ODISHA ELECTRICITY REGULATORY COMMISSION
BIDYUT NIYAMAK BHAWAN
PLOT NO.4, CHUNOKOLI, SHAILASHREE VIHAR,
BHUBANESWAR - 751021
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Present: Shri G. Mohapatra, Officiating Chairperson
Shri S. K. Ray Mohapatra, Member

Case No. 05/2024

Odisha Power Transmission Corporation Ltd. (OPTCL) …… Petitioner

Vrs.

TPWODL & others …… Respondents

In the matter of: **Application under Condition 10 of its Licence Conditions seeking approval of investment proposal taken up from FY 2022-23 & FY 2023-24 for construction of 2 nos. 132 kV SC line on DC tower, 01 no.132 kV LILO line and 01 no. 132/33 kV Grid Sub-station (GSS) along with associated line on availing equity/grant/loan assistance from the suitable funding agency.**

For the Petitioner: Shri B. B. Mehta, Director (Operation), OPTCL,

For the Respondents: Shri K. C Nanda, GM (RA & Strategy), TPWODL, Representative of SLDC and Ms. Sonali Pattnaik, Manager (Legal), Department of Energy, Government of Odisha.

Date of hearing: 30.04.2024 **Date of Order: 13.05.2024**

ORDER

1. The petitioner, OPTCL being the State Transmission Utility and deemed Transmission Licensee, has submitted an application under condition 10 of the Licence Condition seeking approval of investment proposals for the construction of 2 Nos, of S/C lines on D/C tower (Padmapur-Ghens 132kV S/C line & Kantabanji-Patnagarh 132kV S/C line), 132 kV LILO line (LILO of Budhipadar-Sundargarh 132kV line at Bamra Grid Sub-station) and 132/33 kV Grid Sub-station (GSS) at Jharbandh with associated 132 kV LILO line on availing equity/grant/loan assistance from suitable funding agency.

2. As per OPTCL's Licence Condition 7.1 and provision under Section 40 of the Electricity Act, 2003 OPTCL, a Transmission Licensee is duty bound to make investments to build, maintain & operate an efficient co-ordinated & economic intra-State transmission system. As per OPTCL's Licence Condition 10 read with Condition 23.1, the Petitioner-OPTCL is required to obtain prior approval of the Commission for an investment proposal of Rs.10.00 Cr. and above. Accordingly, OPTCL has submitted

this investment proposal for the execution of four transmission projects totalling Rs.129.14 Cr., as the individual cost of the proposed projects exceeds the limit of Rs.10.00 Cr. As per the Licence Condition, the Commission is to be satisfied with the need for such investment and also to examine the economic, techno-commercial & environmental issues attached to such investment proposals. In compliance with the requirements under Licence Condition 10.4, OPTCL has submitted the Detailed Project Reports (DPRs) of individual investment proposals along with relevant information and justification pertaining to the above projects. The details of the investment proposal based on the load flow study are as follows:

a) OPTCL has proposed for construction of a new 132 kV S/C line on the D/C tower from 132/33 kV Grid Sub-station at Padampur to 132/33 kV Grid Sub-station at Ghens and one 132 kV feeder bay extension each at Padampur and Ghens Sub-Station (approx. line length: 40.137 km.) at an estimated cost of Rs.28.80 Cr. with 30% Equity Support from the Government of Odisha under RRCP (Radial to Ring Conversion Project) phase-II Scheme and the rest 70% availing loan from outside funding agency. OPTCL has submitted that the existing 2X40 MVA, 132/33 kV Grid Sub-station at Ghens is radially connected and getting power through 132kV D/C lines (line length: 29.53 kms.) from 220/132/33 kV Grid Sub-station at Bargarh New. The Ghens Grid Sub-Station is catering to the load of Melechhamunda, Sohela, Ghens and Bijepur command areas at 33 kV. Further, the 132/33kV Grid Sub-station at Padampur is connected with the 132/33 kV Substation at Patnagarh and a Solar power plant of 40 MW Power capacity. The 33 kV supply has been extended to both rural and agricultural areas from this substation. Since the 132/33 kV Grid Sub-Station at Ghens is radially connected to a single source, to ensure the reliability of the transmission network and uninterrupted power supply, a ring system will be highly essential. The proposed line will form a ring transmission system with Grid Substations (i.e. Padampur – Patnagarh - Bolangir New – Barpali - Bargarh New – Ghens - Padampur). Further, 132/33kV Grid Sub-Station at Padampur is connected to the 132/33 kV Grid Sub-Station at Patnagarh and the 132/33 kV Grid Sub-Station at Nuapada. Once this proposed project is completed, Ghens Grid Sub-Station will get the power from both Bargarh New & Padampur GSS thereby ensuring stability and reliability of the 132 kV network in the western part of Odisha by improving the voltage profile and providing an uninterrupted power supply. The proposed Transmission line has been considered in the Revised 14th Transmission Plan of OPTCL for the period

