JHARKHAND URJA SANCHARAN NIGAM LIMITED

(JUSNL)

Business Plan for 2nd Control Period
(FY 2016-17 to FY 2020-21)

Contents

1 Introduction

This section briefs on the background of Jharkhand Urja Sancharan Nigam Ltd (JUSNL) and the second control period (FY 2016-17 to FY 2020-21).

1.1 Background

Jharkhand Urja Sancharan Nigam Ltd. (herein after to be referred to as "JUSNL" or erstwhile "JSEB-Transmission function") has been incorporated on 23rd October 2013 with the Registrar of Companies, Jharkhand, Ranchi and has obtained Certificate of Commencement of Business on 28th November 2013.

Before formation of JUSNL, the erstwhile JSEB's transmission function was responsible for transmitting power from the state owned generation stations and other procurement from external sources into the state distribution network. The responsibilities of the erstwhile JSEB-transmission function, as a STU, have now been transferred to Jharkhand Urja Sancharan Nigam Ltd (JUSNL).

The grid substation capacity of JUSNL is 2300 MVA for 220KV and 2870 MVA for 132KV class in 35 GSS as listed below:

Table 1: GSS capacity of JUSNL (Source: Power for All Plan for Jharkhand)

Sl. No.	Voltage Rating	No. of GSS	Nos. /capacity of Power transformers (In MVA)	Capacity (In MVA)
A-1	400 kV Class			
A-2	220 kV Class	7	12 X 150 = 1800	2,300
			5 x 100 = 500	
A-3	132 kV Class	28	51 x 50 = 2,550	2,870
			16 X 20 = 320	
Total No of GSS		35		

The above grid substations are connected through 400/220/132 KV transmission lines with total line length of 3,386 CKM

Table 2: Existing Transmission Lines (Source: Power for All Plan for Jharkhand)

Sl No.	Class of Transmission line	Length (In CKM)
1	400 KV	180
2	220 KV	988
3	132 KV	2,218
Total		3,386

The state power sector of Jharkhand is currently under the second MYT control period from 2016-17 to 2020-21. The newly formed JUSNL has to comply, as a transmission licensee, to the various directives and requirements of the MYT regulations prescribed by the state electricity regulator.

As per the MYT regulations 2015, issued by the Hon'ble Commission, JUSNL is required to file for all reasonable expenses it believes it would incur over the next control period and seek the approval of the Hon'ble Commission for the same. The filing is to be done based on the projections of the expected revenue and costs, O&M expenses which should be arrived at by a reasonable methodology adopted by JUSNL.

It is pertinent to mention that the O&M expenses for the said control period have been projected considering the historical data. Owing to the fact that a substantial number of households in Jharkhand do not have access to the electricity as well as the fact that the planned capital expenditure in transmission actual O&M expenses are expected to be much higher, the actual O&M expenses may be significantly higher than the current projections..

1.2 Business plan requirements as per JSERC MYT Regulations, 2015

In Regulation 6.6 of the JSERC (Terms and Conditions for Determination of Transmission Tariff) Regulations, 2015 it is also stated that the Business Plan shall be for the entire Control Period and shall, inter alia, contain;

a) *''Capital Investment Plan: This should be commensurate with load growth and quality improvement proposed in the Business Plan. The investment plan should also include corresponding capitalization schedule and financing plan;*

b) *The appropriate capital structure and cost of financing (interest on debt) and return on equity, terms of the existing loan agreements, etc;*

c) *Operation and Maintenance (O&M) Expenses: This shall include the costs estimated for the Base Year, the actual expenses incurred in the previous control period and the projected values for each year of the Control Period based on the proposed norms for O&M cost, including indexation and other appropriate mechanisms;*

d) *Depreciation: Based on the fair life of the asset and capitalization schedules for each year of the Control Period;*

e) *Performance Targets: A set of targets proposed for controllable items such as Availability of transmission system, transformer failure rate, and any other parameters for quality of supply. The targets shall be consistent with the capital investment plan proposed by the Transmission Licensee;*

f) *Proposals for Non-Tariff Income with item-wise description and details;*

g) *Proposals in respect of income from Other Business; and*

h) *Other Information: This shall include any other details considered appropriate by the Transmission Licensee for consideration during determination of tariff''*

This document covers the detailed business plan for JUSNL, for the 2nd control period of FY 2016-17 to FY 2020-21 in line with MYT regulations.

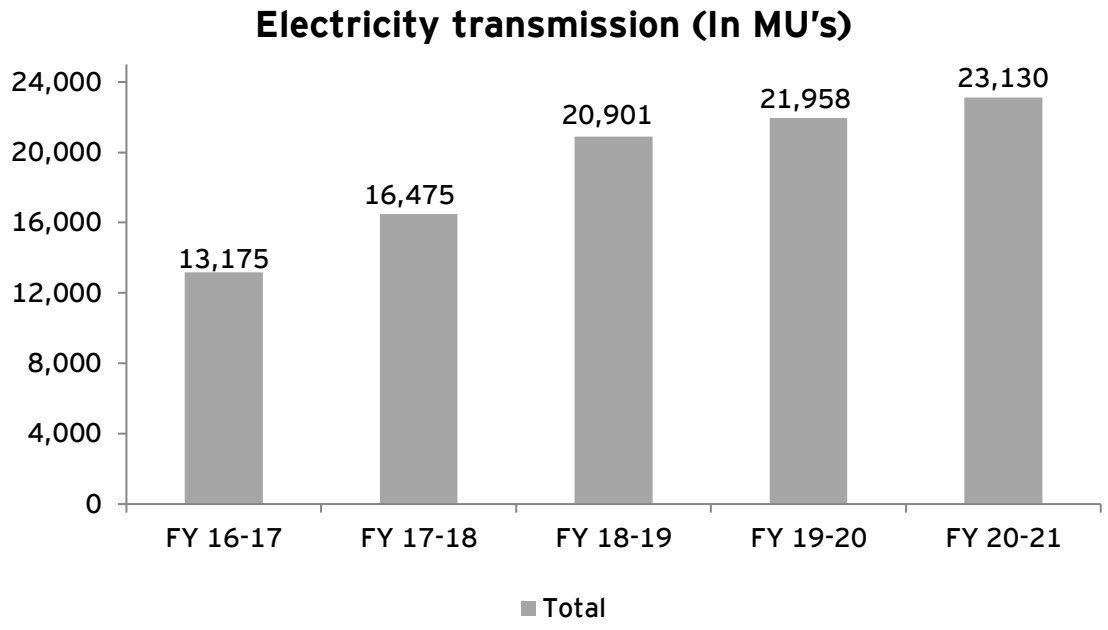
2 Electricity demand scenario for the state

As per the PFA document, the electricity access in the state of Jharkhand is among the lowest in the country. As on FY 2016, a total 28.18 Lac (~56%) rural HHs and 1.8 Lac (~10.4%) urban HH were not having access to electricity. The state of Jharkhand has prepared an ambitious plan for achieving power for all (PFA) by FY 2019. The subsequent sections provide details of future electricity growth in line with the state plan to achieve PFA.

2.1 Electricity Demand scenario in Jharkhand from 2016-17 to 2020-21

The demand for power has been increasing gradually in Jharkhand over the years. For JBVNL alone, the state's s largest distribution licensee, it is expected to increase by almost 80% from 9,759 MUs to 17,133 MUs during the said control period from 2016-17 to 2020-21.The exponential rise in electricity sales is primarily seen as a result of the ambitious efforts to enhance accessibility of electricity to households besides meeting the requirement of industries and other category of consumers.

The projected requirement of power transmission for the said period from 2016-17 to 2020-21, is expected to increase by almost 50% from 13,175 MUs to 23,130 MUs .The increase over the years is illustrated in the figure below:



The above projections have been computed considering the following JBVNL'S projections.

Table 3: Year wise Projection of Sales (MU's)

Year	MUs
2016-17	9,759
2017-18	12,204
2018-19	15,482
2019-20	16,265
2020-21	17,133

The AT&C loss level for JBVNL has been considered as 30% as mentioned in PFA document and technical loss (transmission) has been considered as 5%. As JUSNL is primarily transmitting power to JBVNL, hence only their projections have been considered. Such a huge growth in power transmission is expected owing to development of large IPPs in state of Jharkhand, up gradation of Patratu Thermal power plant and downstream strengthening of 220/132 KV network which is required to ensure efficient power transfer from interstate generation projects. The large addition in transmission capacity is required to facilitate open access, decongest the transmission system and strengthen the intra state grid to provide the required support to the downstream discoms.

2.2 Peak load growth in Jharkhand

As per Power for All (24X7) report ,the peak load demand projections by end of XIIth Plan (2016-17) would be 4616 MW. However the same is expected to grow by an average 5 yearly growth of 37% for the next three five-year plan period ending 2031-32 as shown below:

Table 4: Short Term Peak Load Demand Projections Year wise (MW)

Peak Load Demand Projections (In MW)				
State	2016-17	2021-22	2026-27	2031-32
Jharkhand	4,616	6,341	8,780	11,930

As is evident from the above, the next five years are expected to witness exponential rise in electricity demand in the state of Jharkhand. This in turn would require a robust transmission infrastructure to transmit requisite electricity from the generation sources to the Discom periphery.

3 Approach to development of the business plan for 2nd control period

The Business Plan for the Transmission Company is prepared based on the review of erstwhile JSEB business profile, current operational performance and future plans to meet the PFA vision. While preparing the Business Plan, historical trends of various parameters has been considered so as to project the same appropriately for the years covered under the control period.

3.1 Key components of the business plan:

In line with the MYT regulations for the 2nd control period, the Transmission Business Plan covers the following:

- **Capital Investment Plan**: Capital investments are required for both, addition of new lines and substations necessary for allowing flow of increased power onwards to the distribution utilities as well as system strengthening and improvement schemes for increased reliability and grid stability. The planning of Capital Investment is essentially commensurate with the anticipated load growth and quality improvement measures. The Capital Investment Plan broadly includes the proposed year wise Capital expenditure towards new assets to be added and renovation & modernisation (R&M) to be undertaken across various transmission voltages.

- **Capitalization schedule:** The Business Plan also includes the schedule of capitalization for the proposed investments, separately for the new schemes and for R&M works.

- **Financing Plan and Depreciation:** The Business plan also includes the schedule of financing indicating the total amount of debt and equity required for funding the future capital expenditure. In addition, annual depreciation has also been calculated based on the fair life of the asset and capitalisation schedules for each year of the Control Period.

- Operation & maintenance (O&M) expenses: These include projections of employee costs, R&M costs and the administration & general (A&G) costs.

- **Proposals for Non-Tariff Income with item-wise description and details;**

- **Proposals in respect of income from Other Business; and**

- **Other Information:** This shall include any other details considered appropriate by the Transmission Licensee for consideration during determination of tariff

Each of the above mentioned components of the Business Plan has been detailed out in subsequent chapters. The Business Plan has been prepared according to the JSERC Terms and Conditions of Tariff Regulations, 2015 applicable rules/ regulations/ provision of the law, Standard Accounting Practices and generally accepted O&M norms etc.

