

# Project Administration Manual

Project Numbers: 44426-016  
October 2015

India: Green Energy Corridor and Grid  
Strengthening Project

## Contents

### ABBREVIATIONS

I.	PROJECT DESCRIPTION	1
II.	IMPLEMENTATION PLANS	2
	A. Project Readiness Activities	2
	B. Overall Project Implementation Plan	3
III.	PROJECT MANAGEMENT ARRANGEMENTS	4
	A. Project Implementation Organizations – Roles and Responsibilities	4
	B. Key Persons Involved in Implementation	5
	C. Project Organization Structure	6
IV.	COSTS AND FINANCING	7
	A. Detailed Cost Estimates by Expenditure Category	7
	B. Detailed Cost Estimates by Financier	8
	C. Detailed Cost Estimates by Outputs/Components	9
	D. Detailed Cost Estimates by Year	10
	E. Contract and Disbursement S-curve (Sovereign Loan)	11
	F. Fund Flow Diagram	11
V.	FINANCIAL MANAGEMENT	12
	A. Financial Management Assessment	12
	B. Disbursement	12
	C. Accounting	13
	D. Auditing	13
VI.	PROCUREMENT AND CONSULTING SERVICES	14
	A. Advance Contracting and Retroactive Financing	14
	B. Procurement of Goods, Works and Consulting Services	15
	C. Procurement Plan	15
	D. Consultant's Terms of Reference	15
VII.	SAFEGUARDS	15
VIII.	GENDER AND SOCIAL DIMENSIONS	16
IX.	PERFORMANCE MONITORING, EVALUATION, REPORTING AND COMMUNICATION	16
	A. Project Design and Monitoring Framework	16
	B. Monitoring	16
	C. Evaluation	17
	D. Reporting	17
	E. Stakeholder Communication Strategy	18
X.	ANTICORRUPTION POLICY	19
XI.	ACCOUNTABILITY MECHANISM	20
XII.	RECORD OF PAM CHANGES	20

## **Project Administration Manual Purpose and Process**

The project administration manual (PAM) describes the essential administrative and management requirements to implement the project on time, within budget, and in accordance with Government and Asian Development Bank (ADB) policies and procedures. The PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

Power Grid Corporation of India Limited (POWERGRID) is wholly responsible for the implementation of ADB financed projects, as agreed jointly between the borrower and ADB, and in accordance with Government and ADB's policies and procedures. ADB staff is responsible to support implementation including compliance by POWERGRID of its obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At Loan Negotiations the borrower and ADB shall agree to the PAM and ensure consistency with the Loan agreement. Such agreement shall be reflected in the minutes of the Loan Negotiations. In the event of any discrepancy or contradiction between the PAM and the Loan Agreement, the provisions of the Loan Agreement shall prevail.

After ADB Board approval of the project's report and recommendations of the President (RRP) changes in implementation arrangements are subject to agreement and approval pursuant to relevant Government and ADB administrative procedures (including the Project Administration Instructions) and upon such approval they will be subsequently incorporated in the PAM.

## **Abbreviations**

ADB	=	Asian Development Bank
CAG	=	Comptroller and Auditor General of India
EMP	=	environmental management plan
HVDC	=	high voltage direct current
ICB	=	international competitive bidding
IEE	=	initial environmental examination
LIBOR	=	London interbank offered rate
PAM	=	project administration manual
POWERGRID	=	Power Grid Corporation of India Limited
RRP	=	report and recommendation of the President to the Board
SPS	=	Safeguard Policy Statement

## I. PROJECT DESCRIPTION

1. **The Project.** The project will finance high-voltage transmission lines to augment existing transmission system in India, including (i) a portion of the transmission networks within the Government of India's "Green Energy Corridor" initiative to facilitate power transfer from the renewable energy rich areas to other parts of the country, consisting of 765 kilovolt (kV) and 400 kV transmission lines, an associated 765/400kV substation, and equipment that will measure and monitor power flows within the transmission network; and (ii) four high voltage direct current (HVDC) terminals (two 800 kV and two 320 kV) as part of increased inter-regional connectivity between India's western and southern regional power grids.

2. **Impact and Outcome.** The impact will be increased overall efficiency of the Indian power system, expanded access to electricity, increased private investment in renewable energy, and enhanced energy security in India. The outcome will be improved and more reliable transmission system capacity in selected regions of India.

3. **Outputs.** This would be achieved by 2020 through the following outputs: (i) green energy corridor transmission system expanded in the northern region; and (ii) transmission interconnection capacity between the western and southern regions expanded. Specific investments are as follows:

- (i) Green energy corridor system expanded in the northern region:
  - 765kV double circuit transmission line from Ajmer to Bikaner (263 km);
  - 765kV double circuit transmission line from Bikaner to Moga (366 km);
  - 400kV double circuit (Quad) transmission line from Bikaner (new substation) to Bikaner (existing substation) (26 km);
  - 765/400kV substation with 2x1500 megavolt-ampere (MVA) transformers at Bikaner;
  - Extensions of the existing Ajmer and Moga substations by adding 2 additional line bays each; and
  - Real-time measurement and monitoring equipment.
- (ii) Transmission interconnection capacity between the western and southern regions expanded:
  - 800kV HVDC terminal stations at Raigarh, Chhattisgarh and Pugalur, Tamil Nadu; and
  - 320kV voltage source converter HVDC terminal stations at Pugalur, Tamil Nadu and North Trichur, Kerala.

## II. IMPLEMENTATION PLANS

### A. Project Readiness Activities

Indicative Activities	2015												Responsibility
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Advance contracting actions	X	X	X	X	X	X	X	X	X	X			POWERGRID
Retroactive financing actions											X	X	ADB
Establish project implementation arrangements	X												POWERGRID
ADB Board approval											X		ADB
Loan signing												X	GOI, POWERGRID & ADB
Government legal opinion provided												X	GOI
POWERGRID budget inclusion				X									POWERGRID
Loan effectiveness												X	ADB

ADB = Asian Development Bank, GOI = Government of India, POWERGRID = Power Grid Corporation of India Limited.

## B. Overall Project Implementation Plan

Description	2015				2016				2017				2018				2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Green Energy Corridor Component</b>																								
<b>765 kV and 400kV AC Transmission Tower</b>																								
Tendering and Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
<b>765/400 kV Bikaner(NEW) and extension of Ajmer &amp; Moga</b>																								
Tendering and Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
<b>Real Time Measurement/Monitoring</b>																								
Tendering Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
<b>Western-Southern HVDC Terminals Component</b>																								
<b>800kV, 6000MW HVDC</b>																								
Tendering and Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
<b>320kV, 2000MW HVDC</b>																								
Tendering and Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
<b>Reviews</b>																								
Project Completion Report																								

### III. PROJECT MANAGEMENT ARRANGEMENTS

#### A. Project Implementation Organizations – Roles and Responsibilities

<b>Project implementation organizations</b>	<b>Management Roles and Responsibilities</b>
<ul style="list-style-type: none"><li>• Power Grid Corporation of India Limited (POWERGRID)</li></ul>	<ul style="list-style-type: none"><li>➤ Overall responsibility for implementation of the Project.</li></ul>
<ul style="list-style-type: none"><li>• Coordination Committee Meeting</li></ul>	<ul style="list-style-type: none"><li>➤ To schedule progress of the project, in consultation with the Central Electricity Authority.</li></ul>
<ul style="list-style-type: none"><li>• Project Management Unit (PMU)</li></ul>	<ul style="list-style-type: none"><li>➤ Responsible for coordination, implementation, and administration of the project.</li><li>➤ Headed by Executive Director (Corporate Planning) at its headquarters.</li></ul>
<ul style="list-style-type: none"><li>• Asian Development Bank (ADB)</li></ul>	<ul style="list-style-type: none"><li>➤ Will undertake regular project review and facilitate in project implementation.</li></ul>



