for such compensation. Based on the MoP guidelines issued on 15.10.15 regarding payment of compensation towards damages in regard to Right of Way for transmission lines, provisions in the DPR has been kept to meet such cost.

POWERGRID has developed its own Environmental and Social Policy & Procedure (ESPP) for its project activities after detailed consultation, within and outside POWERGRID, including National Consultation. **POWERGRID's ESPP envisages a progressive policy on Resettlement & Rehabilitation (R&R).** National policy on R&R is not attracted by the transmission projects, as these do not involve displacement of a large number of families. However, POWERGRID has adopted entitlement benefits listed in the national R&R policy in its **"Social Entitlement Framework"** that is being implemented wherever land acquisition for substations was undertaken by invoking Land Acquisition Act, 1894. However, to make land acquisition process in the country more transparent and participative as well as to ensure Rehabilitation and Resettlement of affected families GOI has enacted a new act viz. **"The Right to Fair compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013"** by repealing the old "Land Acquisition Act, 1894". The new act has become operational from 1<sup>st</sup> January 2014. Under this the **Social assessment and R&R of affected persons is the responsibility of concerned State govt. or its authorized agency instead of utility (POWERGRID).** However, costs of such measures are to be borne by the utility.

In the instant project, two nos. of new 765/400/220 kV substations are coming up at suitable locations near Phalodi/ Bhadla in Jodhpur (Bhadla-II PS) and near Fatehgarh in Jaisalmer Distt (Fatehgarh-II PS). Approximately **173** acres of land is required for each of these new Substations. To meet the cost of R&R measures, a provision of Rs. **150** lakhs has been kept for each of the substations.

For extension of 765/400kV Bhadla (PG), Moga (PG) and Bhiwani (PG) Substations, no additional land is required.

12. The Detailed Project Report is placed below for approval please for onward submission to COIP/Board of Directors of POWERGRID for further processing of investment approval.

(के.वी.एस. लक्ष्मी देवी)  
वरिष्ठ उप महाप्रबंधक (ला.अभि.)

मुख्य महा . प्र . (सी . टी . यू .- प्लानिंग)

मुख्य महा . प्र . (अभि.-पारे.लाइन)

मुख्य महा . प्र . (अभि .- उपकेन्द्र)

वरिष्ठ महा . प्र . (एल.डी. & सी)

मुख्य महा . प्र . (स्मार्ट ग्रिड)

वरिष्ठ महा . प्र . ( ला . अभि .)

का . नि . (अभि .- पारे . लाइन , उपकेन्द्र एवं सिविल)

का . नि . (एल.डी.&सी)

का . नि . (सी . एम . जी)

का . नि . (वाणिज्य)

का . नि . (के . आ . , ला . अभि . , व अ . स . प्र)

का . नि . (सी . टी . यू .- प्लानिंग एवं स्मार्ट ग्रिड)

का . नि . (वित्त)

निदेशक (परियोजना)

निदेशक (वित्त)

अध्यक्ष एवं प्रबंध निदेशक

Local Reference:

1. DPR Write-up - Solar Energy Zones in Rajasthan
2. Preamble
3. Annexures - SEZ in Rajasthan
4. IRR - SEZ in Rajasthan



**Annexure 8\_2nd\_NRSCT.pdf**



**Annexure 8\_Minutes\_of\_3rd\_meeting\_of\_ECT.pdf**



**Exhibit 1.pdf**



**Annexure 8\_MoP Office Memorandum.pdf**



**Exhibit 2\_SLD.pdf**



**Exhibit 3\_Implementation Schedule.pdf**

**22/02/2019 5:15 PM**

**K.V.SUBBALAKSHMI DEVI  
(DGM (CE))**

**22/02/2019 6:21 PM**

**MUKESH KHANNA  
(CH GM(CTU-PLG))**

**05/03/2019 12:06 PM**

**RAJESH VERMA  
(DGM(CTU-PLG))**

08/03/2019 11:26 AM

VMS PRAKASH YERUBANDI  
(MGR(CTU-PLG))

**Note No. #5**

(i) The scheme has been technically agreed in the 2nd meeting of NRSCT held on 13.11.2018.

(ii) The scheme is to be implemented by Sep'20 except for ICT augmentation i.e. 2X500 MVA, 400/220 kV at Bhadla (PG) & 1X1500 MVA, 765/400 kV at Moga S/s by Dec'19 (as per 3rd ECT held on 21.12.2018).