3.2 Structuring of proposed investments in the business plan

The congestion/loading on JUSNL's transmission system is likely to increase further due to implementation of upcoming electricity access enhancement projects in the downstream distribution segment viz. DDUGJY, RGGVY, IPDS and other state funded schemes for meeting the 24X7 PFA objectives. JUSNL's overall objectives that drive the ongoing schemes include:

a) Meeting demand for power arising from existing and future end-consumers in various load centers/ pockets in the State;

b) Providing connectivity for evacuation of power from various upcoming intra and inter-state power plants and for onward delivery of such power to load centres/ drawl points;

c) Improving the availability and reliability of the intra-state transmission systems in the state; and

d) Improving efficiency by way of reducing technical losses in the intra-state transmission systems.

For the purpose of this business plan, the planned capital initiatives have been divided into components as below:

- Ongoing capex schemes
- Proposed capex schemes
- Infrastructure augmentation schemes
- Renovation and Modernisation schemes

3.2.1 Ongoing capex schemes/projects

The ongoing schemes include those schemes/projects where execution has been commenced before FY 16 and are expected to be completed by FY 17 end.

JUSNL, through the Jharkhand consultancy project which is being executed by PGCIL, has undertaken execution of schemes for enhancement of transmission capacity to meet the downstream load of JBVNL, which has increased substantially over past few years. Approximately 1,627 CKM of transmission lines construction has commenced before 2016 and will be completed by FY 2017 as per the details shown below:

Table 5: Ongoing Line length for Transmission Line

Sl. No.	Class of Transmission line	Length (In KM)	Length (In CKM)
1	400 KV	120	240
2	220 KV	435.40	869.81
3	132 KV	258.64	517.28
Total		**814.05**	**1627.09**

The details about the ongoing transmission lines are provided in the Annexure 1 for 400 kV, Annexure 2 for 220 kV and Annexure 3 for 132 kV.

JUSNL is adding 11 number of grid sub-station (GSS) before FY 16 which are covered under ongoing capex schemes. These schemes are expected to enhance the transformation capacity of the intra-state and inter-state transmission system of Jharkhand.

Table 6: Ongoing Capacity of GSS

Sl. No.	Voltage Rating	No. of GSS	Capacity (In MVA)
1	400/220/132 KV	-	-
2	400/220 KV	-	-
3	220/132/33 KV	4	1200 MVA (220/132) kV 400 MVA (132/33) kV
4	220/132 KV	1	300
5	132/33 KV	6	570
Total No of GSS		**11**	

The details about the ongoing GSS are provided in the Annexure 4 for 400/220/132 KV, Annexure 5 for 440/220 KV, Annexure 6 for 220/132/33, Annexure 7 for 220/132/33 KV, Annexure 8 for 220/132 KV and Annexure 9 for 132/33 KV.

3.2.2 Planned capex schemes

The planned new capex schemes are those schemes which have been planned for execution under the 2nd control period between FY 17 to FY 21.

Approximately 11,137 cKm of new transmission lines have been planned to be added by year 2020-2021under the proposed new capex schemes. The table below depicts the Voltage level wise plan of line length for the FY17-FY21.

Table 7: Planned Line length for Transmission Line

Sl No.	Class of Transmission line	Length (In KM)	Length (In CKM)
1	400 KV	1309	2618
2	220 KV	1151	2302
3	132 KV	3108	6217
Total		**5,568**	**11,137**

The details about the ongoing transmission lines are provided in the Annexure 1 for 400 KV, Annexure 2 for 220 KV and Annexure 3 for 132 KV.

In addition, JUSNL has planned to add 63 new GSS in the state. Voltage level wise plan, for the proposed new capex schemes, is shown below which depicts no of GSS to be added and the overall capacity enhancement in the state.

Table 8: Planned Capacity for GSS

Sl. No.	Voltage Rating	No. of GSS	Capacity (In MVA)
1	400/220/132 KV	3	1890 MVA (400/220) kV 900 MVA (220/132) kV
2	400/220 KV	4	2520
3	220/132/33 KV	12	3600 MVA (220/132) kV 1200 MVA (132/33) kV
4	220/132 KV	3	900
5	132/33 KV	41	4100
Total No of GSS		**63**	

As seen from the above, JUSNL has large number of capital schemes that would be commissioned during the current control period. The details about the ongoing GSS are provided in the Annexure 4 for 400/220/132 KV, Annexure 5 for 440/220 KV, Annexure 6 for 220/132/33, Annexure 7 for 220/132/33 KV, Annexure 8 for 220/132 KV and Annexure 9 for 132/33 KV.

3.2.3 Augmentation schemes

The augmentation schemes include those capital schemes which involve capacity augmentation of existing transmission network to meet the growing electricity demand in the state of Jharkhand.

The average size of power transformers in JUSNL's system range from 150 MVA to 20 MVA. In addition, new transformers are proposed for installation in existing GSS for enhancement of the existing transformation capacity. The implementation of proposed augmentation schemes is expected to result in an overall capacity addition of 1,400 MVA.

The major augmentation schemes proposed to be undertaken are as follows:

- Installation of additional 50 MVA transformers including allied protective system and other associated works at the following locations:
  - Noamundi
  - Goelkera
  - Chakardharpur
- Installation of additional 150 MVA transformers including allied protective system and other associated works in 220/131 KV GSS at the following locations:
  - Hatia II
  - Govindpur
  - Chaibasa
  - Dumka
  - Latehar
  - Giridih
  - Jasidih
- Replacement and Refurbishment of equipment's such as panels , breakers , CT,PT , bus bars , substation structures ,control room , foundations earthing system , lighting system , Energy Meters, spares management and structures for old GSS:
  - 220 kV Class G/S/S - 4 nos.
    : 6 X 150 = 600 MVA
    : 5 x 100 = 500 MVA
  - 132 kV Class G/S/S-27 nos.
    : 39 X 50 = 1950 MVA
    : 17 X 20 = 340 MVA

The details about the Augmentation schemes are provided in the Annexure 11.

3.2.4 Renovation and Modernization schemes

The Renovation and Modernization schemes are those capital schemes which involve repair, revamp or reconstruct of existing transmission network to meet the growing electricity demand in the state.

During this control period JUSNL proposes to replace all its 20 MVA transformers with 50 MVA transformers. In addition JUSNL proposed to install SCADA and allied systems to ensure better coordination and efficient O&M of its transmission assets. Replacement of ground wires with OPGW and re-conductoring with HTLS conductors shall also be undertaken during this control period.

The major R&M schemes proposed to be undertaken are as follows:

- Replacement of 20 MVA with 50 MVA transformers including replacement of allied protective system and other associated works in 132/33 KV GSS at the following locations:
  - Kamdara -2
  - Garhwa-1
  - Rajkharsawn-1
  - Golkera-1
  - Kendposi-2
  - Jadugoda-2
  - Jamtara-2
  - Lalmatia-1
  - Gumla-2
  - Japla-2
  - Chakradharpur-1

- Implementation of SCADA and energy management and auditing system (EMAS). In addition remote data collection repository at substation level and mechanism to communicate such data across JUSNL to SLDC and ULDC for information analysis, pricing etc. is proposed to be installed.
- Implementation of asset Management system and development of georelational database and GIS mapping
- Implementation of preventive maintenance system for safe and reliable operation of transmission system including procurement of testing and diagnosis equipment's for five transmission zones viz. Thermovision camera, Hardware fittings, Protective Relays, Measuring equipment, CRITL Testing Equipment's etc.
- Interconnectivity of existing GSS for SCADA and EMAS through OPGW (Optical power Ground Wire) Line Length 2048.345 KM(line)
- Replacement of old RTU at 07 GSS and new RTU at 04 GSS
- Battery + Charger (15 No GSS)

- PLCC and Allied equipment for 12 Link of JUSNL
- Optical Fiber procurement and laying along Terminal Equipment
- Dual redundant optical fiber path from SLDC to Hatia-1 GSS
- Web site designing
- Replacement of 48 Volt battery banks
- Renovation of SLDC building and Centralized AC of SLDC
- Bus bar system of power distribution of entire SLDC
- Video projector , power flow study software, relay coordination, furniture and furnishment of conference room
- GPS clock installation in all GSS for relay and meters
- Renovation of Carrier room at each GSS for AC environment
- PLCC panels for upcoming GSS as mandatory spares, Testing Equipment, Modem etc.

The details about the R&M schemes are provided in the Annexure 9 and 10.

4 Capital Investment Plan

This section covers the detailed capital investment plan for JUSNL in line with the aforementioned segregation of schemes. The associated capitalization schedule and financing plan are also part of this section.

The JSERC terms and conditions of transmission tariff regulations 2015, state as under with regard to the capital investment plan:

"6.8 Capital investment plan submitted by the Licensee shall also provide details of ongoing projects that will spill into the Control Period and new projects that will commence during the Control Period but may extend beyond the Control Period.

6.9 The capital investment plan shall be in conformity with the plans made by the CEA/CTU and with the capital investment plans of the Distribution Licensee and the Generating Company. The investment plan shall be scheme-wise and each scheme shall include:

a) Purpose of investment (i.e. replacement of existing assets, meeting load growth, technical loss reduction, meeting reactive energy requirements, improvement in quality and reliability of supply, etc.);

b) Capital Structure;

c) Capitalization Schedule;

d) Financing Plan;

e) Cost-benefit analysis;

f) Improvement in operational efficiency envisaged in the control period;

4.1 Key assumptions

The major assumptions considered for estimating annual capital requirements deal with capex phasing. Annual capex phasing has been done separately for planned and ongoing projects as explained below:

1) For Ongoing projects

The phasing of planned projects has been considered taking into account the number of years left to complete the project execution. For ongoing projects we have divided them as 1 year project, 2 year project, 3 year project and 4 year project as mentioned in the table below:

Table 9: Phasing for Ongoing projects

Capex phasing (Ongoing projects)	Year 1	Year 2	Year 3	Year 4
1 year project	100%	-	-	-
2 year project	40%	65%	-	-
3 year project	30%	43%	35%	-
4 year project	15%	32%	47%	19%

The project cost also contains an escalation factor of 8% which is in line with JSERC 2015 Regulations. The regulations prescribe calculation of escalation factor using average of 5 year whole sale price index (WPI) and consumer price index (CPI). The average of the CPI and WPI is then combined as per the following formula to arrive at the escalation factor (**0.55 * CPI + 0.45 * WPI).** This has resulted into an escalation factor of 8%. The escalation factor so derived has been used for the entire control period.