## B. Key Persons Involved in Implementation

### Executing Agency

POWERGRID  
Head Office

Officer's Name: Mr. B. Mishra  
Position: Executive Director (Corporate Planning)  
Telephone: +91 124-2571960  
Email address: [bmishra@powergridindia.com](mailto:bmishra@powergridindia.com)  
Office Address: 'SAUDAMINI', Plat No. 2, Sector 29,  
Gurgaon 122 007, Haryana, India

### ADB

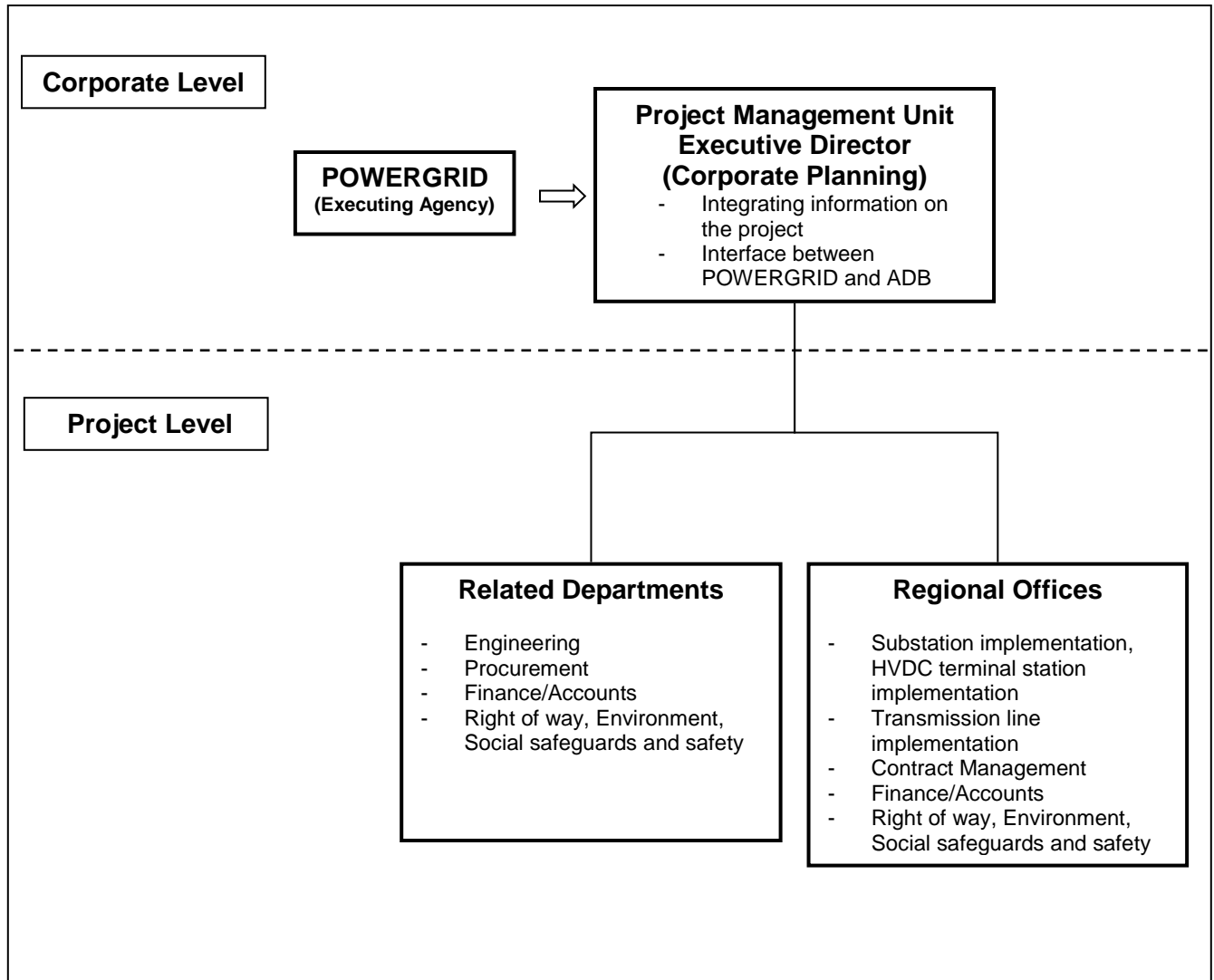
South Asia Energy Division

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Position: Director  
Telephone No.: +63 2 632 6198  
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Mission Leader

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### C. Project Organization Structure



ADB = Asian Development Bank, HVDC = high voltage direct current, POWERGRID = Power Grid Corporation of India Limited.

#### IV. COSTS AND FINANCING

4. The project is estimated to cost \$2,581.3 million, including contingencies and financing charges. ADB will provide a \$500 million sovereign loan as part of the project's financing plan.

##### A. Detailed Cost Estimates by Expenditure Category

Item	(\$ million)		Total Cost	% of Base Cost
	Foreign Exchange	Local Currency		
<b>A. Investment Costs<sup>a</sup></b>				
1. Civil works	0.00	12.41	12.41	0.6
2. Mechanical and Equipment	2,116.01	0.00	2,116.01	96.1
3. Environmental and Social Mitigation	0.00	6.74	6.74	0.3
4. Preliminary Survey and Soil Investigation	0.00	0.32	0.32	0.0
5. Land Acquisition	0.00	4.51	4.51	0.2
<b>Subtotal (A)</b>	<b>2,116.01</b>	<b>23.98</b>	<b>2,139.99</b>	<b>97.1</b>
<b>B. Pre-operative Costs</b>				
1. Incidental expenses	0.00	60.93	60.93	2.8
2. Overheads	0.00	0.24	0.24	0.0
3. Equipment Operation and Maintenance	0.00	1.67	1.67	0.1
<b>Subtotal (B)</b>	<b>0.00</b>	<b>62.84</b>	<b>62.84</b>	<b>2.9</b>
<b>Total Base Cost</b>	<b>2,116.01</b>	<b>86.82</b>	<b>2,202.83</b>	<b>100</b>
<b>C. Contingencies</b>				
1. Physical <sup>b</sup>	114.64	5.89	120.53	5.5
2. Price <sup>c</sup>	61.87	2.60	64.47	2.9
3. Exchange Rate Variation-PPP Adjustment	0.00	(19.14)	(19.14)	(0.9)
<b>Subtotal (C)</b>	<b>176.51</b>	<b>(10.65)</b>	<b>165.86</b>	<b>8.4</b>
<b>D. Financing Charges During Implementation</b>				
1. Interest During Implementation <sup>d</sup>	69.50	130.54	200.04	9.1
2. Commitment Charges	12.55	0.00	12.55	0.6
<b>Subtotal (D)</b>	<b>82.05</b>	<b>130.54</b>	<b>212.59</b>	<b>9.7</b>
<b>Total Project Cost (A+B+C+D)</b>	<b>2,374.57</b>	<b>206.71</b>	<b>2,581.28</b>	<b>118.0</b>

Note: Numbers may not sum up precisely due to rounding.

( ) = negative.

<sup>a</sup> In mid-2015 prices. Includes taxes and duties of \$44.1 million, which are eligible for financing from ADB resources.

<sup>b</sup> 3% of base investment costs for substations and equipment, and 15% for transmission lines.

<sup>c</sup> 5.5% for 2016–2018 for domestic costs; and 1.5% for 2016, 1.4% for 2017; and 1.5% for 2018 for foreign costs.

<sup>d</sup> For sovereign guaranteed loan, interest during implementation has been computed with 5-year forward LIBOR plus spread of 0.5% and a maturity-based premium of 0.1%, and a sovereign guarantee fee (payable by POWERGRID to the Government of India) of 1.2%. Commitment charges are 0.15% per year on undisbursed loan amounts. Locally raised debt funds are assumed at 8.5%. Applicable rates for non-sovereign loan are included.

Sources: Power Grid Corporation of India Limited and Asian Development Bank estimates.