from FY 2022-23 to 2026-27 (Case No.08 /2024). OPTCL has projected a reduction of average annual technical loss to the extent of 0.28 MW, which is equivalent to a gain of Rs.02.34 Lakh in monetary terms (considering 24paise/kWh). They have further projected an additional flow of 1009.98 LU (considering 3% transmission loss) shall bring annual revenue of Rs.242.39 Lakhs to OPTCL at the transmission charge of 24 paise/kWh. Thus, as per Cost Benefit Analysis, OPTCL has projected the total annual revenue to the tune of Rs.244.73 Lakhs with the Average Annual Rate of Return is 8.50%. Further, OPTCL has estimated the Internal Rate of Return (IRR) from this investment as 5.43% with a negative Net Present Value (NPV).

b) OPTCL has proposed for construction of a new 132 kV S/C line on the D/C tower from 132/33 kV GSS, Kantabanji to 132/33kV GSS, Patnagarh with bay extension at both GSS (approx. line length: 39.993 km.) at an estimated cost of Rs.28.27 Cr. with 30% Equity Support from the Government of Odisha under RRCP (Radial to Ring Conversion Project) phase-II scheme and the rest 70% availing loan from outside funding agency. OPTCL has submitted that the existing 132/33 kV Grid S/S (2X20+1X40 MVA) at Patnagarh is fed from a 132 kV D/C line (line length: 39.805Kms.) from 220/132/33 kV Grid Substation Bolangir New and is connected to Jyoti Solar and Alex Green Solar at 33kV for solar power injection. The 132/33 kV Grid Substation (2x40 MVA) at Kantabanji is fed from a single source by a 132 kV SC line from the 132/33kV Grid Substation at Khariar and is feeding power to RTSS Kantabanji. The Kantabanji Grid Substation is further catering to Kantabanji, Turekela, Muribahal, Gudighat and Industrial feeders at 33 kV. The 33 kV supply has been extended to both agricultural and industrial areas from this Sub-Station. Since 132/33 kV Kantabanji is radially connected to a single source, the proposed ring transmission system (i.e. Patnagarh - Bolangir New- Bolangir old - ACME Solar – Tusura - ABREL Solar – Saintala – Kesinga - Khariar – Kantabanji – Patnagarh) will be highly essential in order to ensure the reliability of the transmission network and uninterrupted power supply. Once this Project is completed, Kantabanji Grid Substation will connect to both Khariar & Patnagarh GSS which will ensure the stability and reliability of the 132kV network in the western part of Odisha by improving the voltage profile and providing an uninterrupted power supply. The proposed Transmission line has been included in the Revised 14th Transmission Plan of OPTCL for the period from FY 2022-23 to 2026-27 (Case No.08 /2024). OPTCL has projected a reduction of average annual

technical loss to the extent of 0.98 MW, which is equivalent to a gain of Rs.08.13 Lakh in monetary terms (considering 24 paise/kWh). The expectation of an additional 819.76 LU (considering a 3% transmission loss) shall bring additional annual revenue of Rs.196.74 Lakhs to OPTCL at the transmission charge of 24 paise/kWh. Thus, as per Cost Benefit Analysis, OPTCL has projected the total annual revenue to the tune of Rs.204.87 Lakhs with the Average Annual Rate of Return is 7.25%. Further, OPTCL has estimated the Internal Rate of Return (IRR) from this investment as 2.81% with a negative Net Present Value (NPV).