It is pertinent to mention that the above phasing also addresses the annual cost escalations with respect to the base project cost. It is for the same reason, the consolidate project costing for schemes requiring more than 1 year of completion is more than 100% of the base project cost in the above table.

2) Planned Projects

For planned projects, all ongoing schemes have been divided into 1year project, 2 year project and 3 year project based on the number of years left for project completion. The phasing assumptions are as per the following table:

Table 10: Phasing for Planned Projects

Capex phasing (new projects)	Year 1	Year 2	Year 3
1 year project	100%	-	-
2 year project	40%	65%	-
3 year project	30%	43%	35%

Similar cost escalations, as for the ongoing schemes, have been followed for the planned projects also.

4.2 Consolidated capital investment plan

The total project cost for all the ongoing, planned, augmentation and R&M schemes, for the 2nd control period, is Rs10,674.79 Cr. A summary of the year wise capital expenditure is as follows:

Table 11: Year wise Capex (2016-2021) (Rs. Cr)

S.No	Particulars	2016-17	2017-18	2018-19	2019-20	2020-21	Total
1	Ongoing Schemes	360.98	46.31	-	-	-	**407.29**
2	Planned Schemes	1305.61	2911.16	2935.43	982.91	694.31	**8829.41**
3	Augmentation Schemes	508.58	64.80	87.48	-	-	**660.86**
4	Renovation & Modernization Schemes	291.65	292.61	162.95	-	30.01	**777.22**
Total		**2466.82**	**3314.88**	**3185.86**	**982.91**	**724.32**	**10674.79**

The details of the above schemes and the key assumptions followed for estimating the scheme costings are included in the subsequent sections.

4.3 Detailed capital investment plan

This section provides voltage-wise and year-wise capital expenditure plan of JUSNL across the four scheme types viz. ongoing schemes, planned schemes augmentation and R&M schemes. The four aforementioned schemes have been further segregated into capital investments across transmission lines and GSS.

4.3.1 Ongoing Schemes

The voltage wise details of the ongoing schemes, covering transmission lines and GSS, are as below:

Ongoing transmission lines

A total investment of Rs. 164.20 Cr is planned, through ongoing schemes, during the second control period. Out of this, majority of investments shall be undertaken in FY 2016-17 with the maximum proportion (49%) being planned at 220 KV level. The subsequent table provides details of the same.

Table 12: Year wise Capex for Ongoing Transmission lines (Rs. Cr)

Transmission lines (ongoing)	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	24.36	-	-	-	-	**24.36**
220 kV	81.67	-	-	-	-	**81.67**
132 kV	47.35	10.81	-	-	-	**58.16**
Total	153.39	**10.81**	-	-	-	**164.20**

Ongoing GSS

The table below shows the amount of expenditure being incurred on ongoing GSS projects which have commenced construction before 2016-17. The table below depicts that Rs.243.09 Cr will be spent on ongoing GSS works during the second control period. Out of this, 85% of the amount shall be invested in the first year of the control period. Further, the highest proportion of the investments on ongoing GSS shall be on 220/132/33 KV and 132/33 KV schemes.

Table 13: Year wise Capex for Ongoing Grid Substations (Rs. Cr)

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	17.21	-	-	-	-	17.21
220/132/33	101.33	35.50	-	-	-	136.83
132/33	89.06	-	-	-	-	89.06
Total (GSS)	207.59	35.50	-	-	-	243.09

4.3.2 Planned capex schemes

The voltage wise details of the planned capex schemes, covering transmission lines and GSS, are as follows:

Planned Transmission Lines:

A total investment of Rs. 3,770.53 Cr is proposed, through planned schemes during the second control period. Out of this, majority of investments shall be undertaken in FY 2017-18 and FY 2018-19 with the maximum proportion (21%) being planned at 400 KV level and (56%) at 132 KV level. The subsequent table provides details of the same.

Table 14: Year wise Capex for Planned Transmission lines (Rs. Cr)

Transmission lines (planned)	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	-	239.04	371.21	141.85	61.39	813.49
220 kV	88.30	242.19	282.83	113.96	109.56	836.84
132 kV	418.51	712.93	687.20	200.82	100.75	2,120.20
Total	506.80	1,194.17	1,341.23	456.62	271.70	3,770.53

Planned Grid Substations:

The table below shows the amount of expenditure being incurred on planned GSS projects which shall start construction after 2016-17. The table below depicts that Rs 5,058.89 Cr will be spent on planned GSS works during the second control

period. Out of this, 35% of the amount shall be invested in the second year of the control period. Further, the highest proportion of the investments on ongoing GSS shall be on 220/132/33 KV and 132/33 KV substations.

Table 15: Year wise Capex for Planned Grid Substations (Rs. Cr)

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	62.00	217.62	180.79	117.15	84.35	**661.92**
400/220/132	60.40	228.31	211.35	-	-	**500.06**
220/132	54.64	118.03	127.47	-	-	**300.14**
220/132/33	199.02	345.03	314.97	230.02	234.63	**1323.67**
132/33	422.74	808.01	759.62	179.11	103.63	**2273.10**
Total (GSS)	**798.81**	**1716.99**	**1594.20**	**526.29**	**422.60**	**5058.89**

4.3.3 Augmentation schemes

The voltage wise details of the planned and ongoing augmentation schemes, covering transmission lines and GSS, are as below:

Ongoing augmentation schemes: Ongoing augmentation schemes are subdivided into following:

1) Ongoing augmentation-transmission: No investments are being made in ongoing augmentation schemes for Transmission lines.

2) Ongoing augmentation-GSS: No investments are being made in ongoing augmentation schemes for GSS.

Planned augmentation schemes: Planned augmentation schemes are subdivided into following:

1) Planned augmentation-transmission: No investments are being proposed for augmentation schemes of Transmission lines in the 2nd control period.

2) Planned augmentation-GSS: The table below shows the amount of expenditure proposed on planned GSS projects which shall start construction after 2016-17. The table below depicts that Rs. 660.86 Cr will be spent on planned GSS works during the second control period. Out of this, 76% of the amount shall be invested in the first year of the control period. Further, the highest proportion of the investments on ongoing GSS shall be on 220/132 KV.

Table 16: Planned Augmentation Schemes for Grid Substations (Rs. Cr)

Augmentation	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	120	32.4	69.984	-	-	222.384
220/132/33	-	-	-	-	-	-
132/33	305	21.6	-	-	-	326.6
Others	83.58	10.8	17.496	-	-	111.87
Total (GSS)	**508.58**	**64.8**	**87.48**	**-**	**-**	**660.86**

4.3.4 Renovation and Modernization (R&M) schemes

The voltage wise details of the planned and ongoing R&M schemes, covering transmission lines and GSS, are as follows:

Ongoing R&M schemes: Ongoing R&M schemes are subdivided into following:

1) Ongoing R&M-transmission: No such investments are being made in R&M for Transmission lines.
2) Ongoing R&M -GSS : The table below shows the amount of expenditure being incurred on ongoing GSS projects which has commenced construction before 2016-17. The table below depicts that Rs. 70 Cr will be spent on ongoing GSS works during the second control period.

Table 17: Ongoing R&M Scheme for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	-	-	-	-	-	-
220/132/33	-	-	-	-	-	-
132/33	70	-	-	-	-	70
Others	-	-	-	-	-	-
Total (GSS)	70	-	-	-	-	70

Planned R&M schemes: Planned R&M schemes are subdivided into following.

1) Planned R&M-transmission: A total investment of Rs. 328.10 Cr is proposed, through planned schemes, during the second control period. Out of this, majority of investments shall be undertaken in FY 2017-18 and FY 2018-19 with the maximum proportion (43%) being planned at 220 KV level and (56%) at 132 KV level. The subsequent table provides details of the same.

Table 18 : Planned Augmentation Schemes for Transmission Lines (Rs. Cr)

Augmentation	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	-	-	-	-	-	-

Augmentation	2016-17	2017-18	2018-19	2019-20	2020-21	Total
220 kV	70.86	47.96	23.78	-	-	142.61
132 kV	17.20	16.60	121.67	-	30.01	185.49
Total (Transmission lines)	**88.07**	**64.56**	**145.45**	**-**	**30.01**	**328.10**

2) Planned R&M-GSS : The table below shows the amount of expenditure being incurred on planned GSS projects which shall start construction from 2016-17. The table below depicts that Rs, 379.12 Cr will be spent on planned GSS works during the second control period. Out of this, 60% of the amount shall be invested in the second year of the control period. Further, the highest proportion of the investments on ongoing GSS shall be on 132/33 KV.

Table 19: Ongoing R&M Scheme for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	-	-	-	-	-	-
220/132/33	-	-	-	-	-	-
132/33	50	54	-	-	-	**104**
Others	83.58	174.05	17.49	-	-	**275.12**
Total (GSS)	**133.58**	**228.05**	**17.49**	**-**	**-**	**379.12**

5 Capitalization Schedule

This section covers the detailed capitalization schedule in line with the aforementioned schemes. Post the commissioning of the respective transmission line/GSS, the project cost of the commissioned element is considered to be capitalized in the same year .

This section provides voltage-wise and year-wise capitalization plan of JUSNL across the four scheme types viz. ongoing schemes, planned schemes, augmentation schemes and R&M. The four aforementioned schemes have been further segregated into transmission lines and GSS.

5.1 Ongoing Schemes

The voltage wise details of the ongoing schemes, covering transmission lines and GSS, are as below:

Ongoing transmission lines

A total capitalization of Rs. 634.97 Cr is planned, through ongoing schemes, during the second control period. Out of this, major capitalization shall be in FY 2016-17 with the maximum proportion (53%) being planned at 220 KV level. The subsequent table provides details of the same.

Table 20: Capitalisation Schedule for Ongoing Transmission Schemes (Rs. Cr)

Transmission lines	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	133.35	-	-	-	-	**133.35**
220 kV	341.21	-	-	-	-	**341.21**
132 kV	136.25	24.16	-	-	-	**160.40**
Total	**610.81**	**24.16**	**-**	**-**	**-**	**634.97**

Ongoing GSS

The table below shows the amount of capitalization being made on ongoing GSS projects which have commenced construction before 2016-17. The table below depicts that Rs, 728.28 Cr will be capitalized on ongoing GSS works during the second control period. Out of this, 88% of the amount shall be capitalized in the first year of the control period. Further, the highest proportion of capitalization on ongoing GSS schemes, shall be on 220/132/33 KV and 132/33 KV schemes.

Table 21: Capitalisation Schedule for Ongoing GSS Schemes (Rs. Cr)

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	
400/220/132	-	-	-	-	-	
220/132	74.62	-	-	-	-	**74.62**

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
220/132/33	241.20	84.75	-	-	-	**325.95**
132/33	327.72	-	-	-	-	**327.72**
Total (GSS)	**643.53**	**84.75**	**-**	**-**	-	**728.28**

5.2 Planned schemes

The voltage wise details of the planned schemes, covering transmission lines and GSS, are as follows:

Planned Transmission Lines:

A total capitalization of Rs. 3,640.48 Cr is proposed during the second control period. Out of this, major capitalization shall be undertaken in FY 2018-19 with the maximum proportion being planned at (57%) at 132 KV level. The subsequent table provides details of the same.