**B. Detailed Cost Estimates by Financier**

Item	(\$ million)						Total Cost
	ADB		Other Debt Funding		POWERGRID		
	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	
<b>A. Investment Costs</b>							
1 Civil Works	0.00	0.0	0.00	0.0	12.41	100.0	12.41
2 Mechanical and Equipment <sup>a</sup>	500.00	23.6	1,092.06	51.6	523.95	24.8	2,116.01
3 Environment and Social Mitigation	0.00	0.0	0.00	0.0	6.74	100.0	6.74
4 Preliminary survey and soil investigation	0.00	0.0	0.00	0.0	0.32	100.0	0.32
5 Land acquisition	0.00	0.0	0.00	0.0	4.51	100.0	4.51
<b>Subtotal (A)</b>	<b>500.00</b>	<b>23.4</b>	<b>1,092.06</b>	<b>51.0</b>	<b>547.93</b>	<b>25.6</b>	<b>2,139.99</b>
<b>B. Pre-operative Costs</b>							
1 Incidental expenses <sup>b</sup>	0.00	0.0	0.00	0.0	60.93	100.0	60.93
2 Overheads	0.00	0.0	0.00	0.0	0.24	100.0	0.24
3 Equipment Operation and Maintenance	0.00	0.0	0.00	0.0	1.67	100.0	1.67
<b>Subtotal (B)</b>	<b>0.00</b>	<b>0.0</b>	<b>0.00</b>	<b>0.0</b>	<b>62.84</b>	<b>100.0</b>	<b>62.84</b>
<b>Total Base Cost</b>	<b>500.00</b>	<b>22.7</b>	<b>1,092.06</b>	<b>49.6</b>	<b>610.77</b>	<b>27.7</b>	<b>2,202.83</b>
<b>C. Contingencies</b>	<b>0.00</b>	<b>0.0</b>	<b>84.30</b>	<b>50.8</b>	<b>81.56</b>	<b>49.2</b>	<b>165.86</b>
<b>D. Financing Charges During Implementation</b>	<b>0.00</b>	<b>0.0</b>	<b>130.54</b>	<b>61.4</b>	<b>82.05</b>	<b>38.6</b>	<b>212.59</b>
<b>Total Project Cost (A+B+C+D)</b>	<b>500.00</b>	<b>19.4</b>	<b>1,306.90</b>	<b>50.6</b>	<b>774.38</b>	<b>30.0</b>	<b>2,581.28</b>

Note: Numbers may not sum up precisely due to rounding.

ADB = Asian Development Bank. POWERGRID = Power Grid Corporation of India Limited.

<sup>a</sup> ADB finances eligible expenditures up to 100% of every claim it receives, as long as sufficient undisbursed loan amounts remain (Option 2, para 9 of Operations Manual J6).

<sup>b</sup> Includes annual audit costs.

Sources: Power Grid Corporation of India Limited and Asian Development Bank estimates.

### C. Detailed Cost Estimates by Outputs

Item	Total Cost	(\$ million)			
		Western-Southern Interconnect (HVDC)		Green Energy Corridor	
	Amount	% of Cost Category	Amount	% of Cost Category	
<b>A. Investment Costs</b>					
1 Civil Works	12.41	7.34	59.1	5.07	40.9
2 Mechanical and Equipment	2,116.01	1,509.32	71.3	606.69	28.7
3 Environment and Social Mitigation	6.74	0.00	0.0	6.74	100.0
4 Preliminary survey and soil investigation	0.32	0.00	0.0	0.32	100.0
5 Land acquisition	4.51	4.03	89.3	0.48	10.7
<b>Subtotal (A)</b>	<b>2,139.99</b>	<b>1,520.68</b>	<b>71.1</b>	<b>619.31</b>	<b>28.9</b>
<b>B. Pre-operative Costs</b>					
1 Incidental expenses	60.93	56.50	92.7	4.43	7.3
2 Overheads	0.24	0.00	0.0	0.24	100.0
3 Equipment Operation and Maintenance	1.67	1.67	100.0	0.00	0.0
<b>Subtotal (B)</b>	<b>62.84</b>	<b>58.17</b>	<b>92.6</b>	<b>4.67</b>	<b>7.4</b>
<b>Total Base Cost</b>	<b>2,202.83</b>	<b>1,578.85</b>	<b>71.7</b>	<b>623.98</b>	<b>28.3</b>
<b>C. Contingencies</b>	<b>165.86</b>	<b>81.96</b>	<b>49.4</b>	<b>83.89</b>	<b>50.6</b>
<b>D. Financing Charges During Implementation</b>	<b>212.59</b>	<b>162.21</b>	<b>76.3</b>	<b>50.38</b>	<b>23.7</b>
<b>Total Project Cost (A+B+C+D)</b>	<b>2,581.28</b>	<b>1,823.03</b>	<b>70.6</b>	<b>758.25</b>	<b>29.4</b>

Note: Numbers may not sum up precisely due to rounding.

HVDC = high voltage direct current.

Sources: Power Grid Corporation of India Limited and Asian Development Bank estimates.