c) OPTCL has proposed for construction of LILO of one circuit (ckt-II) of Budhipadar-Sundargarh 132 kV D/C line at 220/132/33 kV Grid Sub-Station at Bamra with bay extensions at Bamra (approx. line length: 35.5 km.) at an estimated cost of Rs.33.39 Cr. with 30% Equity Support from the Government of Odisha under RRCP (Radial to Ring Conversion Project) phase-II scheme and the rest 70% availing loan from outside funding agency. OPTCL has submitted that presently, the 132 kV Grid Substation at Sundargarh is drawing power radially through the 132 kV D/C line from the 220/132/33 kV Grid Substation at Budhipadar. The present maximum load of 132 kV Budhipadar-Sundargarh (CKT-II) feeder is around 40 MW. If any breakdown occurs in the aforesaid line or 220/132/33 kV Grid Sub-Station at Budhipadar, then the entire Sundargarh district will remain in darkness and a similar situation arises during maintenance activity in Sundargarh Grid Substation also. This hampers the Govt.'s aim of providing quality and uninterrupted power supply to the consumers in the Sundargarh districts. Hence, there is a requirement for establishing multi-source connectivity to the Sundargarh Grid Substation to enhance the power transmission capacity and reliability in the region, thereby catering to the growing demand for electricity. The proposed Transmission line has been considered in the Revised 14th Transmission Plan of OPTCL for the period from FY 2022-23 to 2026-27 (Case No.08 /2024). OPTCL has projected a reduction of average annual technical loss to the extent of 0.37 MW, which is equivalent to a gain of Rs.03.10 Lakh in monetary terms (considering 24paise/kWh). The expectation of an additional 1855.79 LU (considering a 3% transmission loss) shall bring additional annual revenue of Rs.445.39 Lakhs to OPTCL at the transmission charge of 24 paise/kWh. Thus, as per Cost Benefit Analysis, OPTCL has projected the total annual revenue to the tune of Rs.448.48 Lakhs with the Average Annual Rate of Return is 13.43%.

Further, OPTCL has estimated the Internal Rate of Return (IRR) from this investment as 19.17% with positive Net Present Value (NPV).

d) OPTCL has proposed for construction of a new 2X20 MVA 132/33 kV Grid Sub-Station (GSS) at Jharbandh (Bargarh) with SAS along with the associated 132 kV LILO line on 132 kV Padampur - Nuapada Line (Approx. Line Length- 8.705 km.) at an estimated cost of Rs.38.68 Cr. with 100% Equity Support from Government of Odisha under OTSSP (Odisha Transmission System Strengthening Programme) Phase-I Scheme. OPTCL has submitted that Paikmal Primary Sub-station (PSS) is availing power from 132/33 kV Grid Sub-Station at Padampur which is 33 km away. The other PSS Jharbandh, Dova, Dunguripali, Jhitiki, Mandosil are connected to Paikmal PSS and availing power through the same feeder. The present maximum load on that feeder is around 20MW. The present voltage scenarios of Paikmal, Jharbandh, Dova, Dunguripali, Jhitiki, and Mandosil PSS are found to be very low and beyond the permissible limit. As aforesaid 6 nos. of PSS have connected through a single PSS i.e. Paikmal, for any fault in that feeder or during the maintenance of the 132/33 kV Grid Sub-station, the entire Jharbandh & Paikmal Tahasil remains in darkness. So, the proposed 132/33 kV Grid Sub-Station at Jharbandh is very much necessary for TPWODL to provide quality & uninterrupted supply to the consumers in the nearby areas. TPWODL will also be able to meet the future load growth in that area. The proposed Sub-station has been considered in the Revised 14th Transmission Plan of OPTCL for the period from FY 2022-23 to 2026-27 (Case No.08 /2024). OPTCL has projected a reduction of average annual technical loss to the extent of 0.78 MW, which is equivalent to a gain of Rs.06.50 Lakh in monetary terms (considering 24 paise/kWh). With 70% utilization of (2x20) MVA transformation capacity at the proposed grid S/S and with 3% transmission loss, the additional energy available would be 1284.78 LU/annum, which will bring additional annual revenue of Rs.308.35 Lakhs to OPTCL at the transmission charge of 24 paise/kWh. Thus, as per Cost Benefit Analysis, OPTCL has projected the total annual revenue to the tune of Rs. 314.85 Lakhs with the Average Annual Rate of Return is 8.14%. Further, OPTCL has estimated the Internal Rate of Return (IRR) from this investment as 97.03% with positive Net Present Value (NPV).