Table 22: Capitalisation Schedule for Planned Transmission Schemes (Rs. Cr)

Transmission lines	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	-	-	392.80	321.40	-	**714.20**
220 kV	-	119.78	433.42	-	283.64	**836.84**
132 kV	7.66	0.78	1519.78	341.06	220.16	**2089.45**
Total	**7.66**	**120.56**	**2346.00**	**662.46**	**503.80**	**3640.48**

Planned Grid Substations:

The table below shows the capitalization schedule of planned GSS projects which shall start construction after 2016-17. The table below depicts that Rs, 4,033.89 Cr will be spent on planned GSS works during the second control period. Out of this, 60% of the amount shall be capitalized in the third year of the control period. Further, the highest proportion of the investments on ongoing GSS shall be on 220/132/33 KV and 132/33 KV schemes.

Table 23: Capitalisation Schedule for Planned GSS (Rs. Cr)

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	122.44	135.44	141.11	102.93	**501.92**
400/220/132	-	113.25	251.82	-	-	**365.06**
220/132	-	-	280.14	-	-	**280.14**
220/132/33	-	162.63	414.90	-	446.14	**1023.67**
132/33	-	86.43	1365.44	246.68	164.56	**1863.10**
Total (GSS)	-	**484.75**	**2447.72**	**387.79**	**713.63**	**4033.89**

5.3 Augmentation schemes

The voltage wise details of the planned and ongoing augmentation schemes, are as follows:

Ongoing augmentation schemes: Ongoing augmentation schemes are subdivided into following:

1) Ongoing augmentation-transmission: No capitalization has been considered in ongoing augmentation schemes for Transmission lines.
2) Ongoing augmentation-GSS: No capitalization has been considered in ongoing augmentation schemes for GSS.

Planned augmentation schemes: Planned augmentation schemes are subdivided into following :

1) Planned augmentation-transmission: No capitalization has been considered in planned augmentation schemes for Transmission lines.
2) Planned augmentation-GSS: The table below shows the amount of capitalization on planned GSS projects which shall start construction after 2016-17. The table below depicts that Rs, 548.9 Cr will be capitalized on planned GSS works during the second control period. Out of this, 77% of the amount shall be capitalized in the first year of the control period. Further, the highest proportion of the capitalization shall be on 220/132 KV and other schemes.

Table 24: Planned Augmentation Schemes for Grid Substations (Rs. Cr)

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	120	32.4	69.984	-	-	222.38
220/132/33	-	-	-	-	-	-
132/33	305	21.6	-	-	-	326.6
Others	-	-	-	-	-	-
Total (GSS)	425	54	69.984	-	-	548.98

5.4 Renovation and Modernization schemes

The voltage wise details of the planned and ongoing R&M schemes, covering transmission lines and GSS, are as follows:

Ongoing R&M schemes: Ongoing R&M schemes are subdivided into following:

1) Ongoing R&M-transmission: No capitalization has been considered in ongoing R&M schemes for Transmission lines.

2) Ongoing R&M -GSS : The table below shows the amount of capitalization being incurred on ongoing GSS projects which commenced construction before 2016-17. The table below depicts that Rs, 70 Cr will be capitalized on ongoing GSS works during the second control period. Further, the highest proportion of the capitalization on ongoing GSS shall be on 132/33 KV schemes.

Table 25: Ongoing R&M Scheme for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	-	-	-	-	-	-
220/132/33	-	-	-	-	-	-
132/33	70	-	-	-	-	70
Others	-	-	-	-	-	-
Total (GSS)	70	-	-	-	-	70

Planned R&M schemes: Planned R&M schemes are subdivided as follows:

1) Planned R&M-transmission: A total capitalization of Rs. 394.2 Cr is proposed, through planned schemes, during the second control period. Out of this, majority capitalization shall be undertaken in FY 2016-17 and FY 2018-19 with the maximum proportion (43%) being planned at 220 KV level and (56%) at 132 KV level. The subsequent table provides details of the same.

Table 26 : Planned Augmentation Schemes for Transmission Lines (Rs. Cr)

Augmentation	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	-	-	-	-	-	-
220 kV	70.86	47.96	23.8	-	-	142.6
132 kV	17.20	16.60	187.8	-	30.0	251.6
Total (Transmission lines)	**88.07**	**64.56**	**211.6**	**-**	**30.0**	**394.2**

2) Planned R&M-GSS: The table below shows the amount of capitalization incurred on planned GSS projects which shall start construction from 2016-17. The table below depicts that Rs, 379.12 Cr will be capitalized on planned GSS works during the second control period. Out of this, 60% of the amount shall be capitalized in the second year of the control period. Further, the highest proportion of the capitalization on ongoing GSS shall be on 132/33 KV and other schemes.

Table 27: Ongoing R&M Scheme for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	-	-	-	-	-	-
220/132/33	-	-	-	-	-	-
132/33	50	54	-	-	-	**104**
Others	83.58	174.05	17.496	-	-	**275.12**
Total (GSS)	**133.58**	**228.05**	**17.496**	-	-	**379.12**

6 Financing Plan & Depreciation

6.1 Introduction

The financing plan provides a clear picture of the amount of debt and equity required during the second control period between FY 2016-17 to FY 2020-21.

The Debt and Equity ratio has been assumed as 70% and 30% for the financing plan.

Table 28: Percentage of Debt-Equity ratio

Capital Structure	
Debt	70%
Equity	30%

6.2 Consolidated financing plan

The total amount of debt which shall be required during the 2nd control period, is Rs 7,472.35 Cr. Majority of the debt would be used during the period between FY 2017 to 2019.The year wise detail is depicted below in the table:

Table 29: Year wise Financing plan (Debt) 2016-2021 (Rs. Cr)

Particulars	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Debt	1726.77	2320.42	2230.10	688.04	507.02	7,472.35

The total amount of equity which shall be required during the 2nd control period is Rs 3,202.44 Cr .The maximum amount of equity, during the 2nd control period, would be infused during the period between FY 2017 to 2019. The year wise detail is depicted below in the table:

Table 30: Year wise Financing plan (Equity) 2016-2021 (Rs. Cr)

Particulars	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Equity	740.04	994.47	955.76	294.87	217.30	3,202.44

6.3 Detailed financing plan

This section provides voltage-wise and year-wise debt and equity requirement of JUSNL across the four scheme groups viz. transmission lines, GSS, augmentation schemes and R&M.

6.3.1 Transmission Lines

The voltage wise and year wise details of the debt and equity covering transmission lines are as follows:

Debt for Transmission lines:

A total debt of Rs. 2,754.31 Cr is planned for the transmission lines, during the second control period. Out of this, major debt shall be required in FY 2018-19 with the maximum proportion (34%) being directed towards 132 KV level schemes. The subsequent table provides details of the same.

Table 31: Year wise Debt for Transmission lines (Rs. Cr)

Transmission lines	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	17.05	167.33	259.85	99.29	42.98	**586.50**
220 kV	118.98	169.54	197.98	79.77	76.69	**642.96**
132 kV	326.10	506.62	481.04	140.57	70.53	**1524.86**
Total	**462.13**	**843.49**	**938.86**	**319.63**	**190.19**	**2754.31**

Equity for Transmission lines :

A total equity of Rs. 1,180.42 Cr shall be required for the construction of transmission lines during the second control period. Out of this, majority of equity shall be required in FY 2018-19 with the maximum proportion (55%) being directed to 132 KV level schemes. The subsequent table provides details of the same.

Table 32: Year wise Equity for Transmission lines (Rs. Cr)

Transmission lines	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	7.31	71.71	111.36	42.55	18.42	**251.36**
220 kV	50.99	72.66	84.85	34.19	32.87	**275.55**
132 kV	139.76	217.12	206.16	60.24	30.23	**653.51**
Total	**198.06**	**361.49**	**402.37**	**136.99**	**81.51**	**1180.42**

6.3.2 Grid Substations

The voltage wise and year wise details of the debt and equity required for GSS are as follows:

Debt for Grid Substations :

A total debt of Rs. 3,711.39 Cr shall be required for the GSS, during the second control period. Out of this, major debt shall be undertaken in FY 2017-18 with the maximum proportion (44%) being directed to 132 KV level schemes. The subsequent table provides details of the same

Table 33: Year wise Debt for GSS (Rs. Cr)

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	43.40	152.33	126.55	82.01	59.05	**463.34**
400/220/132	42.28	159.82	147.95	-	-	**350.04**
220/132	50.30	82.62	89.23	-	-	**222.14**
220/132/33	210.25	266.37	220.48	161.02	164.24	**1022.35**
132/33	358.26	565.60	531.73	125.38	72.54	**1653.51**
Total (GSS)	**704.48**	**1226.74**	**1115.94**	**368.40**	**295.82**	**3711.39**

Equity for Grid Substations :
A total equity infusion of Rs. 1,590.59 Cr shall be required for the GSS, during the second control period. Out of this, major equity shall be infused in FY 2017-18 with the maximum proportion (44%) being directed to 132 KV level schemes. The subsequent table provides details of the same.

Table 34: Year wise Equity for GSS (Rs. Cr)

GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	18.60	65.29	54.24	35.15	25.31	**198.57**
400/220/132	18.12	68.49	63.41	-	-	**150.02**
220/132	21.56	35.41	38.24	-	-	**95.20**
220/132/33	90.11	114.16	94.49	69.01	70.39	**438.15**
132/33	153.54	242.40	227.89	53.73	31.09	**708.65**
Total (GSS)	**301.92**	**525.75**	**478.26**	**157.89**	**126.78**	**1590.59**

6.3.3 Augmentation Schemes

The voltage wise and year wise details of the debt and equity required for augmentation schemes, covering transmission lines and GSS, are as follows:

Augmentation schemes of Transmission Lines: No investment is being made in augmentation schemes for Transmission lines during the 2nd control period.

Augmentation schemes of Grid Substation: The voltage wise details of the debt and equity required for augmentation of GSS follows:

1) Debt required for Augmentation schemes of GSS: A total debt of Rs. 462.60 Cr is required for the GSS, during the second control period. Out of this, major debt infusion shall be in FY 2016-17 with the maximum proportion (76%) being directed to other schemes and 132/33 KV level schemes. The subsequent table provides details of the same.