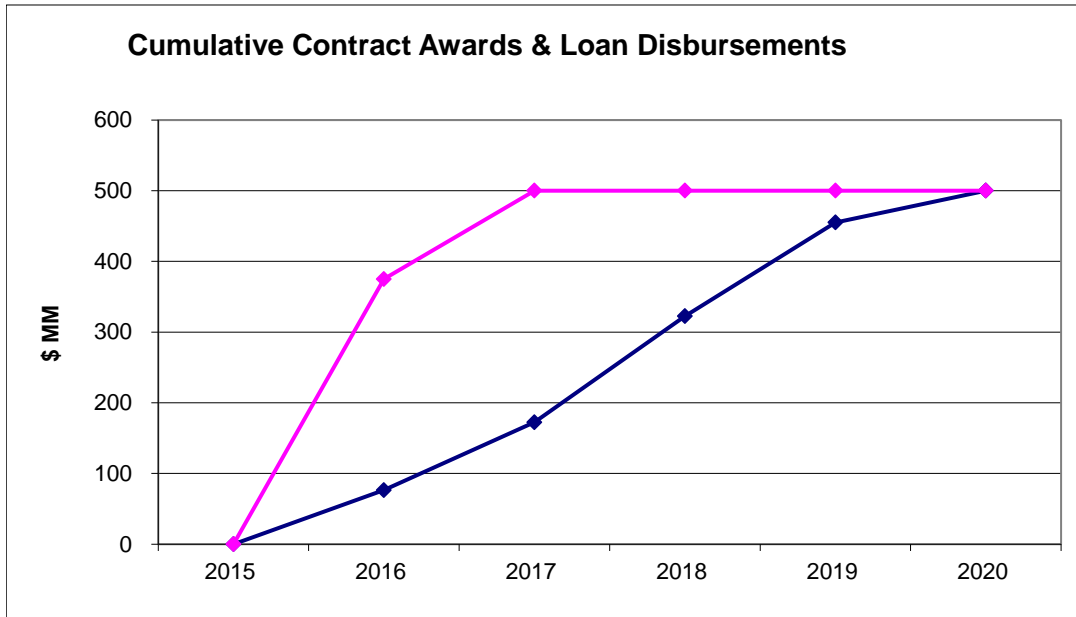
#### D. Detailed Cost Estimates by Year

Item	Total Cost	(\$ million)				
		2016	2017	2018	2019	2020
<b>A. Investment Costs</b>						
1 Civil Works	12.41	0.86	2.08	3.81	4.90	0.76
2 Mechanical and Equipment	2,116.01	132.41	340.19	630.97	855.52	156.91
3 Environment and Social Mitigation	6.74	0.67	1.35	2.36	2.36	0.00
4 Preliminary survey and soil investigation	0.32	0.03	0.06	0.11	0.11	0.00
5 Land acquisition	4.51	0.24	0.68	1.29	1.89	0.42
<b>Subtotal (A)</b>	<b>2,139.99</b>	<b>134.21</b>	<b>344.37</b>	<b>638.54</b>	<b>864.78</b>	<b>158.10</b>
<b>B. Pre-operative Costs</b>						
1 Incidental expenses	60.93	3.13	9.08	17.22	25.63	5.87
2 Overheads	0.24	0.02	0.05	0.08	0.08	0.00
3 Equipment Operation and Maintenance	1.67	0.08	0.24	0.46	0.71	0.17
<b>Subtotal (B)</b>	<b>62.84</b>	<b>3.23</b>	<b>9.37</b>	<b>17.77</b>	<b>26.42</b>	<b>6.05</b>
<b>Total Base Cost</b>	<b>2,202.83</b>	<b>137.44</b>	<b>353.73</b>	<b>656.31</b>	<b>891.20</b>	<b>164.14</b>
<b>C. Contingencies</b>	<b>165.86</b>	<b>13.39</b>	<b>30.30</b>	<b>52.68</b>	<b>61.98</b>	<b>7.52</b>
<b>D. Financing Charges During Implementation</b>	<b>212.59</b>	<b>12.75</b>	<b>33.60</b>	<b>62.62</b>	<b>86.76</b>	<b>16.86</b>
<b>Total Project Cost (A+B+C+D)</b>	<b>2,581.28</b>	<b>163.58</b>	<b>417.63</b>	<b>771.61</b>	<b>1,039.93</b>	<b>188.52</b>
<b>% Total Project Cost</b>	<b>100.0</b>	<b>6.3</b>	<b>16.2</b>	<b>29.9</b>	<b>40.3</b>	<b>7.3</b>

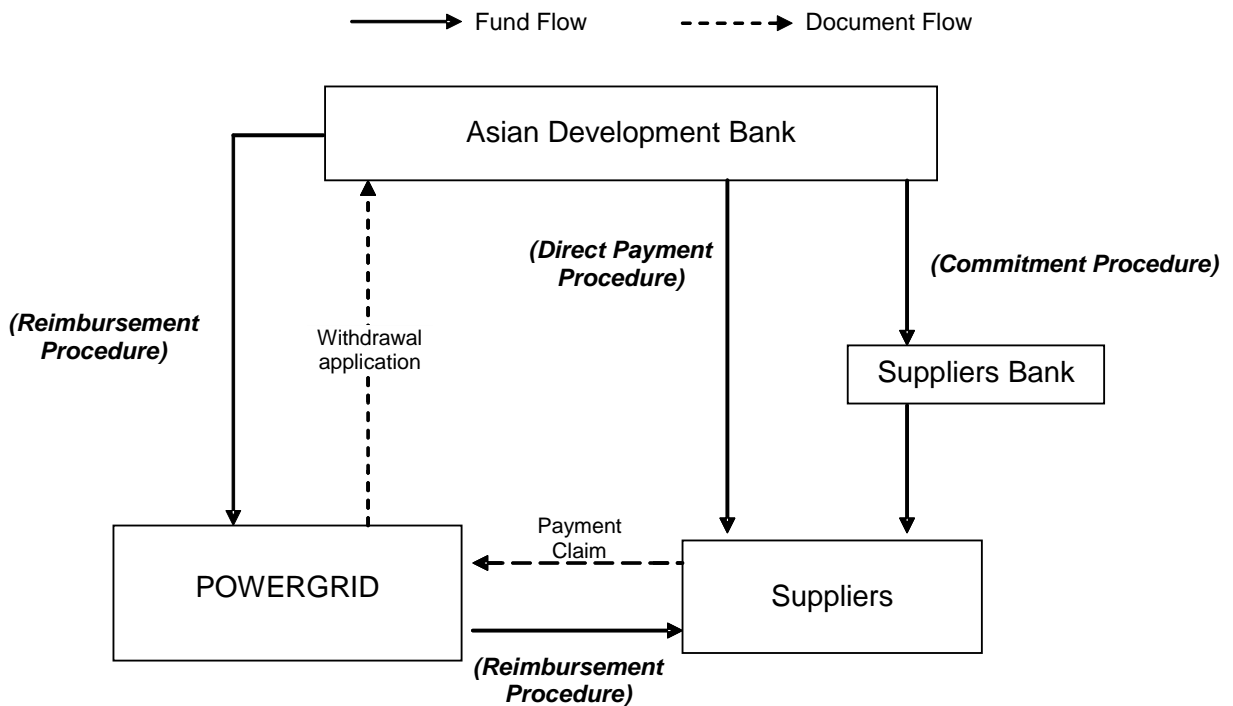
Note: Numbers may not sum up precisely due to rounding.

Sources: Power Grid Corporation of India Limited and Asian Development Bank estimates.

**E. Contract and Disbursement S-curve**



**F. Fund Flow Diagram**



## V. FINANCIAL MANAGEMENT

### A. Financial Management Assessment

5. While the financial management structure of POWERGRID was assessed and found to be adequate during the processing of the past ADB loans, it was reconfirmed with POWERGRID regarding their current ability to fulfill ADB's fiduciary requirements under the proposed project.

6. As was previously determined in past loans, the financial accounting system of POWERGRID is advanced, utilizing computerization with confidentiality and integrity at various levels, and well-defined charts of accounts enabling proper recording of financial transactions. Accounting practices and preparation of financial statements are based on the accounting standards issued by the Institute of Chartered Accountants of India. Accounting and financial reporting responsibilities are carried out as per the delegation of powers defined and approved by POWERGRID's board of directors. POWERGRID's Finance Department has developed procedures and guidelines for this reporting. As a publicly listed company, POWERGRID is subject to several strong governance measures imposed by the Securities and Exchange Board of India which enhance accountability, transparency, and predictability of its financial governance through disclosure of information to shareholders, investment professionals, and the general public. POWERGRID issued its first foreign currency, offshore bond of US\$500 million in January 2013. POWERGRID maintains an international long-term issue credit rating of BBB- (Outlook: Stable) from both Standard & Poor's and Fitch, and enjoys the highest domestic credit rating of AAA.<sup>1</sup>

7. POWERGRID is managed by a board of directors that comprises of five full-time directors, two part-time directors from the Ministry of Power, and seven independent directors. POWERGRID is audited by the Comptroller and Auditor General of India (CAG), in addition to the audit by one or more independent chartered accountant firms appointed by the CAG. Further, the internal audit department and vigilance departments provide continuing in-house monitoring and oversight of operations. In addition, the board has an audit subcommittee comprising independent and part-time directors, which meets at least four times a year, and oversees the company's financial management in its entirety. The financial management risk is thus low. POWERGRID will create in favor of ADB a pari-passu interest in the liens created on its assets as security for debt in order to equally and ratably secure the payment of ADB loan.

### B. Disbursement

8. The Loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2015, as amended from time to time),<sup>2</sup> and detailed arrangements agreed upon between the Government and ADB.

9. ADB's commitment letter, direct payment, and reimbursement procedures may be utilized. ADB finances eligible expenditures up to 100% of every claim it receives, as long as sufficient undisbursed loan amounts remain. If the remaining amount is not sufficient to cover 100% of the claim, only the remaining amount will be disbursed. Each contract package under the project is expected to be financed and disbursed up to 100% from the loan as requested by

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<sup>1</sup> Since 2001, POWERGRID's domestic bonds have been rated AAA by the Credit Rating Information Services of India. (CRISIL) and AAA by the Investment Information and Credit Rating Agency of India (ICRA). From 2008, the Credit Analysis & Research has also given these bonds a rating of AAA.

<sup>2</sup> Available at: <http://www.adb.org/Documents/loan-disbursement-handbook>.



POWERGRID.<sup>3</sup> This percentage, however, is subject to change upon notification from POWERGRID. POWERGRID will be responsible to maintain contract ledger(s) including payments by fund sources (sovereign, other loans and POWERGRID) and their balances. Each disbursement request under the loan will not be less than \$1,000,000, or will be equal to the remaining amount of the loan if the undisbursed balance is less than \$1,000,000. POWERGRID has sufficient financial management capacity and the control mechanisms in place to properly manage and monitor the funds flow, and has the ability to readily raise the additional debt funds in the domestic market as required to complete the project.