(iii) Petition for Regulatory approval for the scheme has already been filed before CERC.

12/03/2019 12:20 PM

RAJESH VERMA  
(DGM(CTU-PLG))

**Note No. #6**

12/03/2019 5:10 PM

MUKESH KHANNA  
(CH GM(CTU-PLG))

**Note No. #7**

12/03/2019 5:53 PM

ANISH ANAND  
(CH GM(ENGG TL))

**Note No. #8**

14/03/2019 10:30 AM

A.K. VYAS

(SR. GM(ENGG. TL-NR,IN HOUSE))

**Note No. #9**

14/03/2019 4:51 PM

RAJEEV KUMAR  
(GM(ENGG. TL-NR))

**Note No. #10**

15/03/2019 11:47 AM

CHANDRA KANT  
(CH. MGR(ENGG. TL-NR))

**Note No. #11**

15/03/2019 12:19 PM

RAJEEV KUMAR  
(GM(ENGG. TL-NR))

**Note No. #12**

15/03/2019 3:45 PM

A.K. VYAS  
(SR. GM(ENGG. TL-NR,IN HOUSE))

**Note No. #13**

18/03/2019 3:51 PM

ANISH ANAND  
(CH GM(ENGG TL))

**Note No. #14**

19/03/2019 10:13 AM

KAILASH RATHORE  
(CH GM(ENGG-SS))

**Note No. #15**

19/03/2019 1:33 PM

P.K. DAS  
(SR GM(ENGG-SS))

**Note No. #16**

20/03/2019 11:42 AM

RAJENDRA KUMAR GUPTA  
(DGM(ENGG-SS))

**Note No. #17**

25/03/2019 7:23 AM

VIVEK GUPTA  
(CH MGR(ENGG-SS))

**Note No. #18**

25/03/2019 3:35 PM

K. DEEPAK  
(DY MGR(ENGG-SS))

**Note No. #19**

25/03/2019 4:52 PM

**P.K. DAS**  
**(SR GM(ENGG-SS))**

**Note No. #20**

**25/03/2019 5:03 PM**

**KAILASH RATHORE**  
**(CH GM(ENGG-SS))**

**Note No. #21**

**26/03/2019 10:24 AM**

**H H SHARAN**  
**(SR GM(LD&C))**

**Note No. #22**

**01/04/2019 6:04 PM**

**H.S. KAUSHAL**  
**(SR GM(LD&C))**

**Note No. #23**

DPR envisages requirement of around 850 kms OPGW and implementation schedule considered in DPR as 18 months from investment approval.

**02/04/2019 10:05 AM**

**H H SHARAN**  
**(SR GM(LD&C))**

**Note No. #24**

**03/04/2019 4:44 PM**

**A K BAHL**  
**(SR GM(CE))**

**Note No. #25**

03/04/2019 5:03 PM

K.V.SUBBALAKSHMI DEVI  
(DGM (CE))**Note No. #26**

16/04/2019 2:57 PM

ACHYUT SARAT  
(MGR(CE))**Note No. #27**का . नि . (अभि .- पारे . लाइन , उपकेन्द्र एवं सिविल)का . नि . (एल.डी.&सी)का . नि . (सी . एम . जी)का . नि . (वाणिज्य)का . नि . (के . आ . , ला . अभि . , व अ . स . प्र)का . नि . (सी . टी . यू .- प्लानिंग एवं स्मार्ट ग्रिड)का . नि . (वित्त)निदेशक (परियोजना)निदेशक (वित्त)अध्यक्ष एवं प्रबंध निदेशक

16/04/2019 3:00 PM

K.V.SUBBALAKSHMI DEVI  
(DGM (CE))**Note No. #28**

18/04/2019 4:34 PM

A K BAHL  
(SR GM(CE))

**Note No. #29**

22/04/2019 1:27 PM

R.N. SINGH  
(ED(ENGG-S/S,TL,CIVIL))

**Note No. #30**

22/04/2019 3:29 PM

SUNIL AGRAWAL / सुनील अग्रवाल  
(ED(LD&C))

**Note No. #31**

22/04/2019 4:07 PM

H H SHARAN  
(SR GM(LD&C))

**Note No. #32**

23/04/2019 5:34 PM

H.S. KAUSHAL  
(SR GM(LD&C))

**Note No. #33**

24/04/2019 9:27 AM

H H SHARAN  
(SR GM(LD&C))