Table 35: Year wise Debt for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	84.00	22.68	48.99	-	-	155.66
220/132/33				-	-	-
132/33	213.50	15.12	-	-	-	228.62
Others	58.51	7.56	12.25	-	-	78.313
Total (GSS)	356.01	45.36	61.24	-	-	462.60

2) Equity for Augmentation schemes for GSS: A total equity of Rs. 198.25 Cr is required for the Augmentation of GSS during the second control period. Out of this, major equity shall be infused in FY 2016-17 with the maximum proportion (76%) being directed to 220/132KV level. The subsequent table provides details of the same:

Table 36: Year wise Equity for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	36	9.72	20.99	-	-	66.71
220/132/33	-	-	-	-	-	-
132/33	91.5	6.48	-	-	-	97.98
Others	25.07	3.24	5.24	-	-	33.56
Total (GSS)	152.57	19.44	26.24	-	-	198.25

6.3.4 Renovation and Modernization schemes

The voltage wise details of the R&M schemes, covering transmission lines and GSS, are as below:

R&M schemes for Transmission Lines: The voltage wise details of the debt and equity covering Transmission Lines for R&M schemes are as follows:

1) Debt for R&M schemes of Transmission Lines: A total debt of Rs. 229.66 Cr shall be required for the augmentation of existing transmission lines, during the second control period. Out of this, major debt infusion shall be in FY 2018-19 with the maximum proportion (44%) being directed to 132 KV level scheme. The subsequent table provides details of the same.

Table 37: Year wise Debt for Augmentation Schemes (Rs. Cr)

Augmentation for Transmission lines	2016-17	2017-18	2018-19	2019-20	2020-21	Total

Augmentation for Transmission lines	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	-	-	-	-	-	
220 kV	49.60	33.57	16.64	-	-	99.82
132 kV	12.04	11.62	85.17	-	21.01	129.84
Total (Transmission lines)	61.65	45.20	101.82	-	21.01	229.66

2) Equity for R&M schemes for Transmission Lines: A total equity infusion of Rs. 98.43 Cr shall be required for the augmentation of transmission lines, during the second control period. Out of this, major equity infusion shall be in FY 2018-19 with the maximum proportion (56%) being directed to 132 KV level schemes. The subsequent table provides details of the same.

Table 38: Year wise Equity for Augmentation Schemes (Rs. Cr)

Augmentation for Transmission lines	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400 kV	-	-	-	-	-	
220 kV	21.26	14.39	7.13	-	-	42.78
132 kV	5.16	4.98	36.50	-	9.00	55.65
Total (Transmission lines)	26.42	19.37	43.64	-	9.00	98.43

R&M schemes for GSS: The voltage wise details of the debt and equity required for R&M of GSS are as follows:

1) Debt for R&M schemes for GSS : A total debt of Rs. 314 Cr shall be required planned for the R&M of existing transmission lines, during the second control period. Out of this, major debt infusion shall be in FY 2017-18 with the maximum proportion being directed to 132 KV level and other schemes. The subsequent table provides details of the same.

Table 39: Year wise Equity for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-	-	-	-
220/132	-	-	-	-	-	-
220/132/33	-	-	-	-	-	-
132/33	84.00	37.80	-	-	-	**122**
Others	58.51	121.84	12.25	-	-	193
Total (GSS)	142.51	159.64	12.25	-	-	314

2) Equity for R&M schemes for GSS : A total equity of Rs. 135 Cr shall be required for the R&M of existing GSS, during the second control period. Out of this, major debt infusion shall be in FY 2017-18 with the maximum proportion being directed to 132 KV level and other schemes. The subsequent table provides details of the same.

Table 40: Year wise Equity for GSS (Rs. Cr)

Augmentation for GSS	2016-17	2017-18	2018-19	2019-20	2020-21	Total
400/220	-	-	-	-	-	-
400/220/132	-	-	-		-	-
220/132	-	-	-	-	-	-
220/132/33	-	-	-	-	-	-
132/33	36	16.2	-	-	-	52
Others	25.07	52.21	5.24	-	-	83
Total (GSS)	61.07	68.41	5.24	-	-	135

6.4 Depreciation

For the purpose of projecting the depreciation costs and also their inclusion in the business plan, the JSERC regulation 2015 has been followed. The regulations state:

> *''6.6 The Transmission Licensee shall file for the Commission's approval, a Business Plan approved by the Board of Directors, as per the timelines specified in Section A16: of these Regulations. The Business Plan shall be for the entire Control Period and shall, interalia, contain;*
>
> *(d) Depreciation: Based on the fair life of the asset and capitalization schedules for each year of the Control Period;*
>
> ***''Depreciation***
>
> *7.25 Depreciation shall be calculated for each year of the Tariff period, on the amount of Capital Cost of the assets admitted by the Commission; Provided that ''*

6.4.1 Detailed Methodology

From the Appendix-I: Depreciation Schedule of JSERC Regulations 2015, depreciation rate is taken as 5.28% using Straight line method. Straight line depreciation method charges cost evenly throughout the useful life of a fixed asset. This depreciation method is appropriate where economic benefits from an asset are expected to be realized evenly over its useful life.

Table 41: Rate of Depreciation

Particulars	Rate
Depreciation (Transmission line)	5.28%
Depreciation (GSS)	5.28%

The depreciation of an asset has been assumed to start the very next year an asset has been capitalized. For instance if the asset is capitalized in 2017-18 then the

depreciation of 5.28% is charged in 2018-19, 2019-20, 2020-21 till the last year of the second control period.

The below table provides the depreciation booked by JUSNL for the second control period. Closing value of the Net assets is taken from the audited accounts of the 2013-14 .The depreciation for the respective year is being calculated on the average of opening and closing balance as shown below:

Table 42 : Year wise Closing Balance of Net Assets (In Crs)

Particulars	2016-17	2017-18	2018-19	2019-20	2020-21
Opening (Net Assets)	286.86	2076.75	3049.07	7759.61	8383.68
Asset Addition	1978.6	1060.8	5092.8	1050.3	1247.4
Less :Depreciation	65.74	134.09	287.91	426.18	463.36
Closing (Net Assets)	2,203.11	3,002.26	7,856.51	8,383.68	9,167.74

As can be seen from the above table, the projected depreciation expenses are showing a significant increase over the control period. This is primarily because of the significant capital base addition during the second control period.

7 O&M expenses for 2nd control period

The O&M expenses of JUSNL for the 2nd MYT control period have been projected considering the historical expenses. This historical data is being used as the base figure and then being escalated to arrive at the future projections. The O&M expenses, as per the JSERC regulations 2015 are segregated across the following three expense heads:

- Employee expenses
- Repairs expenses
- A&G expenses

At the outset, the JUSNL would like to state that all the above expense heads have been projected for the control period in accordance with the procedure outlined in the JSERC tariff regulations 2015 for transmission function. The rate used for escalation of employee costs and A&G expenses is 8% as notified by the Commission in its tariff order and the constant 'K' required for projecting the Repairs expenses as per the regulations is considered at 3.96% of the GFA.

In the following lines we have independently dealt with the basis of projections for each of the expense heads outlined above. Based on the projections the total O&M expenses for the transmission function is as provided in the table below:

Table 43: Projections of O&M expenses for transmission function (Rs. Cr)

Expense head	Control period				
	2016-17	2017-18	2018-19	2019-20	2020-21
Employee Expenses	62.12	67.09	72.46	78.26	84.52
Repairs Expenses	93.56	137.43	335.34	376.94	426.39
A&G expenses	7.45	8.04	8.69	9.38	10.13
Total	**163.13**	**212.56**	**416.49**	**464.58**	**521.04**

As can be seen, the main reason for the increase in the total O&M expenses is the projected increase in Repairs expenses because of significant planned capital asset addition in the transmission function. It is also to be noted that the same is based on the capitalization schedule proposed by JUSNL.

7.1 Employee expenses

As already mentioned, JUSNL would like to mention that the basis of projection of the employee costs has been taken from audited accounts of 2013-14 (Jan to

March 2014) and the same has been proportionally increased. Thereafter, escalation factor of 8% was used to arrive at the employee costs of the JUSNL.

As per JSERC Tariff regulations 2015, Employee expenses of nth year is Employee Costs of the Licensee excluding terminal liabilities for the nth year. Since we have used audited accounts of one quarter for the year 2013-14 so, once this was accomplished, an increase of 8% was assumed for the subsequent years for projecting the employee expenses for JUSNL (2016-17 to 2020-21).

Accordingly the employee expenses for transmission function so arrived at are as provided below:

Table 44: Projections of employee expenses for JUSNL (Rs. Cr)

Employee Expenses	Control period				
	2016-17	2017-18	2018-19	2019-20	2020-21
Transmission	62.12	67.09	72.46	78.26	84.52

7.2 Repairs expenses

As already stated, for projecting the Repairs expenses for the JUSNL, closing GFA for the relevant year has been considered. The Repairs expenses for JUSNL were then calculated as a percentage of the closing GFA for each year from 2016 to 2021.

In this case we have used 2013-14 as the base year and 2012-13 as the preceding year to the base year hence K factor is calculated as 3.96 % and this factor 'k' is then multiplied with the sum total of opening GFA and assets capitalized to arrive at the actual Repair expenses for the each year from 2016 to 2021.

Based on this methodology the projected Repair expenses for the JUSNL for the control period are provided in the table below:

Table 45: Projections of Repair expenses for JUSNL (Rs. Cr)

Employee Expenses	Control period				
	2016-17	2017-18	2018-19	2019-20	2020-21
Transmission	93.56	137.43	335.34	376.94	426.39

As can be seen from the above table, the Repair expenses for the JUSNL are expected to go up significantly over the control period. This is because JUSNL is planning massive expansion in its transmission system for meeting the huge

demand growth. The expansion in the network would be required to meet the demand of the new consumer base as well as to meet the increase in demand from the existing consumer base. In light of the above huge addition in capital assets and consequently a proportionate increase in the Repair expenses is envisaged by the JUSNL.

7.3 A&G expenses

For projecting the A&G expenses, JUSNL has used the metric of 8% escalation rate as was used by the Hon'ble Commission in its previous tariff order. The A&G expenses for JUSNL is based on the number of employees for the year 2013-14. Audited accounts of 2013-14 (Jan to March 2014) has been taken, the same has been proportionally increased. Using the figure for FY 2013-14 as the base year, an escalation rate of 8% was applied on the same to arrive at the projected A&G expenses for each year.

Table 46: Projections of A&G expenses for transmission function (Rs. Cr)

Employee Expenses	Control period				
	2016-17	2017-18	2018-19	2019-20	2020-21
Transmission	7.45	8.04	8.69	9.38	10.13

8 Performance parameters of the JUSNL

Apart from undertaking requisite capital investments, JUSNL also endeavours towards being among the best performing state transmission utility in the country. As a result, JUSNL would continuously strive to benchmark It's various performance parameters with the industry standards.

8.1 Transmission losses

Being a newly formed licensee, JUSNL humbly submits that it is in the process of putting the necessary infrastructure and systems in place which shall help in correct estimation of its transmission losses. However, in the current scenario of absence of transmission loss levels, JUSNL had conducted a system loss study on its network, wherein the Consultants have estimated the transmission level losses through a load flow simulation exercise through deployment of state-of-the-art software based techniques. The study is still under process and JUSNL shall submit the same to the Hon'ble Commission at the earliest.