Risks	Risk Assessment/Control Mechanism
<p>Additional local currency debt funding as well as POWERGRID counterpart equity funding are required to complete the project</p> <p>This mechanism requires financial management capacity</p>	<p>POWERGRID routinely raises local currency financing to fund its capital expenditure program. POWERGRID maintains an international long-term issue credit rating of BBB- (Outlook: Stable) from both Standard &amp; Poor's and Fitch, and enjoys the highest domestic credit rating of AAA. Based on the cost-plus nature of the tariff setting process and POWERGRID's superior operating efficiency, it has increased revenues and net profits consistently, maintaining a robust financial position with stable cash flows to cover its costs, capital investment, and debt payments.</p> <p>POWERGRID has the capacity to properly maintain contract ledger(s) including payments by fund sources and their balances. (Please see Financial Management Assessment in Section V.A. above.)</p>

10. Before the submission of the first withdrawal application, POWERGRID should submit to ADB sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the borrower, together with the authenticated specimen signatures of each authorized person. The minimum value per withdrawal application is US\$1,000,000, unless otherwise approved by ADB. POWERGRID is to consolidate claims to meet this limit for reimbursement and imprest account claims.

### C. Accounting

11. POWERGRID will maintain separate books and records by funding source for all expenditures incurred on the project following the Government's financial regulations. POWERGRID will prepare consolidated project financial statements in accordance with the government's accounting laws and regulations prevailing in India.

### D. Auditing

12. POWERGRID will cause the detailed consolidated project financial statements to be audited in accordance with audit regulations prevailing in India by an auditor acceptable to ADB. POWERGRID will submit the audited financial statements in the English language to ADB within 6 months of the end of the fiscal year. The annual audit report for the project financial statements will include audit opinions which cover (i) whether the project financial statements present a true and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting framework; (ii) whether loan proceeds were used only for the purposes of the project or not; and (iii) the level of compliance for each financial covenant

<sup>3</sup> The use of any loan saving may be considered for change in scope in accordance with the ADB Project Administration Instructions.

contained in the legal agreements for the project. If the auditor issues a management letter, a copy will also be submitted to ADB.

13. POWERGRID will also cause its entity-level financial statements to be audited in accordance with audit regulations prevailing in India, by an independent auditor acceptable to ADB. The audited entity-level financial statements, together with the auditors' report, will be submitted in the English language to ADB within one month after their approval by the competent authority. The government and POWERGRID have been made aware of ADB's policy on delayed submission, and the requirements for satisfactory and acceptable quality of the audited accounts. ADB reserves the right to verify the project's financial accounts to confirm that the share of ADB's financing is used in accordance with ADB's policies and procedures.<sup>4</sup> Compliance with financial reporting and auditing requirements will be monitored by review missions and during normal program supervision, and followed up regularly with all concerned, including the external auditor.

14. Public disclosure of the project financial statements, including the audit report on the project financial statements, will be guided by ADB's Public Communications Policy (2011).<sup>5</sup> After review, ADB will disclose the project financial statements for the project and the opinion of the auditors on the financial statements within 30 days of the date of their receipt by posting them on ADB's website. The entity financial statements and management letter will not be disclosed.

## VI. PROCUREMENT AND CONSULTING SERVICES

### A. Advance Contracting and Retroactive Financing

15. All advance contracting and retroactive financing will be undertaken in conformity with ADB's *Procurement Guidelines* (2015, as amended from time to time)<sup>6</sup> and ADB's *Guidelines on the Use of Consultants* (2013, as amended from time to time).<sup>7</sup> The issuance of invitations to bid under advance contracting and retroactive financing will be subject to ADB approval. POWERGRID has been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the Project.

16. **Advance contracting.** In order to expedite project implementation, POWERGRID has requested approval for advance contracting for the procurement of the equipment, goods and works. The steps to be concluded in advance include preparation of bidding documents, bidding, and bid evaluation for all the eligible contract packages to be agreed between ADB and

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<sup>4</sup> ADB Policy on delayed submission of audited project financial statements:

- When audited project financial statements are not received by the due date, ADB will write to the executing agency advising that (i) the audit documents are overdue; and (ii) if they are not received within the next six months, requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement, and issuance of new commitment letters will not be processed.
- When audited project financial statements have not been received within 6 months after the due date, ADB will withhold processing of requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement, and issuance of new commitment letters. ADB will (i) inform the executing agency of ADB's actions; and (ii) advise that the loan may be suspended if the audit documents are not received within the next six months.
- When audited project financial statements have not been received within 12 months after the due date, ADB may suspend the loan.

<sup>5</sup> Available from <http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications>.

<sup>6</sup> Available at: <http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf>.

<sup>7</sup> Available at: <http://www.adb.org/Documents/Guidelines/Consulting/Guidelines-Consultants.pdf>.

POWERGRID.

17. **Retroactive financing.** Withdrawals from the loan account may be made for reimbursement of eligible expenditures incurred under the project before the loan effective date, but not earlier than 12 months before the date of signing the loan agreement, subject to a maximum amount equivalent to 20% of the loan amount.

#### **B. Procurement of Goods, Works and Consulting Services**

18. All procurement of goods and works will be undertaken in accordance with ADB's *Procurement Guidelines*.

19. Except as otherwise agreed with ADB, international competitive bidding procedures will be followed for all the packages. POWERGRID has sufficient capacity to design and administer transmission system construction.<sup>8</sup> POWERGRID has also demonstrated good performance and track record with procurement of plant, goods and works for transmission systems for the past and ongoing ADB funded projects. Therefore, they have sufficient knowledge on ADB's *Procurement Guidelines* and procedures.

20. An 18-month procurement plan indicating threshold and review procedures, goods, works, and consulting service contract packages and national competitive bidding guidelines is in Section C.

#### **C. Procurement Plan**

21. The Procurement Plan is provided in Appendix 1.

#### **D. Consultant's Terms of Reference**

22. There are no consulting services involved in this project.

### **VII. SAFEGUARDS**

23. Pursuant to ADB's Safeguard Policy Statement (2009) (SPS),<sup>9</sup> ADB funds may not be applied to the activities described on the ADB Prohibited Investment Activities List set forth at Appendix 5 of the SPS.

24. POWERGRID is responsible for undertaking the project in accordance with the initial environment examination (IEE), implementing the environmental management plan (EMP), corrective action plan (if applicable), and resettlement plan in accordance with ADB's Safeguard Policy Statement 2009. A Project Management Unit (PMU) will be responsible for coordinating and implementing all social and environmental activities. The PMU will coordinate responsible managers in charge at various construction sites for the right of way clearances including environmental, social and safety issues. The construction of transmission lines will not require any permanent land acquisition, however, impact on crop and livelihood sources will be mitigated and/or appropriately compensated. During project implementation, POWERGRID will be responsible for reflecting the occurrence of new and significant impacts resulting from project

<sup>8</sup> The Independent Evaluation Department (IED) validation report for ADB's second loan to POWERGRID concluded POWERGRID's performance rating as highly successful. The procurement capacity assessment report has identified no substantial issues on the project procurement and POWERGRID's capacity to implement it.

<sup>9</sup> Available at: <http://www.adb.org/Documents/Policies/Safeguards/Safeguard-Policy-Statement-June2009.pdf>

activities and designing and integrating sound mitigation measures into the EMP and the resettlement plan. Environmental and social grievances will be handled in accordance to the project grievance redress mechanism. Open and transparent dialogue will be maintained with project affected persons as and when needed, in compliance with ADB safeguard policy requirements. Where relevant, POWERGRID will ensure that contractor agreements include sufficient safeguard measures to ensure the continuity of the project's compliance with the EMP and the resettlement plan, including occupational health, safety and applicable labor standards. See Section IX.B for safeguards monitoring.

## **VIII. GENDER AND SOCIAL DIMENSIONS**

25. The loan agreements include a standard assurance related to the compliance with host country labor standards for contractors, including provisions to ensure equal pay for equal work (where women are concerned), and the provision of awareness training on HIV and sexually transmitted diseases and human trafficking (where relevant). Dialogue and communication (both written and verbal) with stakeholders will be carried out in a culturally sensitive manner and in the local language spoken (Hindi) as required. See Section IX.B to describe how the gender and social dimensions will be monitored.