3. The total investment has been estimated to be Rs.129.14 Cr. The investment proposal in brief, with the source of funding as submitted by OPTCL is given in the Table below:

Sl. No.	DESCRIPTION	CAPITAL EXPENDITURE (Rs. Cr.)	NAME OF THE SCHEME & SOURCE OF FUNDING
1	132 kV S/C line on D/C tower from 132/33 kV GSS at **Padampur** to 132/33 kV GSS at **Ghens** with Bay extension at both the GSS.	28.80	RRCP-II (30% GoO Equity) 70%- Loan
2	132 kV S/C line on D/C tower from 132/33 kV GSS at **Kantabanji** to 132/33 kV GSS at **Patnagarh** with bay extension at both GSS.	28.27	RRCP-II (30% GoO Equity) 70%- Loan
3	132 kV LILO line from 132 kV **Budhipadar-Sundargarh** (CKT-II) line to 220/132/33 kV GSS at **Bamra** with bay extension at Bamra .	33.39	RRCP-II (30% GoO Equity) 70%- Loan
4	2X20 MVA, 132/33 kV GSS at **Jharbandh** with SAS and associated 132 kV LILO line.	38.68	OTSSP-1 (100% GoO Equity)
TOTAL		**129.14**	

4. OPTCL has submitted that the System Studies have been conducted in line with the planning criteria considering different load generation scenarios under normal steady-state conditions. The implementation of the aforesaid additional proposed Substation and transmission lines would improve the system voltage profile, reduce the loading on certain important sections of the transmission network and also reduce the overall transmission system loss. Further, under a single contingency scenario, the study indicates potential problems related to the overloading of remaining lines and the collapse of system voltages at locations close to the tripped line. Therefore, OPTCL has submitted the above investment proposal for the construction of the above-mentioned Substation and transmission lines for reinforcement of its existing transmission network to meet the system needs in future years. OPTCL envisages the reduction of an average annual loss of a total of 2.41MW after the execution of the above projects.

5. OPTCL has submitted that the projects have been proposed after a detailed discussion with the concerned DISCOM. OPTCL has also submitted the Environmental Impact Assessment (EIA) Study for the projects. As per the EIA study, the projects do not have any adverse environmental impact or resettlement issue and the overall impact of the projects is highly positive. OPTCL has also stated that the projects are being executed on a turnkey basis through a Competitive Bidding process.

6. The Concerned DISCOM i.e., TPWODL has agreed with the submission of OPTCL. TPWODL has submitted that the proposed projects are necessary for the current

situation despite the lower IRR (Internal Rate of Return) and negative NPV (Net Present Value) of the proposed projects. Further, TPWODL has requested OPTCL to consider the capacity of 2x40 MVA instead of 2x20 MVA for the 132/33 kV Grid Substation at Jharbandh. TPWODL has also raised concern that the cost of the 132 kV LILO line from 132 kV Budhipadar-Sundargarh (CKT-II) line to 220/132/33 kV GSS at Bamra may change due to the forest diversion. Additionally, TPWODL has requested OPTCL for the upgradation of Lapanga GSS from 2x20 MVA to 2x40 MVA and a new GSS at the Sambalpur airport dyke area or Sason area near Hirakud reservoir.

7. In response to TPWODL's query regarding the capacity upgradation of Jharbandh, OPTCL has informed that earlier TPWODL had proposed 2x20 MVA for Jharbandh GSS. Accordingly, a tender was floated and work was awarded. The agency has already requisitioned 2x20MVA transformers, which are expected to be delivered shortly. However, if required, the transformers will be upgraded in the future to meet the increased load demand of Jharbandh GSS. Regarding the forest diversion, OPTCL has submitted that the DGPS survey of the proposed 132 kV LILO line from 132 kV Budhipadar-Sundargarh (CKT-II) line to 220/132/33 kV GSS at Bamra is to be authenticated by ORSAC, after which actual involvement of forest can be ascertained.