**Note No. #34**

24/04/2019 1:44 PM

**SUNIL AGRAWAL / सुनील अग्रवाल**  
**(ED(LD&C))****Note No. #35**

25/04/2019 9:27 AM

**SANJEEV SINGH**  
**(ED(CMG))****Note No. #36**

25/04/2019 11:10 AM

**ANOOP SINGH**  
**(SR GM(CMG))****Note No. #37**

MoP vide letter dated 30/01/2019 approved the subject scheme for implementation by POWERGRID under compressed time schedule through Regulated Tariff Mechanism (RTM) with the Implementation schedule of the project 21 months (3 months for bidding + 18 months for implementation). During the pre-award meeting held on 30/04/2019, CTU informed that Petition for Regulatory approval for the scheme has already been filed before CERC and approval of the same is still awaited from CERC. Regulatory approval from CERC may take 2-3 months more. It has been further deliberated that procurement activities have already been initiated and completion schedule may be kept as envisaged earlier, i.e. 18 months from Investment approval. Efforts would be made to match the completion schedule with requirement during PBD discussions at the time of award.

01/05/2019 3:43 PM

**NARENDRA BABU**  
**(DGM(CMG))****Note No. #38**

01/05/2019 5:51 PM

**ANOOP SINGH**  
**(SR GM(CMG))**

**Note No. #39**

**02/05/2019 10:04 AM**

**SANJEEV SINGH**  
**(ED(CMG))**

**Note No. #40**

**03/05/2019 6:41 PM**

**A. CHAUDHARY**  
**(ED(COMML. & RC))**

**Note No. #41**

**07/05/2019 10:22 AM**

**MANJU GUPTA**  
**(SR.GM(RC))**

**Note No. #42**

The comprehensive Transmission system for Solar Energy Zones in Rajasthan has been identified to cater to 8900MW power transfer interalia including 3100MW for which LTA application have been received/approved. Out of 3100MW, PPA is available for a quantum of approx. 1900MW. Further, RPC approval for the scheme is yet to be accorded. As such, Regulatory Approval is paramount important for recovery of transmission charges.

Keeping in view the above and discussion held during various meetings, POWERGRID, as CTU, have approached CERC for Regulatory Approval of the scheme vide Petition No. 23/MP/2019. Hearing in the said petition was held on 27/02/2019 and queries have been replied. However, approval of CERC is awaited.

Further, as brought out para 9 above, the transmission charges may be worked out in line with CERC (Terms and Conditions of Tariff) Regulations, 2019.

07/05/2019 5:13 PM

AMIT BHARGAVA  
(GM(RC))

**Note No. #43**

08/05/2019 1:01 PM

MANJU GUPTA  
(SR.GM(RC))

**Note No. #44**

08/05/2019 7:02 PM

A. CHAUDHARY  
(ED(COMML. & RC))

**Note No. #45**

09/05/2019 3:17 PM

ANIL JAIN  
(ED(CP))

**Note No. #46**

10/05/2019 10:01 AM

DR. SUBIR SEN  
(COO(CTU-PLG))

**Note No. #47**

13/05/2019 3:19 PM

MUKESH KHANNA  
(CH GM(CTU-PLG))

**Note No. #48**

14/05/2019 12:02 PM

**RAJESH VERMA**  
(DGM(CTU-PLG))**Note No. #49**

20/05/2019 11:08 AM

**VMS PRAKASH YERUBANDI**  
(MGR(CTU-PLG))**Note No. #50**

The scheme is being taken up in forthcoming meeting of NRPC for approval .  
Petition for Regulatory Approval has been filed before CERC.

28/05/2019 8:22 PM

**YATIN SHARMA**  
(ASST MGR(CTU-PLG))**Note No. #51**

31/05/2019 9:37 AM

**RAJESH VERMA**  
(DGM(CTU-PLG))**Note No. #52**

1. LILO length for Ajmer-Bikaner at Bhadla-II may be separately indicated for Loop in & Loop out portion
2. CTU may update new LTA applications quantum on SEZ(8.9 GW) Tr.corridor

07/06/2019 6:51 PM

**KASHISH BHAMBHANI**  
(DGM(SG))**Note No. #53**

**13/06/2019 8:27 PM**

**RAJESH VERMA  
(DGM(CTU-PLG))**

**14/06/2019 12:36 PM**

**K.V.SUBBALAKSHMI DEVI  
(SR DGM(CE))**



**IOM regarding Moga ICT Deletion.pdf**

**14/06/2019 3:32 PM**

**RAJESH VERMA  
(DGM(CTU-PLG))**

3rd 1X1500MVA, 765/400kV ICT at Moga S/s from the scope of works has been mentioned. Accordingly the WBS ELEMENTS corresponding to the same may be deleted in SAP so that DPR cost could be re-worked with the latest scope of works .