## **IX. PERFORMANCE MONITORING, EVALUATION, REPORTING AND COMMUNICATION**

### **A. Project Design and Monitoring Framework**

26. The Design and Monitoring Framework of the project is in Appendix 2 to this PAM.

### **B. Monitoring**

27. **Project performance monitoring:** Overall monitoring of the project in terms of progress and performance will be undertaken in a timely manner by POWERGRID. The PMU headed by the executive director (corporate planning) has been set up at POWERGRID's headquarters. The unit, through the related functional departments of POWERGRID, will be responsible for monitoring the implementation of the project, including outcomes, outputs and activities in relation to the targets and milestones set for the project.

28. POWERGRID has nine regional offices headed by an executive director or general manager to implement the projects under their respective jurisdictions. The additional general manager or deputy general managers in the region responsible for construction and commissioning of the projects will report to their respective regional heads. The regional heads will facilitate submission of the implementation progress reports. The management of POWERGRID will receive monthly progress reports and review each project in quarterly review meetings.

29. POWERGRID will prepare monitoring reports in the format covering all essential aspects of the Project and submits them to ADB at the agreed frequency for each type of report.

30. **Compliance monitoring:** Compliance with covenants in the loan agreement will be monitored through ADB's project administration missions – including project inception mission to discuss and confirm the timetable for compliance with the loan covenants; project review missions to review the borrower's compliance with particular loan covenants and, where there is any noncompliance or delay, discuss proposed remedial measures with the government; and

midterm review mission if necessary to review covenants to assess whether they are still relevant or need to be changed, or waived due to changing circumstances.

31. **Safeguards monitoring:** Compliance with environmental requirements, including implementation of the EMP, the corrective action plan (if applicable), and with social safeguard requirements, including implementation of the resettlement plan, will be monitored internally by the PMU. POWERGRID will submit the safeguards monitoring report to ADB on semi-annual basis which will be disclosed on the ADB website. In case of any compliance issues identified during monitoring, a corrective action plan will be developed and implemented to resume compliance.

32. **Gender and social dimensions monitoring:** Compliance will be monitored by the PMU.

### C. Evaluation

33. ADB will field regular review missions every six months at the minimum to review status of contract awards, disbursements, physical progress and implementation of the environmental management plan. There may be a mid-term review of project implementation in 2018 to determine if any corrective measures need to be taken in consultation with POWERGRID. Within six months of physical completion of the project, POWERGRID will submit a project completion report to ADB.<sup>10</sup> Subsequently, ADB will field a mission to finalize the project completion report.

#### Evaluation Methodology

Evaluation Activity	Purpose	Methodology	Who responsible and involved
Review Mission	Review the progress of the project and provide guidance to facilitate implementation	Site visits and meetings with POWERGRID officials, contractors, consultants at least twice a year	ADB/POWERGRID
Mid Term Review	Comprehensive review of the project	2 years after the loan effectiveness, focusing on the engineering, resettlement, and environmental aspects of the Investment Program, and reviewing the financial status of POWERGRID.	ADB/POWERGRID
Project completion report	Evaluate the overall output of the project and its relevance and suitability	Site visit and meetings with POWERGRID officials, contractors, consultants	ADB/POWERGRID

ADB = Asian Development Bank, POWERGRID = Power Grid Corporation of India Limited.

### D. Reporting

34. POWERGRID will provide ADB with (i) quarterly progress reports in a format consistent with ADB's project performance reporting system; (ii) consolidated annual reports including (a) progress achieved by output as measured through the indicator's performance targets, (b) key

<sup>10</sup> Project completion report format is available at: <http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar>

implementation issues and solutions; (c) updated procurement plan; and (d) updated implementation plan for next 12 months; and (iii) a project completion report within six months of physical completion of the project. To ensure projects continue to be both viable and sustainable, project accounts and POWERGRIDS's audited financial statements, together with the associated auditor's report, should be adequately reviewed.

#### **E. Stakeholder Communication Strategy**

35. POWERGRID will post all relevant information on its website. The website will include at minimum information regarding the bidding process, bidders, contract awards, use of funds disbursed under the Project and physical progress. The Stakeholder Communications Strategy is described in the following table.

### Stakeholder Communication Strategy

Project information to be communicated	Means of Communication	Responsibility	Audience	Frequency
ADB's RRP with linked documents (including safeguards plans)	ADB website	ADB	All stakeholders including the general public	Once
Project information while planning/ designing	Discussions and stakeholder consultations	POWERGRID	Project beneficiaries	Regular intervals during planning and design
Draft Safeguards Documents (i.e., IEE and resettlement plan) and any update during implementation	Websites of ADB and POWERGRID	POWERGRID and ADB	All stakeholders including the general public	Once before implementation and as needed, during implementation
Status of implementation during construction	Information boards at site	POWERGRID/ Contractors	Project beneficiaries	All the time at construction sites
Project Performance Reports and Project Information Documents	ADB website	ADB	All stakeholders including the general public	Quarterly
Safeguards Monitoring During Implementation (i.e., Environmental and Social Monitoring Report)	ADB website	ADB and POWERGRID	All stakeholders including the general public	Semi-annually
Quarterly progress reports	ADB website	POWERGRID	All stakeholders including the general public	Quarterly
Project completion report	ADB website	ADB	All stakeholders including the general public	Once

ADB = Asian Development Bank, GOI = Government of India, IEE = initial environmental examination, POWERGRID = Power Grid Corporation of India Limited, RRP = Report and Recommendation of the President.

### X. ANTICORRUPTION POLICY

36. POWERGRID is advised of ADB's Anticorruption Policy (1998, as amended to date).<sup>11</sup> Consistent with its commitment to good governance, accountability and transparency, implementation of the project shall adhere to ADB's Anticorruption Policy.<sup>12</sup> ADB reserves the right to review and examine, directly or through its agents, any alleged corrupt, fraudulent, collusive, or coercive practices relating to the Project. In this regard, investigation of government officials, if any, would be requested by ADB to be undertaken by the government.

37. To support these efforts, relevant provisions of ADB's Anticorruption Policy are included in the Loan Regulations and the bidding documents. In particular, all contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of POWERGRID, and all contractors, suppliers, consultants, and other service providers as they relate to the project. Individuals and entities on ADB's anticorruption

<sup>11</sup> Available at: <http://www.adb.org/Documents/Policies/Anticorruption-Integrity/Policies-Strategies.pdf>.

<sup>12</sup> Available at: <http://www.adb.org/Documents/Policies/Anticorruption-Integrity/Policies-Strategies.pdf>.

debarment list are ineligible to participate in ADB-financed activities and may not be awarded any contract under the Project.<sup>13</sup>

38. ADB's Anticorruption Policy designates the Office of Anticorruption and Integrity<sup>14</sup> as the point of contact to report allegations of fraud or corruption among ADB-financed projects or its staff. Office of Anticorruption and Integrity is responsible for all matters related to allegations of fraud and corruption. For a more detailed explanation refer to the Anticorruption Policy and Procedures. Anyone coming across evidence of corruption associated with the project may contact the Anticorruption Unit by telephone, facsimile, mail, or email at the following numbers/addresses:

- by email at [integrity@adb.org](mailto:integrity@adb.org) or [anticorruption@adb.org](mailto:anticorruption@adb.org)
- by phone at +63 2 632 5004
- by fax to +6326362152
- by mail at the following address (**Please mark correspondence Strictly**

**Confidential**):

Office of Anticorruption and Integrity  
Asian Development Bank  
6 ADB Avenue  
Mandaluyong City 1550  
Metro Manila, Philippines

## **XI. ACCOUNTABILITY MECHANISM**

39. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make a good faith effort to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.<sup>15</sup>

## **XII. RECORD OF PAM CHANGES**

40. All revisions/updates during course of implementation should be retained in this Section to provide a chronological history of changes to implemented arrangements recorded in the PAM.