8.2 Availability of the Transmission System

As far as the transmission system availability is concerned, JUSNL has consistently tried to ensure a transmission system availability of above 98% as stipulated by the transmission tariff regulations notified by the Hon'ble Commission. In the future also JUSNL shall continue to ensure a transmission system availability of at-least 98% despite the increasing network loading. The table below provides the target for transmission system availability for the future years:

Table 47; Transmission system availability for the control period (%)

	2016-17 (Projected)	2017-18 (Projected)	2018-19 (Projected)	2019-20 (Projected)	2020-21 (Projected)
Transmission system availability	98%	98%	98%	98%	98%

9 Proposals for Non-Tariff Income

The transmission tariff regulation requires that the business plan for the transmission function should also provide the details of non-tariff income for the business as under:

".....The Business Plan shall be for the entire Control Period and shall, inter-alia, contain;

(f) Proposals for Non-Tariff Income with item-wise description and details;"

For projecting the Non-Tariff Income, JUSNL has used the metric of 8% escalation rate as was used by the Hon'ble Commission in its previous tariff order. The Non-Tariff Income for JUSNL is based on audited accounts of 2013-14 (Jan to March 2014), the figures were then appropriately escalated and escalated by 8% to get the projections from 2016 to 2021.The details of the same are as follows:

Table 48: Non-Tariff income for control period for transmission function (Rs. Cr)

Non-tariff income	Control Period				
	2016-17	2017-18	2018-19	2019-20	2020-21
Interest on Staff Loan & Advance	-	-	-	-	-
Income from Investment (F.D)	-	-	-	-	-
Interest on Loan & advance to licensees	-	-	-	-	-
D.P.S from Consumer	-	-	-	-	-
Interest on advance to Supplier/Contractor	0.25	0.27	0.29	0.31	0.34
Interest from Bank (Other than F.D)	-	-	-	-	-
Income from Trading	-	-	-	-	-
Income from Staff Welfare activities	0.01	0.01	0.01	0.01	0.01
Miscellaneous Receipt.	9.00	9.72	10.50	11.34	12.24
TOTAL	9.97	10.77	11.63	12.56	13.57

It is pertinent to mention that the income from trading, as above, indicates trading of scrap etc. and not power trading.

10 Conclusion

JUSNL humbly submits its business plan for the 2nd MYT control period for approval. A rational approach has been followed for ascertaining various data points using practical assumptions wherever required.

It is therefore humbly requested that the Hon'ble Commission may approve the above business plan in its entirety and allow JUSNL to successfully contribute to the state's growing power sector.

11 Annexures

11.1 Annexure 1 (400 KV Transmission Line)

TRANSMISSION LINES	Length (In KM)	Length in CKM	Start	End	Cost (In Rs Cr.)
Ongoing					
400 KV D/C Latehar(JSEB) to 400 KV PTPS G/S/S	90	180	2013-14	2016-17	96.70
400 KV D/C ESSAR (Latehar)-JSEB 400 KV G/S/S (Latehar) TL by Quad Moose conductor	30	60	2013-14	2016-17	32.23
Planned					
400 KV Quad Moose Koderma DVC TPS to Koderma JUSNL (15 Km)	15	30	2017-18	2018-19	16.12
400 KV Quad Moose Noth Karanpura (TPS) to Latehar GSS (100 Km)	100	200	2017-18	2018-19	107.44
400 KV Quad Moose North Karanpura (TPS) to Patratu GSS (58Km)	58	116	2017-18	2018-19	62.32
400 KV Quad Moose Patratu to Koderma GSS 400 KV (150 KM)	150	300	2017-18	2018-19	161.17
LILO of one circuit of 400 kV Kahalgaon - Maithon trans. line at 400 kV GSS Dumka	20	40	2017-18	2019-20	21.49
400 KV Quad Moose TTPS to Dumka GSS (236 KM)	236	472	2017-18	2019-20	253.57
400 kV D/C Dumka – Jasidih	70	140	2019-20	2020-21	75.21

11.2 Annexure 2 (220 KV Transmission Line)

TRANSMISSION LINES	Length (In KM)	CKM	Start	End	Cost (In Rs Cr.)
Ongoing projects					
220kV Dumka - Rupnarayanpur trans. line (D/C)	74	148	2013-14	2015-16	55.28
220 kV D/C 3 Ph. Chaibasa -Chaibasa (PG) Transmission line	1	1	2013-14	2016-17	0.75
220 KV D/C Hatia-Namkum (PGCIL) transmission line	16	32	2013-14	2016-17	11.95
220 KV D/C Link Line from 220 KV Lohardagga-Latehar TL near 132 KV GSS to 220 KV Lohardagga GSS	1.5	3	2013-14	2016-17	1.12
220 KV D/C Link Line from 400 KV JSEB S/S to existing Lohardagga-Latehar TL near 132 KV Latehar GSS	1.5	3	2013-14	2016-17	1.12
220 KV D/C TTPS-Govindpur transmission line	66.198	132.396	2013-14	2016-17	49.45
220 KV D/C Govindpur – Dumka transmission line	59.94	119.88	2013-14	2016-17	44.78
220 KV D/C Ramchandrapur – Chaibasa transmission line	24.267	48.534	2013-14	2016-17	18.13
220 KV D/C Chatra - Latehar transmission line	104	208	2013-14	2016-17	77.69
220 KV D/C Chatra - PBCMP (Barkagaon) transmission line	54	108	2013-14	2016-17	40.34
220 KV D/C Daltonganj - Garhwa transmission line	33	66	2015-16	2016-17	24.65
Planned Projects					
LILO of 220 KV D/C TTPS-Govindpur transmission line at Jainamore Bokaro	35	70	2016-17	2017-18	26.15
220KV D/C Ratu - PTPS transmission line	48	96	2016-17	2017-18	35.86
220 kV D/C Dumka – Jasidih	70	140	2016-17	2017-18	52.29
220 kV D/C 3 Ph. Godda - Lalmatia Transmission line	50	100	2016-17	2018-19	37.35

TRANSMISSION LINES	Length (In KM)	CKM	Start	End	Cost (In Rs Cr.)
220 kV D/C 3 Ph. Godda - Dumka Transmission line	75	150	2016-17	2018-19	56.03
220 Kv D/C link line to 220/132 KV PTPS GSS and 400/220 KV GSS	20	40	2016-17	2018-19	14.94
220 kV D/C Tenughat – Gomia	10	20	2016-17	2018-19	7.47
Link lines to 220KV D/C Daltonganj -Garhwa Trans. Line for both ends.	35	70	2016-17	2018-19	26.15
220 KV D/C400/220 Chandil GSS to Tamar (25 KM)	25	50	2017-18	2018-19	18.68
220 KV D/C 400/220 Chandil GSS to Chandil (10 KM)	10	20	2017-18	2018-19	7.47
220 kV D/C Koderma – Giridih	140	280	2017-18	2018-19	104.58
220 kV D/C Koderma (JSEB) – Koderma (DVC)	21	42	2017-18	2018-19	15.69
220 kV D/C Tenughat – Hazaribagh	135	270	2017-18	2018-19	100.85
220 kV D/C 3 Ph. Simdega - Chaibasa Trans. line	165	330	2018-19	2020-21	123.26
220 kV D/C Govindpur-Topchanchi	12	24	2018-19	2020-21	8.96
220 kV D/C Govindpur-Baliyapur	7	14	2018-19	2020-21	5.23
220 kV D/C Tenughat – Chandrapura	8	16	2018-19	2020-21	5.98
220 kV D/C DVC Koderma- Domchanch	16	32	2019-20	2021-22	11.95
220KV D/C Ratu -Mander transmission line	15	30	2019-20	2021-22	11.21
220KV D/C Mander - Tamar transmission line	56	112	2019-20	2021-22	41.83
220KV D/C LILO from Hatia-Lohardaga transmission line to GSS Mander	10	20	2019-20	2021-22	7.47
220 kV D/C Hazaribagh - Barkatta	18	36	2018-19	2021-22	13.45
220 kV D/C PTPS- Gola	20	40	2018-19	2021-22	14.94

11.3 Annexure 3 (132 KV Transmission Line)

TRANSMISSION LINES	Length (In KM)	In CKM	Start	End	Cost (In Rs Cr.)
Ongoing Projects					
132 KV D/C Simdega-Manoharpur transmission line	40.508	81.016	2013-14	2016-17	25.03
132 KV D/C Ramchandrapur-Jadugora transmission line	23.721	47.442	2013-14	2016-17	14.66
132KV Chaibasa-Manoharpur transmission line	37.685	75.37	2013-14	2016-17	23.29
132KV Jadugora – Dalbhumgarh transmission line	10.729	21.458	2013-14	2016-17	6.63
132 KV trans. line from location no.78 of Hatia-Sikidri 3rd CKT at Namkum G/S/S	25	50	2013-14	2016-17	15.45
132KV Hatia - Kanke transmission line	37	74	2013-14	2016-17	22.86
132KV Garhwa - Japla transmission line	33	66	2015-16	2016-17	20.39
LILO of 132 kV S/C Deoghar - Jamtara trans. line at proposed GSS Chitra	1	2	2015-16	2016-17	0.62
132 kV D/C Jasidih - Madhupur transmission line	50	100	2015-16	2017-18	30.90
Planned Projects					
132 kV D/C Deoghar - Jasidih trans. line	10	20	2016-17	2016-17	6.18
132 KV D/C Link Line from 400 KV JSEB S/S to existing 132 KV Latehar GSS	1.2	2.4	2016-17	2016-17	0.74
132 KV D/C Link Line from 132 KV Lohardagga GSS to 220 KV D/C Hatia-Lohardagga TL near existing 132 KV Hatia GSS	1.2	2.4	2016-17	2016-17	0.74
132 KV D/C Link Line from 220 KV Hatia-Lohardagga TL (near existing 220 KV Hatia)to 132 KV Hatia GSS	1.2	2.4	2016-17	2017-18	0.74
132 kV D/C 3 Ph. Chatra(Pratappur)-Chatra(220KV)	30	60	2016-17	2018-19	18.54
132 kV D/C 3 Phase Khunti -Hatia T/L	45	90	2016-17	2018-19	27.81
132 kV D/C Giridih -Jamua trans. line	29	58	2016-17	2018-19	17.92
132 KV D/C Ramgarh-Hazaribagh	65	130	2016-17	2018-19	40.50
132 KV D/C Ramgarh-Gola	20	40	2016-17	2018-19	12.50