**14/06/2019 4:42 PM**

**K.V.SUBBALAKSHMI DEVI  
(SR DGM(CE))**

20/06/2019 10:26 AM

RAJESH VERMA  
(DGM(CTU-PLG))

**Note No. #58**

28/06/2019 1:30 PM

KASHISH BHAMBHANI  
(DGM(SG))

**Note No. #59**

01/07/2019 9:50 AM

RAJESH VERMA  
(DGM(CTU-PLG))

**Note No. #60**

02/07/2019 5:28 PM

K.V.SUBBALAKSHMI DEVI  
(SR DGM(CE))

**Note No. #61**

The DPR for subject project was prepared at September 2018 price level and the cost estimate worked out as **Rs. 2820.66 crores** including IDC of **Rs. 126.37 crores**.

As mentioned in Note#53 & Note#55 of subject note and informed by CTU vide their IOM dated 13.06.2019, 1x1500MVA, 765/400kV ICT (3<sup>rd</sup>) at Moga (PG) substation has been deleted from scope of subject scheme as decided in 45th NRPC meeting held on 08.06.2019 (Copy of minutes of meeting attached as **Annexure-9.0**). Further, CMG informed vide their e-mail dated 10.07.2019 that subject scheme's packages could be expected to be awarded progressively from August 2019.

As the prevailing Schedule of Rates (SOR) is now at March 2019 price level, the DPR cost estimate has been revised accordingly incorporating the deletion of

Moga ICT (3<sup>rd</sup>) from the scheme's scope and considering an implementation schedule of 18 months with zero date as 01.08.2019.

Considering the modified scope, the DPR cost estimate has been updated to **March 2019 price level**. The revised DPR cost estimate works out to **Rs. 2577.93 crores** including IDC of **Rs. 121.78 crores** considering implementation schedule of 18 months from the date of investment approval. Unit rates for 765kV & 400kV transmission lines and 765/400/220kV substation works have been taken from **Schedule of Rates** (which has been prepared based on the average of unit rates of latest LOAs/Bids and/or from Raw material prices) for **March 2019** Price level.

The completion cost of the project is expected to be **Rs. 2679.37 crores** including IDC of **Rs. 124.89 crores**.

Tentative monthly fixed charges work out to **Rs. 4343.92 Lakhs** on Base Cost and **Rs. 4491.88 Lakhs** on Projected Completed Cost based on the latest CERC Transmission Tariff norms (2019).

Project IRR, Economic IRR & Equity IRR on projected completed cost have been worked out and are given below:

Project IRR (%)	Economic IRR (%)	Equity IRR (%)
12.42	14.85	17.76

The copies of revised cost estimate annexures, IRR excel files and documents have been attached at local reference as:

1. SEZ\_Rajasthan\_Mar 2019 PL\_Annexures
2. SEZ\_Rajasthan\_Mar 2019 PL\_IRR
3. DPR-SEZ in Rajasthan
4. Revised Schedule

(अच्युत शर्त)  
प्रबंधक (ला. अभि.)

वरिष्ठ उप महाप्रबंधक (ला. अभि.)

वरिष्ठ महाप्रबंधक (ला. अभि.)

का. नि. (सी. टी. यू.- प्लानिंग एवं स्मार्ट ग्रिड)

का. नि. (सी. एम. जी)

का. नि. (के. आ. ला. अभि. एवं सी. सी. सी)

का. नि. (वित्त)

निदेशक (परियोजना)

निदेशक (वित्त)

अध्यक्ष एवं प्रबंध निदेशक



**Annexure-9\_EXTRACTS\_45NRPC.pdf**

**16/07/2019 4:19 PM**

**ACHYUT SARAT  
(MGR(CE))**

**17/07/2019 10:45 AM**

**K.V.SUBBALAKSHMI DEVI  
(SR DGM(CE))**

**17/07/2019 4:25 PM**

**A K BAHL  
(SR GM(CE))**

**17/07/2019 8:35 PM**

**DR. SUBIR SEN  
(COO(CTU-PLG))**

**17/07/2019 8:46 PM**

**ASHOK PAL  
(CH GM(CTU-PLG))**

Corridors.