8. Regarding capacity upgradation of Lapanga Substation, OPTCL has submitted that considering the additional load demand, the augmentation of one number existing 20 MVA transformer by installing a 40 MVA transformer at Lapanga GSS has been finalised which will be implemented shortly. The upgrade of the 2nd 20 MVA transformer to 40 MVA will be taken up in due course. At present, there is no scope for bay extension at 33 kV level at Lapanga GSS. However, the same can be effected after the acquisition of land which is in progress. Regarding the proposal for the establishment of 01 number new GSS near Sambalpur Airport, OPTCL has submitted that the 132/33 kV GSS at Maneswar is very much nearer to Sambalpur which can accommodate 5 to 6 nos. 33kV feeders easily and is presently underutilized. This aspect may be explored to cater 10 MW projected load for Mega lift Irrigation projects, before establishing a new GSS in the same command area.

9. Heard the parties at length through hybrid mode and considered their written submissions. It is observed that:

   a) The proposed Substation and transmission lines have been included in the Revised 14th Transmission Plan study of OPTCL for the period from FY 2022-23

to 2026-27 (Case No.08 /2024). OPTCL has now approached the Commission with the DPR along with the cost-benefit analysis for approval of their investment proposals for the proposed projects.

b) The petitioner-OPTCL has justified that the investments would strengthen the power transmission system, reduce loading on certain sections of OPTCL's transmission network, reduce the overall transmission losses, improve voltage profile, ensure better quality of power supply, minimize interruption of power supply, enhance security/reliability of power system for smooth flow of power without any constraint/congestion in the system and would enable OPTCL to receive economic return.

c) The Board of Directors (BoD) of OPTCL has accorded administrative approval for the aforesaid projects.

d) The proposed Substation and transmission lines are being executed availing from the Government of Odisha under the OTSSP-1 (Odisha Transmission System Strengthening Programme) scheme (100% Equity) and RRCP (Radial to Ring Conversion Project) phase-II scheme (30% Equity Support by GoO.).

10. The Commission has studied the technical and commercial viability of the projects as submitted by OPTCL which are summarized below:

Sl. No	Name of the Project	Project Cost (Rs. Cr)	Net Cash flow (Rs. Cr)	Period of Benefits (in Years)	Avg. Return estimated by OPTCL (%)	NPV @ 10.46% Dis. Factor (Rs. Cr)	IRR (%)	Viability
1	132 kV S/C line on D/C tower from 132/33 kV GSS at **Padampur** to 132/33 kV GSS at **Ghens** with Bay extension at both the GSS.	28.80	27.35	35	8.50	(5.45)	5.52	**Non-viable**
2	132 kV S/C line on D/C tower from 132/33 kV GSS at **Kantabanji** to 132/33 kV GSS at **Patnagarh** with bay extension at both GSS	28.27	14.47	35	7.25	(8.32)	3.00	**Non-viable**
3	132 kV LILO of one circuit of **Budhipadar-Sundargarh** 132 kV D/C line to 220/132/33 kV GSS at **Bamra** with bay extension at Bamra	33.39	88.45	35	13.43	5.82	15.59	**Viable**

Sl. No	Name of the Project	Project Cost (Rs. Cr)	Net Cash flow (Rs. Cr)	Period of Benefits (in Years)	Avg. Return estimated by OPTCL (%)	NPV @ 10.46% Dis. Factor (Rs. Cr)	IRR (%)	Viability
4	2X20 MVA, 132/33 kV GSS at **Jharbandh** with SAS and associated 132 kV LILO line	38.68	58.48	35	8.14	7.34	93.20	**Viable**

a) The above table shows that out of four (4) projects, two (2) projects i.e. 132 kV S/C line on D/C tower from 132/33 kV GSS at Padampur to 132/33 kV GSS at Ghens and 132 kV S/C line on D/C tower from 132/33 kV GSS at Kantabanji to 132/33 kV GSS at Patnagarh are not economically viable but the proposed lines would result in reduction in the transmission loss to the extent of 0.28 MW & 0.98 MW respectively.