TRANSMISSION LINES	Length (In KM)	In CKM	Start	End	Cost (In Rs Cr.)
132 KV D/C link line at PTPS GSS	20	40	2016-17	2018-19	16.00
132 KV D/C Mahuda-Baliyapur	10	20	2016-17	2018-19	6.50
132 KV D/C Gola-Peterwar	25	50	2016-17	2018-19	15.50
132 KV D/C Nirsa-Baliyapur	15	30	2016-17	2018-19	9.50
132 kV 3 ph. Chaibasa -Chakradharpur transmission line	22	44	2016-17	2018-19	13.59
132 kV D/C 3 Ph. Ramchandrapur - Mango Transmission line	24	48	2016-17	2018-19	14.83
132 kV D/C 3 Ph. Noamundi -Chaibasa Transmission line	80	160	2016-17	2018-19	49.43
LILO of one Ckt Of 132 KV D/C 3 ph Noamundi-Chaibasa Transmission Line at132/33 KV GS/S Kendposi including with 2 nos. of 132 kV bay.	14	28	2016-17	2018-19	8.65
132 kV D/C 3 Ph. Chaibasa -Rajkharsawan line with construction of 132 kV bay at 132/33 kV Rajkharsawan grid.	30	60	2016-17	2018-19	18.54
132 kV D/C GSS Ramgarh (JSEB) -GSS Ramgarh (DVC)	24	48	2016-17	2018-19	14.83
LILO of one Ckt Of 132 KV D/C 3 ph Chaibasa-Manoharpur Transmission Line at132/33 KV GS/S at Goelkera including with 2 nos. of 132 kV bay.	14	28	2016-17	2018-19	8.65
132 kV D/C 3 phase Khunti - Tamar transmission line	45	90	2016-17	2018-19	27.81
132 kV D/C 3 Ph. Hatia -Ratu Transmission line	34	68	2016-17	2018-19	21.01
132 kV D/C 3 Ph. Chatra - Ramgarh Transmission line	100	200	2016-17	2018-19	61.79
132 kV D/C 3 Ph. Sahebganj - Rajmahal Transmission line	45	90	2016-17	2018-19	27.81
LILO of 132 kV Dumka - Lalmatia transmission line at GSS Hansdiha	35	70	2016-17	2018-19	21.63
132 kV D/C 3 Ph. Dumka - Sikaripara Transmission line	40	80	2016-17	2018-19	24.72

TRANSMISSION LINES	Length (In KM)	In CKM	Start	End	Cost (In Rs Cr.)
132 kV D/C 3 Ph. Bahragora - Dalbhumgarh Transmission line	40	80	2016-17	2018-19	24.72
132 kV D/C 3 Ph. Amrapara - Godda Transmission line	80	160	2016-17	2018-19	49.43
132 kV D/C 3 Ph. Amrapara - Pakur Transmission line	45	90	2016-17	2018-19	27.81
132 kV D/C 3 Ph. Peterwar - Jaina More (Bokaro) Transmission line	10	20	2016-17	2018-19	6.18
132 kV D/C 3 Ph. Amrapara - Dumka Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Angada - Sikidiri Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Kandra - Ramchandrapur Transmission line	35	70	2016-17	2018-19	21.63
132 kV D/C 3 Ph. Ramgarh - PTPS Transmission line	40	80	2016-17	2018-19	24.72
132 kV D/C 3 Ph. Barkagaon - PTPS (220 kV) Transmission line	40	80	2016-17	2018-19	24.72
132 kV D/C 3 Ph. Silli - Gola Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Silli - Angada Transmission line	43	86	2016-17	2018-19	26.57
132 kV D/C 3 Ph. PTPS (220 kV) - PTPS (132 kV) Transmission line	2	4	2016-17	2018-19	1.24
132 kV D/C 3 Ph. Dugda - Jainamore (Bokaro) Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Putki - Govindpur Transmission line	20	40	2016-17	2018-19	12.36
132 kV D/C 3 Ph. Putki - Pathardih Transmission line	25	50	2016-17	2018-19	15.45
132 kV D/C 3 Ph. Chhatarpur - Daltonganj 220 kV Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Chhatarpur - Japla Transmission line	40	80	2016-17	2018-19	24.72
132 kV D/C 3 Ph. Dumka (Madanpur) - Jamtara	85	170	2016-17	2018-19	52.52

TRANSMISSION LINES	Length (In KM)	In CKM	Start	End	Cost (In Rs Cr.)
Transmission line					
132 kV D/C 3 Ph. Hansdiha - Banka (PG) Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Chandankyari - Bokaro Transmission line	35	70	2016-17	2018-19	21.63
132 kV D/C 3 Ph. Chandankyari - Govindpur Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Mahuda - Putki Transmission line	30	60	2016-17	2018-19	18.54
132 kV D/C 3 Ph. Gomia - Dugda Transmission line	30	60	2016-17	2018-19	18.54
132 kV D/C 3 Ph. Barhi - Chatra Transmission line	40	80	2016-17	2018-19	24.72
132 kV D/C 3 Ph. Silli - Tamar Transmission line	70	140	2016-17	2018-19	43.25
132 kV D/C 3 Ph. Sahebganj - Udhwa Transmission line	50	100	2016-17	2018-19	30.90
132 kV D/C 3 Ph. Sahebganj - Pakur Transmission line	90	180	2016-17	2018-19	55.61
132 kV D/C 3 Ph. Jainamore(Bokaro) - Ramgarh Transmission line	70	140	2016-17	2018-19	43.25
LILO of 132 kV D/C 3 Ph. Dumka-Deoghar Transmission line at GSS Jarmundi	6	12	2016-17	2018-19	3.71
132 kV D/C 3 phase Khunti - Tamar transmission line	65	130	2016-17	2018-19	40.17
132 kV D/C 3 Ph. Hatia -Ratu Transmission line	34	68	2016-17	2018-19	21.01
132 kV D/C 3 Ph. Irba - Kanke- Ratu Transmission line	34	68	2016-17	2018-19	21.01
132 kV D/C 3 Ph. Silli - Sikidiri Transmission line	32	64	2016-17	2018-19	19.77
132kV D/C Daltonganj(PG) - Daltonganj Trans. Line	15	30	2017-18	2018-19	9.27
132Kv Latehar- Mahuadanr Transmission line	45	90	2017-18	2018-19	27.81
132 kV D/C 3 Ph. Chauka - Tamar Transmission line	40	80	2017-18	2018-19	24.72

TRANSMISSION LINES	Length (In KM)	In CKM	Start	End	Cost (In Rs Cr.)
132 kV D/C 3 Ph. Chandwa - Latehar Transmission line	30	60	2017-18	2019-20	18.54
132 kV D/C 3 Ph. Chhatarpur - Panki Transmission line	50	100	2017-18	2019-20	30.90
132 kV D/C 3 Ph. Ramkanda - Garhwa (220KV) Transmission line	60	120	2017-18	2019-20	37.08
132 kV D/C 3 Ph. Meral - Garhwa (220KV) Transmission line	20	40	2017-18	2019-20	12.36
132 kV D/C 3 Ph. Nagar Utari - Garhwa(220KV) Transmission line	40	80	2017-18	2019-20	24.72
132 kV D/C 3 Ph. Irba - Ramgarh Transmission line	50	100	2017-18	2019-20	30.90
132 kV D/C 3 Ph. Irba - Ratu Transmission line	25	50	2017-18	2019-20	15.45
132 kV D/C 3 Ph. Sundarnagar - Jadugoda Transmission line	30	60	2017-18	2019-20	18.54
132 kV D/C 3 Ph. Manoharpur - Goelkera Transmission line	42	84	2017-18	2019-20	25.95
132 kV D/C 3 Ph. Bishnugarh - Hazaribagh Transmission line	50	100	2017-18	2019-20	30.90
132 kV D/C 3 Ph. Saria - Bishnugarh Transmission line	30	60	2017-18	2019-20	18.54
132 kV D/C 3 Ph. Gomia - Bishnugarh Transmission line	35	70	2017-18	2019-20	21.63
LILO of 132KV Goelkera-Rourkela transmission line at proposed GSS Manoharpur (including rerouting and connectivity at Rourkela new GSS)	10	20	2017-18	2019-20	6.41
132 kV D/C 3 phase Bero - Ratu transmission line	32	64	2019-20	2020-21	19.77
132 kV D/C 3 phase Bero -Khunti transmission line	42	84	2018-19	2020-21	25.95
132 kV D/C 3 Ph. Chainpur-Mahuadanr Transmission line	42	84	2018-19	2020-21	25.95
132 kV D/C 3 Ph. Gumla - Chainpur Transmission	50	100	2019-20	2021-22	30.90

TRANSMISSION LINES	Length (In KM)	In CKM	Start	End	Cost (In Rs Cr.)
line					
132 kV D/C 3 Ph. Chatra-Simaria	30	60	2019-20	2021-22	18.54
132 kV D/C 3 phase Khunti - Sarwal(SLDC) transmission line	36	72	2019-20	2021-22	22.25
132 kV D/C 3 phase Sarwal(SLDC) - Bero transmission line	46	92	2018-19	2021-22	28.42
132 kV D/C 3 Ph. Barhi - Hazaribagh (220 kV) Transmission line	38	76	2019-20	2021-22	23.48

11.4 Annexure 4 (440/220/132 KV Grid Substation)

Name of GSS	Capacity Addition (In MVA)		Start	End	Cost (In Rs Cr.)
Ongoing	Nil	Nil	Nil	Nil	Nil
Planned					
400/220/132 KV GSS at Latehar (PG)	630	300	2016-17	2017-18	211
400/220/132 kV (2x 315 + 2x150 MVA) Chandil	630	300	2017-18	2018-19	211
400/220/132 kV (2x 315 + 2x150 MVA) at Koderma	630	300	2017-18	2018-19	211

11.5 Annexure 5 (440/220 KV Grid Substation)

Name of GSS	Capacity Addition (In MVA)	Start	End	Cost (In Rs Cr.)
Ongoing	Nil	Nil	Nil	Nil
Planned				
400/220 KV GSS at Patratu and 400 KV D/C PTPS-Namkum (PG) TL (PG)51.5KM	630	2016-17	2017-18	255
400/220 kV (2x315 MVA) at Dumka	630	2017-18	2018-19	255
400/220 KV GSS Jasidih	630	2017-18	2019-20	255
400/220 KV GSS Mandar	630	2019-20	2021-22	255