18/07/2019 2:50 PM

YATIN SHARMA  
(ASST MGR(CTU-PLG))

**Note No. #67**

18/07/2019 4:50 PM

ASHOK PAL  
(CH GM(CTU-PLG))

**Note No. #68**

19/07/2019 12:06 PM

DR. SUBIR SEN  
(COO(CTU-PLG))

**Note No. #69**

19/07/2019 1:11 PM

M TAJ MUKARRUM  
(ED(FIN))

**Note No. #70**

Pl make necessary corrections & final file may pl be attached

19/07/2019 5:24 PM

SIMMI ARORA  
(DGM(F&A))

**Note No. #71**

The modifications suggested by finance have been incorporated in the subject DPR. The revised cost estimate works out to **Rs. 2578.47 crores** including an IDC of **Rs. 121.80 crores at March 2019 price level**. Tentative monthly fixed charges work out to **Rs. 4344.75 Lakhs** on Base Cost and **Rs. 4492.81 Lakhs** on Projected Completed Cost based on the latest CERC Transmission Tariff norms (2019).

The completion cost of the scheme is expected to be **Rs. 2679.94 crores** including IDC of **Rs. 124.92 crores**.

Project IRR, Economic IRR & Equity IRR on revised projected completed cost have been worked out and are given below:

Project IRR (%)	Economic IRR (%)	Equity IRR (%)
12.42	14.85	17.76

Modified copies of Annexures, IRR and detailed costing excel files and documents have been attached at local reference as:

1. SEZ\_RAJASTHAN\_MAR 2019 PL\_ANNEXURE\_230719
2. SEZ\_RAJASTHAN\_MAR 2019 PL\_IRR\_230719
3. SEZ\_RAJASTHAN\_DETAILED SHEETS\_MAR 2019 PL
4. DPR-SEZ IN RAJASTHAN\_MAR 19 PL
5. PREAMBLE-SEZ\_RAJASTHAN\_MAR 19 PL

Submitted for approval please.

24/07/2019 2:37 PM

**ACHYUT SARAT**  
(MGR(CE))

#### **Note No. #72**

Revised Estimated cost of the DPR is Rs.2578.47 Cr (including an IDC of Rs.121.80 Cr) as on March 2019 price Level is vetted in Finance.

On completed cost, Project IRR is 12.42%, Equity IRR is 17.76% & Economic IRR is 14.85%

25/07/2019 9:45 AM

**SIMMI ARORA**  
(DGM(F&A))

#### **Note No. #73**

25/07/2019 12:50 PM

**SANJEEV BHATNAGAR**  
(SR GM(F&A))

#### **Note No. #74**

25/07/2019 1:54 PM

K.S.R. MURTY  
(ED(FIN))

**Note No. #75**

25/07/2019 2:58 PM

R.K. CHAUHAN  
(DIR(PROJ))

**Note No. #76**

Further to above, Technical and Financial appraisal were sought for the present scheme from designated external agencies as mandated. Both the appraisal reports i.e. Technical as well as Financial were received on 19.08.2019.

Shri R. N. Nayak, retired CMD, POWERGRID, has carried out technical appraisal of the project. The report concludes that the planned scheme of said project is technically in order as detailed in **Section 6.0** of the Technical Appraisal report. (Copy of the Technical Appraisal report is attached at **Appendix-A.**)

M/s SBI Capital Markets Limited in their report in **Chapter 8 – Conclusion have concluded as follows:**

Quote:

*"The project i.e. the proposed Transmission system for Solar Energy Zones in Rajasthan (Part-A) being developed and funded on the strength of POWERGRID's balance sheet may be viewed as financially viable, subject to the*

- Risk analysis and mitigation mechanisms thereof".*

Copy of the financial appraisal report attached at **Appendix-B.**

Put up for Approval please.

(A K Bahl)

Sr. GM (CE)



**Appendix-B.pdf**



**Appendix-A.pdf**

**19/08/2019 5:18 PM**

**A K BAHL  
(SR GM(CE))**

**19/08/2019 6:53 PM**

**R.N. SINGH  
(ED(ENGG-S/S,TL,CIVIL))**

**20/08/2019 4:56 PM**

**R.K.CHAUHAN  
(DIR(PROJ))**

**20/08/2019 5:21 PM**

**For K SREEKANT  
(DIR(FIN))  
AMIT GARG  
(GM(F&A))**

21/08/2019 12:05 PM

**SIMMI ARORA**  
(DGM(F&A))

**Note No. #81**

The modified detailed calculation sheet is attached at local reference as "SEZ\_RAJASTHAN\_DETAILED SHEETS\_MAR 2019 PL\_V1.xlsx".