b) The petitioner, OPTCL has submitted that the proposed transmission lines will convert the existing radial transmission system into the ring system which is highly essential to ensure the reliability of the transmission network and uninterrupted power supply. The proposed 132 kV S/C line on the D/C tower from 132/33 kV GSS at Padampur to 132/33 kV GSS at Ghens will form a ring at 132 kV level (i.e. Padampur – Patnagarh - Bolangir New – Barpali - Bargarh New – Ghens - Padampur). Further, the proposed 132 kV S/C line on the D/C tower from 132/33 kV GSS at Kantabanji to 132/33 kV GSS at Patnagarh will form another ring at 132 kV level (i.e. Patnagarh - Bolangir New- Bolangir old - ACME Solar – Tusura - ABREL Solar – Saintala – Kesinga - Khariar – Kantabanji – Patnagarh).

c) The proposed 132 kV S/C line on the D/C tower from 132/33 kV GSS at Padampur to 132/33 kV GSS at Ghens will form a 132kV transmission ring and establish dual connectivity for the Ghens GSS with both Bargarh New & Padampur GSS. Similarly, the proposed 132 kV S/C line on the D/C tower from 132/33 kV GSS at Kantabanji to 132/33 kV GSS at Patnagarh will establish dual connectivity for the Kantabanji GSS (from Khariar GSS & Patnagarh GSS). The proposed 132 kV LILO of one circuit (CKT-II) of Budhipadar-Sundargarh 132 kV D/C line at 220/132/33 kV GSS at Bamra will establish multisource connectivity to Sundergarh GSS (from Budhipadar GSS and Bamra GSS). The aforementioned proposed Transmission lines will ensure the stability and reliability of the 132 kV network in the western part of Odisha by improving the

voltage profile and providing an uninterrupted power supply due to the formation of 132 kV ring and reducing transmission loss.

d) The present voltage level at Paikmal, Jharbandh, Dova, Dunguripali, Jhitiki, and Mandosil PSS are found to be very low and are beyond the permissible limit as aforesaid 6 nos. of PSS are connected in series starting with Paikmal PSS and availing power from single 132/33 kV Grid Sub-Station i.e. at Padampur which is 33 km. away from Paikmal PSS. The proposed 132/33 kV GSS at Jharbandh will feed the PSSs at Dova, Paikmal, Jhitiki, Jharbandh, etc. and thereby improve the voltage profile at these PSSs.

e) The concerned DISCOM i.e. TPWODL has also agreed for the implementation of these projects, to improve the reliability, availability and quality of power supply in the areas of operation of TPWODL. Further, TPWODL has requested OPTCL to consider upgrading the capacity of the 132/33 kV Grid Substation at Jharbandh from 2x20 MVA to 2x40 MVA. However, OPTCL has submitted that the work has been awarded and the agency has already requisitioned 2x20MVA transformers, which are expected to be delivered shortly. In case of increased load demand, the transformers will be upgraded in the future to cater to the requirements of the 132/33 kV GSS at Jharbandh.

11. In view of the above-stated factual scenario, the Commission is inclined to approve the investment proposal of OPTCL for the construction of the 132/33 kV Grid Sub-station at Jharbandh, 132 kV S/C transmission lines on D/C towers (Padmapur- Ghens 132 kV line & Kantabanji-Patnagarh 132 kV line) and LILO of one circuit (CKT-II) of Budhipadar-Sundergarh 132 kV D/C line at 220/132/33 kV Bamra GSS for the strengthening of the existing transmission system by the creation of two rings at 132 kV level in the OPTCL's transmission network to facilitate smooth flow of power, improving voltage profile at PSS levels of TPWODL & reducing transmission system loss and improving reliability & availability of power supply to achieve ultimate objective of (24x7) quality power supply to all.

12. OPTCL shall ensure that the projects are completed in time to avoid cost and time overrun and 33 kV outlets are optimally utilised by the TPWODL to avoid the creation of stranded assets. Accordingly, TPWODL shall be communicated to develop the downstream distribution network in the matching time frame.

13. Considering the future load growth, it is reiterated that the transmission network of OPTCL should be expanded & strengthened based on the long-term load flow study and should go for standardisation of GSS MVA capacity & Transformation capacity and to keep adequate space in GSS for future expansion. Further, OPTCL is again directed to avoid execution of transmission projects in future without proper system study and prior approval of investment proposal by the Commission.

14. With the above observations and directions, the case is disposed of.

Sd/-

(S. K. Ray Mohapatra)
Member

Sd/-

(G. Mohapatra)
Officiating Chairperson