11.6 Annexure 6 (220/132/33 KV Grid Substation)

Name of GSS	Capacity Addition (In MVA)		Start	End	Cost (In Rs Cr.)
Ongoing					
220/132/33KV Grid Sub-Station Chaibasa (PG)2x150 MVA+2x50 MVA,	300	100	2012-13	2015-16	101.445
220/132/33 kV Grid Sub-Station at Chatra	300	100	2013-14	2016-17	101.445
220/132/33KV Grid Sub-Station Govindpur (PG)2x150 MVA+2x50 MVA,	300	100	2012-13	2016-17	101.445
220/132/33KV Grid Sub-Station Bokaro 2x150 MVA+2x50 MVA,	300	100	2015-16	2017-18	101.445
Planned					
220/132/33KV Grid Sub-Station Jasidih 2x150 MVA+2x50 MVA,	300	100	2016-17	2017-18	101.445
220/132/33KV Grid Sub-Station Giridih 2x150+2x50MVA	300	100	2016-17	2017-18	101.445
220/132/33 kV GSS at Godda(2 x 150 MVA + 2 x 50 MVA	300	100	2016-17	2018-19	101.445
220/132/33 kV GSS at Gomia/ Kathara(2x150 + 2 x 50 MVA)	300	100	2016-17	2018-19	101.445
220/132/33 KV (2x150+2x50 MVA) PTPS GSS	300	100	2016-17	2018-19	95
220/132/33 KV (2x150+2x50 MVA) Koderma GSS	300	100	2016-17	2018-19	95
220/132/33 (2x150 + 2x50 MVA) kV at Hazaribagh	300	100	2017-18	2018-19	101.445
220/132/33 Kv GSS Chandrapura	300	100	2018-19	2020-21	101.445
220/132/33 Kv GSS Baliyapur	300	100	2018-19	2020-21	101.445

Name of GSS	Capacity Addition (In MVA)		Start	End	Cost (In Rs Cr.)
220/132/33 Kv GSS Topchanchi	300	100	2018-19	2020-21	101.445
220/132/33 Kv GSS Barkatha	300	100	2019-20	2021-22	101.445
220/132/33 Kv GSS Domchanch	300	100	2019-20	2021-22	101.445

11.7 Annexure 7 (220/132 KV Grid Substation)

Name of GSS	Capacity Addition (In MVA)			Start	End	Cost (In Rs Cr.)
Ongoing						
2x150MVA,220/132 KV Grid Sub-Station Dumka (PG)		300		2012-13	2015-16	91.07
Planned						
220/132 kV GSS at Garhwa (2 x 150 MVA)		300		2016-17	2018-19	91.07
220/132 KV, (2x150)MVA GSS at Lohardagga (PG)		300		2016-17	2018-19	91.07
220/132 kV GSS at Simdega(2 x 150 MVA)		300		2017-18	2018-19	91.07

11.8 Annexure 8 (132/33 KV Grid Substation)

Name of GSS	Capacity Addition (In MVA)	Start	End	Cost (In Rs Cr.)
Ongoing				
132/33 kV Grid Sub-Station at Tamar and its LILO with Hatia - Chandil trans. line 3.5KM	100	2013-14	2015-16	50.78
132/33KV Grid Sub-Station Madhupur (PG) 2x50MVA,	100	2012-13	2015-16	50.78
132/33KV Grid Sub-Station Manoharpur (PG)2x50MVA,	100	2012-13	2016-17	50.78
132/33KV Grid Sub-Station Mango (PG)2x50 MVA,	100	2012-13	2016-17	50.78
132/33KV Grid Sub-Station Ramchandrapur (PG)2x50 MVA,	100	2012-13	2016-17	50.78
132/33KV Grid Sub-Station Chitra (Deoghar), 1x20 + 1x50 MVA,	70	2015-16	2016-17	50.78
Planned				
132/33KV Grid Sub-Station Saria 2x50MVA,	100	2016-17	2017-18	50.78
132/33 KV GSS , Chatra(Pratappur)	100	2016-17	2017-18	50.78
132/33 kV GSS at Jamua (2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Ratu (2x50 MVA)	100	2016-17	2018-19	50.78
132/33 KV GSS Nirsa	100	2016-17	2018-19	55
132/33 kV GSS at Ramgarh(2x50 MVA)	100	2016-17	2018-19	50.78

Name of GSS	Capacity Addition (In MVA)	Start	End	Cost (In Rs Cr.)
132/33 kV GSS at Rajmahal(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Hansdiha(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Sikaripara(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Bahragora(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Udhwa(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Jarmundi(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Amarpara(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Petarwar(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Angada(2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Kandra (2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Barkagaon (2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Silli (2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Gola (2x50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Barhi (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at PTPS (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Dugda (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Putki (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Pathardih (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Chatarpur (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Chandankiyari (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Mahuda (2 x 50 MVA)	100	2016-17	2018-19	50.78
132/33 kV GSS at Irba(2x50 MVA)	100	2017-18	2018-19	50.78
132/33 kV GSS at Sundarnagar (2x50 MVA)	100	2017-18	2018-19	50.78
132/33 kV GSS at Bishnugarh/ Banaso (2 x 50 MVA)	100	2017-18	2018-19	50.78
132/33 kV GSS at Chouka(2x50 MVA)	100	2017-18	2018-19	50.78
132/33 kV GSS at Chandwa (2x50 MVA)	100	2017-18	2018-19	50.78
132/33KV GSS NagarUntari	100	2017-18	2019-20	50.78
132/33KV GSS Meral	100	2017-18	2019-20	50.78
132/33KV GSS Ramkanda	100	2017-18	2019-20	50.78
132/33KV GSS Panki	100	2017-18	2019-20	50.78
132/33KV GSS Mahuadanr	100	2017-18	2019-20	50.78

Name of GSS	Capacity Addition (In MVA)	Start	End	Cost (In Rs Cr.)
132/33KV GSS Chainpur	100	2018-19	2020-21	50.78
132/33 KV GSS Bero	100	2019-20	2021-22	50.78
132/33 KV GSS Sarwal	100	2019-20	2021-22	50.78
132/33 KV GSS Simaria	100	2019-20	2021-22	50.78

11.9 Annexure 9 (R&M Scheme GSS)

Name of GSS	Start	End	Cost
Ongoing			
132/33 KV GSS			
Kamdara-2	2015-16	2016-17	20
Garhwa-1	2015-16	2016-17	10
Rajkharsawn-1	2015-16	2016-17	10
Golkera-1	2015-16	2016-17	10
Kendposi-2	2015-16	2016-17	20
Planned			
Jadugoda-2	2016-17	2016-17	20
Jamtara-2	2016-17	2016-17	20
Lalmatia-1	2016-17	2016-17	10
Gumla-2	2017-18	2017-18	20
Japla-2	2017-18	2017-18	20
Chakradharpur-1	2017-18	2017-18	10
220/132 KV GSS	Nil	Nil	Nil
Implementation of SCADA and energy management	2016-17	2016-17	62
Replacement of old RTU at 07 GSS and new RTU at 04 GSS	2016-17	2016-17	1.7
Battery + Charger (15 No GSS)	2016-17	2016-17	0.8
PLCC and Allied equipment for 12 Link of JUSNL	2016-17	2016-17	3
Optical Fibre procurement and laying along Terminal Equip.	2016-17	2016-17	9.43
Dual redundant optical fibre path from SLDC to Hatia-1 GSS	2016-17	2016-17	0.22
Web site designing	2016-17	2016-17	0.08
Replacement of 48 V battery banks	2016-17	2016-17	0.15
Renovation of SLDC building and Centralised AC of SLDC	2016-17	2016-17	1.5

Name of GSS	Start	End	Cost
Bus bar system of power distribution of entire SLDC	2016-17	2016-17	0.1
Video projector , power flow study software, relay coordination, furniture and furnishment of conference room	2016-17	2016-17	1
GPS clock installation in all GSS for relay and meters	2016-17	2016-17	0.6
Renovation of Carrier room at each GSS for AC environment	2016-17	2016-17	1
PLCC panels for upcoming GSS as mandatory spares, Testing Equipment, Modem etc.	2016-17	2016-17	2
Implementation of asset Management system	2017-18	2017-18	10
Implementation of preventive maintenance system	2018-19	2018-19	15
Interconnectivity of existing GSS for SCADA and EMAS	2017-18	2017-18	163.25

11.10 Annexure 10 (R&M of Transmission Line)

Name of Transmission Line	Capacity Addition (In MVA)	Start	End	CKM	Cost
Ongoing					
Planned					
PTPS -Chandil	220 kv	2016-17	2016-17	292	70.86
Chandil-Ramchandarpur	220 kv	2017-18	2017-18	30	7.28
Chandil-STPS	220 kv	2017-18	2017-18	28	6.80
Ramchandrapur-Power Grid	220 kv	2017-18	2017-18	-	-
Ramchandrapur-Joda	220 kv	2017-18	2017-18	125	30.34
Farakka- Lalmatia	220 kv	2018-19	2018-19	84	20.39
PTPS -Hatia	132 Kv	2016-17	2016-17	-	-
Hatia- Sikisiri	132 Kv	2016-17	2016-17	46	7.33
Hatia- Namkom	132 Kv	2016-17	2016-17	28	4.46
Namkom -Sikidiri	132 Kv	2016-17	2016-17	34	5.42
Sikidiri-PH1	132 Kv	2017-18	2017-18	1	0.16
Sikidiri-PH II	132 Kv	2018-19	2018-19	14	2.23
Hatia-HEC	132 Kv	2020-21	2020-21	16	2.55
Hatia- Kamdara	132 Kv	2020-21	2020-21	60.5	9.64
Kamdara- Gumla	132 Kv	2020-21	2020-21	62	9.88
Rajkharsawan-Goelkera	132 Kv	2017-18	2017-18	38.5	6.13
Rajkharsawan-Kendposhi	132 Kv	2017-18	2017-18	57	9.08
Rajkharasawan-Adityapur	132 Kv	2018-19	2018-19	36	5.73
Rajkharasawan-Chandil	132 Kv	2018-19	2018-19	34.4	5.48
Rajkharasawan-Chakardahrpur	132 Kv	2018-19	2018-19	44	7.01
Kendposhi-Joda	132 Kv	2018-19	2018-19	42	6.69
Kendposhi-Noamundi	132 Kv	2018-19	2018-19	26	4.14
Chandil-Golmuri	132 Kv	2018-19	2018-19	60	9.56
Chandil-Adityapur	132 Kv	2018-19	2018-19	16	2.55
Golmuri-Jadugoda	132 Kv	2018-19	2018-19	22.5	3.58

11.11 Annexure 11 (Augmentation of GSS)

Name of GSS	Start	End	Cost (In Rs Cr.)
Ongoing			**Nil**
Planned			
132/33 KV GSS			
Noamundi	2017-18	2017-18	10
Goelkera	2016-17	2016-17	10
Namkum	2016-17	2016-17	10
132 kv Class GSS-27 No	2016-17	2016-17	285
Chakradharpur	2017-18	2017-18	10
220/132 KV GSS			
Hatia II	2016-17	2016-17	15
Govindpur	2016-17	2016-17	15
Dumka	2017-18	2017-18	15
Chaibasa	2018-19	2018-19	15
Dumka	2018-19	2018-19	15
Latehar	2018-19	2018-19	15
Giridih	2018-19	2018-19	15
220 kv Class GSS-4 No	2016-17	2016-17	90
Jasidih	2018-19	2018-19	15