21/08/2019 12:24 PM

**ACHYUT SARAT**  
(MGR(CE))

**Note No. #82**

Revised Estimated cost of the DPR is Rs.2578.47 Cr (including an IDC of Rs.121.80 Cr) as on March 2019 price Level is vetted in Finance.

On completed cost, Project IRR is 12.42%, Equity IRR is 17.76% & Economic IRR is 14.85%

21/08/2019 3:24 PM

**SIMMI ARORA**  
(DGM(F&A))

**Note No. #83**

21/08/2019 3:45 PM

**S.K. VENKATESAN**  
(SR GM(F&A))

**Note No. #84**

21/08/2019 3:54 PM

**M TAJ MUKARRUM**  
(ED(FIN))

**Note No. #85**

22/08/2019 9:40 AM

For K SREEKANT  
(DIR(FIN))  
AMIT GARG  
(GM(F&A))

**Note No. #86**

22/08/2019 9:45 AM

M TAJ MUKARRUM  
(ED(FIN))

**Note No. #87**

22/08/2019 10:06 AM

A K BAHL  
(SR GM(CE))

**Note No. #88**

In consultation with Finance Department the loan Repayment schedule has been modified as 3Y moratorium + 12 Y repayment instead of 4Y moratorium+12Y repayment . The IRR calculations on projected completed cost have been worked out based on the above modified loan repayment schedule.

The Project IRR, Equity IRR and Economic IRR on Projected Completed Cost is tabulated below:-

	<b>For Completed Cost</b>
<b>Project IRR</b>	12.32%
<b>Equity IRR</b>	16.73%
<b>Economic IRR</b>	14.74%

The details of calculation are furnished in local reference files attached as mentioned below:

1. IRR\_SEZ-RAJASTHAN-3Y-MORATORIUM.xlsx
2. DPR-SEZ IN RAJASTHAN\_MAR 19 PL-REV1.docx

Accordingly after obtaining the modified financial appraisal report from M/S SBI CAPS incorporating the above changes a copy of the same may please

**A K BAHL**  
**(SR GM(CE))**

**M TAJ MUKARRUM**  
**(ED(FIN))**

**22/08/2019 11:00 AM**

**K.V.SUBBALAKSHMI DEVI**  
**(SR DGM(CE))**

**22/08/2019 11:37 AM**

**A K BAHL**  
**(SR GM(CE))**



**report PGCIL\_Rajasthan\_SEZ\_22\_08\_2019.pdf**

**22/08/2019 12:10 PM**

**SIMMI ARORA**  
**(DGM(F&A))**

**22/08/2019 12:14 PM**

**SANJEEV BHATNAGAR**  
**(GM(F&A))**

**22/08/2019 12:40 PM**

**M TAJ MUKARRUM**  
(ED(FIN))

**Note No. #93**

22/08/2019 1:26 PM

**D.C.JOSHI**  
(ED(CCC))

**Note No. #94**

The Board Note may also be suitably modified to reflect the change in financing terms.

22/08/2019 1:57 PM

**K SREEKANT**  
(CMD)

**Note No. #95**

22/08/2019 2:11 PM

**D.C.JOSHI**  
(ED(CCC))

**Note No. #96**

As suggested, the board note is modified and submitted for approval please

22/08/2019 2:17 PM

**JASBIR SINGH**  
(SR GM(CP))

**Note No. #97**

22/08/2019 7:33 PM

**D.C.JOSHI**  
(ED(CCC))

**Note No. #98**

22/08/2019 9:21 PM

K SREEKANT  
(CMD)

**Note No. #99**

23/08/2019 1:42 PM

D.C.JOSHI  
(ED(CCC))

**Note No. #100**

23/08/2019 4:12 PM

R.N. SINGH  
(ED(ENGG-S/S,TL,CIVIL))

**Note No. #101**

23/08/2019 4:39 PM

A K BAHL  
(SR GM(CE))

**Note No. #102**

23/08/2019 5:34 PM

K.V.SUBBALAKSHMI DEVI  
(SR DGM(CE))

  
पंकज सुथार / Pankaj Suthar  
प्रबंधक (टीएलसी) / Manager(TLC)  
पावरग्रिड, भड़ला-II/POWERGRID,Bhadla-II