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<sup>13</sup> ADB's Integrity Office web site is available at: <http://www.adb.org/integrity/unit.asp>

<sup>14</sup> ADB's Integrity Office web site is available at: <http://www.adb.org/integrity/unit.asp>.

<sup>15</sup> For further information see: <http://www.adb.org/Accountability-Mechanism/default.asp>.



## Procurement Plan

### Basic Data

<b>Project Name:</b> Green Energy Corridor and Grid Strengthening Project	
<b>Project Number:</b> 44426-016	<b>Approval Number:</b>
<b>Country:</b> India	<b>Executing Agency:</b> Power Grid Corporation of India Limited
<b>Project Procurement Classification:</b> Category B	<b>Implementing Agency:</b>
<b>Project Procurement Risk:</b> Low	N/A
<b>Project Financing Amount:</b> \$2,582.3 million <b>ADB Financing:</b> \$500 million (sovereign loan) <b>Cofinancing (ADB Administered):</b> none <b>Other Financing:</b> US\$ 2,082.3 million <sup>a</sup>	<b>Project Closing Date:</b> 31 December 2020
<b>Date of First Procurement Plan:</b> 17 February 2015	<b>Date of this Procurement Plan:</b> 19 October 2015

<sup>a</sup> Includes 30% equity funding from POWERGRID, and other debt funding.

#### A. Methods, Thresholds, Review and 18-Month Procurement Plan

##### 1. Procurement and Consulting Methods and Thresholds

Except as the Asian Development Bank (ADB) may otherwise agree, the following process thresholds shall apply to procurement of goods and works.

Procurement of Goods and Works		
Method	Threshold	Comments
International Competitive Bidding for Works	US\$ 40,000,000	
International Competitive Bidding for Goods	US\$ 3,000,000 and Above	

Consulting Services	
Method	Comments
Quality- and Cost-Based Selection for Consulting Firm	QCBS will be used for consulting services from firms
Individual Consultants Selection for Individual Consultant	Biodata

## 2. Goods and Works Contracts Estimated to Cost \$1 Million or More

The following table lists goods and works contracts for which the procurement activity is either ongoing or expected to commence within the next 18 months.

- Real Time Measurement/Monitoring**

Package Number	General Description	Estimated Value (\$ million)	Procurement Method	Review (Prior/Post)	Bidding Procedure	Advertisement Date (quarter/year)	Comments
1	Real Time Measurement/ Monitoring – (i) Phasor measurement units, (ii) Phasor Data Compensators, (iii) Communication System including Fiber Optic (OPGW) links	75	ICB	Prior	1S2E	Q2 / 2016	Prequalification of Bidders: N  Domestic Preference Applicable: Y  Bidding Document: Plant

- 800kV, 6000MW HVDC between Western and Southern region**

Package Number	General Description	Estimated Value (\$ million)	Procurement Method	Review (Prior/Post)	Bidding Procedure	Advertisement Date (quarter/year)	Comments
2	800 kV, 6000 MW HVDC terminals associated with HVDC Bipole link between Western and Southern region	1002	ICB	Prior	2S	Q1 / 2015	Prequalification of Bidders: N  Domestic Preference Applicable: Y  Bidding Document: Plant

- 320kV, 2000MW HVDC between Pugalur and Trichur**

Package Number	General Description	Estimated Value (\$ million)	Procurement Method	Review (Prior/Post)	Bidding Procedure	Advertisement Date (quarter/year)	Comments
3	320 kV, 2000 MW voltage source converter HVDC terminals associated with HVDC Bipole link between Pugalur and Trichur	381	ICB	Prior	2S	Q4 / 2015	Prequalification of Bidders: N  Domestic Preference Applicable: Y  Bidding Document: Plant

- Green Energy Corridor Part D**

Package Number	General Description	Estimated Value (\$ million)	Procurement Method	Review (Prior/Post)	Bidding Procedure	Advertisement Date (quarter/year)	Comments
4-1	TW01, TW02: Transmission Tower Package 765kV Ajmer-Bikaner Transmission line	Lot1:33 Lot2:33	ICB	Prior	1S2E	Q3 / 2015	Prequalification of Bidders: N  Domestic Preference Applicable: Y

Package Number	General Description	Estimated Value (\$ million)	Procurement Method	Review (Prior/ Post)	Bidding Procedure	Advertisement Date (quarter/year)	Comments
	(Part-I), (Part-II)						
4-2	TW03, TW04: Transmission Tower Package 765kV Ajmer-Bikaner Transmission line (Part-III), (Part-IV)	Lot1:33 Lot2:33	ICB	Prior	1S2E	Q4 / 2015	Advanced Contracting: Y  Bidding Document: Plant
4-3	TW05, TW06, TW07: Transmission Tower Package 765kV Bikaner-Moga Transmission line (Part-I), (Part-II), (Part-III)	Lot1:34 Lot2:34 Lot3:34	ICB	Prior	1S2E	Q4 / 2015	
4-4	TW08, TW09: Transmission Tower Package 765kV Bikaner-Moga Transmission line (Part-IV), (Part-V)	Lot1:32 Lot2:33	ICB	Prior	1S2E	Q4 / 2015	
4-5	TW10: Transmission Tower Package 400kV Bikaner(PG)-Bikaner(RV/PNL) Transmission line	20	ICB	Prior	1S2E	Q4 / 2015	
4-6	CD01, CD02: ACSR ZEBRA Conductor	Lot1:11 Lot2:11	ICB	Prior	1S2E	Q1 / 2016	Prequalification of Bidders: N
4-7	CD03, CD04: ACSR ZEBRA Conductor	Lot1:11 Lot2:11	ICB	Prior	1S2E	Q1 / 2016	Domestic Preference Applicable: Y
4-8	CD05, CD06, CD07: ACSR ZEBRA Conductor	Lot1:11 Lot2:11 Lot3:11	ICB	Prior	1S2E	Q1 / 2016	Bidding Document: Goods
4-9	CD08, CD09: ACSR ZEBRA Conductor	Lot1:11 Lot2:11	ICB	Prior	1S2E	Q1 / 2016	
4-10	CIS01, CIS02: Composite Long Rod Insulator	Lot1:3 Lot2:4	ICB	Prior	1S2E	Q1 / 2016	
4-11	Substation Package (i)765/400kV Bikaner(New) (ii) Extension of 765kV Ajmer S/S (iii) Extension of 765kV Moga(PG) S/S	33	ICB	Prior	1S2E	Q4 / 2015	Prequalification of Bidders: N  Domestic Preference Applicable: Y  Bidding Document: Plant

Package Number	General Description	Estimated Value (\$ million)	Procurement Method	Review (Prior/Post)	Bidding Procedure	Advertisement Date (quarter/year)	Comments
4-12	Transformer Package (i) 7x500MVA, 765/400kV, 1-Ph Auto Transformer at 765/400kV Bikaner Substation	12	ICB	Prior	1S2E	Q1 / 2016	
4-13	Reactor Package (i) 4x110MVAR, 765kV, 1-Ph Bus Reactor at Bikaner Substation (ii) 13x110MVAR, 765kV, 1-Ph Line Reactor at Bikaner Substation	14	ICB	Prior	1S2E	Q1 / 2016	
4-14	Reactor Package (i) 7x110MVAR, 765kV, 1-Ph Bus Reactor at Moga(PG) Substation (ii) 6x80MVAR, 765kV, 1-Ph Line Reactor at Ajmer Substation	10	ICB	Prior	1S2E	Q1 / 2016	

### 3. Goods and Works Contracts Estimated to Cost Less than \$1 Million and Consulting Services Contracts Less than \$100,000 (Smaller Value Contracts)

The following table lists smaller-value goods, works and consulting services contracts for which the activity is either ongoing or expected to commence within the next 18 months.

Goods and Works								
Package Number	General Description	Estimated Value	Number of Contracts	Procurement Method	Review (Prior/Post/Post(Sample))	Bidding Procedure	Advertisement Date (quarter/year)	Comments
None								

### B. Indicative List of Packages Required Under the Project

The following table provides an indicative list of goods, works and consulting services contracts over the life of the project, other than those mentioned in previous sections (i.e., those expected beyond the current period).

Goods and Works							
Package Number	General Description	Estimated Value (cumulative)	Estimated Number of Contracts	Procurement Method	Review (Prior/Post/Post(Sample))	Bidding Procedure	Comments
None							

### C. List of Awarded and On-going, and Completed Contracts

The following tables list the awarded and on-going contracts, and completed contracts.

#### 1. Awarded and Ongoing Contracts

Goods and Works							
Package Number	General Description	Estimated Value	Awarded Contract Value	Procurement Method	Advertisement Date (quarter/year)	Date of ADB Approval of Contract Award	Comments
None							

#### 2. Completed Contracts

Goods and Works								
Package Number	General Description	Estimated Value	Contract Value	Procurement Method	Advertisement Date (quarter/year)	Date of ADB Approval of Contract Award	Date of Completion	Comments
None								

### D. Financing From Other Sources

The following table lists goods, works and consulting services contracts over the life of the project, financed by other sources.

Goods and Works				
General Description	Estimated Value (cumulative)	Estimated Number of Contracts	Procurement Method	Comments
800kV HVDC Bipole Transmission line	495	15	ICB	Financed by POWERGRID
Conductor for 800kV HVDC Line	230	15	ICB	Financed by POWERGRID
Composite Longrod Insulator for 800kV HVDC Line	35	6	ICB	Financed by POWERGRID
Hardware Fittings & Accessories for 800kV HVDC line	30	3	ICB	Financed by POWERGRID
Hexagonal Spacer Damper & Rigid Spacer for 800kV HVDC line	5	2	ICB	Financed by POWERGRID
320kV HVDC Bipole Transmission line	171	1	ICB	Financed by POWERGRID
Conductor and Insulator for 320kV HVDC Line	8	1	ICB	Financed by POWERGRID
Composite Longrod Insulator for 320kV HVDC Line	1	1	ICB	Financed by POWERGRID
Hardware Fittings & Accessories for 320kV HVDC line	1	1	ICB	Financed by POWERGRID
Hexagonal Spacer Damper & Rigid Spacer for 320kV HVDC line	1	1	ICB	Financed by POWERGRID

## DESIGN AND MONITORING FRAMEWORK

**Impacts the Project is aligned with:**  
 Increased overall efficiency of the Indian power system, expanded access to electricity, increased private investment in renewable energy, and enhanced energy security in India. (Electricity for All, Twelfth Five-Year Plan)<sup>a</sup>

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
<p><b>Outcome</b></p> <p>Improved and more reliable transmission system capacity in the northern, western and southern regions of India</p>	<p>By 2020:</p> <p>Additional 3,000 MVA of transmission capacity installed to accommodate renewable energy flows via Bikaner, Rajasthan in the northern region. (2015 baseline = 0)<sup>b</sup></p> <p>Inter-regional capacity between Chhattisgarh in the western and Pugalur in the southern region increased by 6,000 MW. (2015 western-southern baseline: 5,720 MW)<sup>b</sup></p>	<p>National Load Dispatch Center, and from Power System Operation Corporation annual reports</p>	<p>Expected growth in renewable energy generation capacity does not match the increase in transmission capacity</p>
<p><b>Outputs</b></p> <p>1. Green energy corridor transmission system expanded in the northern region</p>	<p>By 2020:</p> <p>1a. About 629 km of 765 kV double circuit transmission lines constructed (2015 baseline: 0)<sup>b</sup>            This consists of about 263 km line from Ajmer to Bikaner and about 366 km line from Bikaner to Moga</p> <p>1b. About 26 km of 400 kV double circuit (Quad) transmission line from Bikaner (new substation) to Bikaner (existing substation) constructed. (2015 baseline: 0)<sup>b</sup></p> <p>1c. 765/400kV substation with 2x1500 MVA transformers at Bikaner constructed. (2015 baseline: 0)<sup>b</sup></p> <p>1d. Existing Ajmer and Moga substations extended by additional two line bays each. (baseline: 0 extensions)</p> <p>1e. Real-time measurement and monitoring equipment installed. (2015 baseline: 0)</p>	<p>POWERGRID Annual Reports</p>	<p>Rights-of-way issues cause delays.</p> <p>Completion of associated transmission lines (external to the project) is delayed.</p> <p>Increases in the prices of equipment and materials exceed contingency and inflation forecasts.</p>
<p>2. Transmission interconnection capacity between the western and southern regional grids expanded</p>	<p>By 2020:</p> <p>2a. Two 800 kV HVDC terminal stations constructed in Raigarh, Chhattisgarh and Pugalur, Tamil Nadu. (2015 baseline = 0)<sup>b</sup></p>	<p>POWERGRID Annual Reports</p>	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
	2b. Two 320 kV voltage source converter HVDC terminal stations constructed in Pugalur, Tamil Nadu and Trichur, Kerala. (2015 baseline = 0) <sup>b</sup>		
<p><b>Key Activities with Milestones</b></p> <p><b>1. Green energy corridor transmission system expanded in the northern region</b></p> <p>1.1 Identify and technically appraise subprojects (Q1–Q3 2015) [G/CD]  1.2 Prepare engineering designs (Q1–Q3 2015)  1.3 Conduct financial and economic assessment (Q3 2015)  1.4 Prepare bid documents (Q1–Q4 2015)  1.5 Award contracts for goods, works, and services (Q3 2015–Q1 2016)  1.6 Construct assets (Q1 2016–Q4 2020)  1.7 Make assets operational (Q4 2018–Q4 2020)</p> <p><b>2. Transmission interconnection capacity between the western and southern regional grids expanded</b></p> <p>2.1 Identify and technically appraise subprojects (Q1–Q3 2015) [G/CD]  2.2 Prepare engineering designs (Q1–Q3 2015)  2.3 Conduct financial and economic assessment (Q3 2015)  2.4 Prepare bid documents (Q1–Q3 2015)  2.5 Award contracts for goods, works, and services (Q3 2015–Q1 2016)  2.6 Construct assets (Q4 2015–Q4 2020)  2.7 Make assets operational (Q4 2018–Q4 2020)</p>			
<p><b>Inputs</b></p> <p>ADB: \$500.0 million (loan)  POWERGRID (other sources)<sup>c</sup>: \$1,307.6 million  POWERGRID equity (Internal sources): \$774.7 million</p>			
<p><b>Assumptions for Partner Financing:</b></p> <p>POWERGRID raises the requisite debt funding from other sources for the project.</p> <p>Parallel, related investments that are aligned with the project outcome, and further contribute to the impact include: German development cooperation through KfW is providing €500 million (about \$556 million equivalent) parallel cofinancing for the Green Energy Corridor Initiative's component that includes transmission lines and substations connecting Gujarat with Rajasthan up to a new substation in Ajmer, Rajasthan.</p>			

ADB = Asian Development Bank, G/CD = governance and capacity development, HVDC = high voltage direct current, km = kilometer, kV = kilovolt, MVA = megavolt-ampere, MW = megawatt, POWERGRID = Power Grid Corporation of India Limited.

<sup>a</sup> Government of India, Planning Commission. 2013. *Twelfth Five-Year Plan, 2012–2017*. Delhi.

<sup>b</sup> As of 31 July 2015, POWERGRID owns and operates about 117,679 circuit km of high voltage transmission lines and 197 substations with transformation capacity of about 239,424 MVA, and total Inter-regional power transfer capacity is 47,450 MW. Source: [http://www.powergridindia.com/\\_layouts/PowerGrid/User/ContentPage.aspx?Pid=150&LangID=English](http://www.powergridindia.com/_layouts/PowerGrid/User/ContentPage.aspx?Pid=150&LangID=English).

<sup>c</sup> Expected to be POWERGRID's domestic bond issuance and/or parallel financing from the commercial banking sector and/or other financial institutions.

Source: ADB.