



Completion Report

Project Number: 32298-053
Loan Number: 2347
July 2016

India: Madhya Pradesh Power Sector Investment Program (Tranche 4)

This document is being disclosed to the public in accordance with ADB's Public Communications Policy 2011.

Asian Development Bank

CURRENCY EQUIVALENTS

Currency Unit – Indian rupee/s (Re/Rs)

		At Appraisal (12 December 2006)	At Project Completion (30 September 2013)
Re1.00	=	\$0.0223	\$0.015961
\$1.00	=	Rs44.83	Rs62.65

ABBREVIATIONS

ADB	-	Asian Development Bank
DISCOM-C	-	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited
DISCOM-E	-	Madhya Pradesh Poorv Kshetra Vidyut Vitaran Company Limited
DISCOM-W	-	Madhya Pradesh Paschim Kshetra Vidyut Vitaran Company Limited
DMF	-	design and monitoring framework
DTR	-	distribution transformer
EIRR	-	economic internal rate of return
MFF	-	Multitranchise Financing Facility
FIRR	-	financial internal rate of return
EMP	-	environmental management plan
FY	-	fiscal year
GSDP	-	gross state domestic product
HT	-	high-tension (power line, 11 kV)
HVDS	-	high-voltage distribution system
ICB	-	international competitive bidding
IDC	-	Interest During Construction
IEE	-	initial environmental examination
LIBOR	-	London interbank offered rate
LT	-	low-tension (power line, 440 V)
LVDS	-	low-voltage distribution system
PFC	-	Power Finance Corporation
REC	-	Rural Electrification Corporation
SBI	-	State Bank of India
VCB	-	vacuum circuit breaker
WACC	-	weighted average cost of capital

WEIGHTS AND MEASURES

GWh	–	gigawatt-hour
hp	–	horsepower
km	–	kilometer
kV	–	kilovolt
kVA	–	kilovolt-ampere
kW	–	kilowatt
kWh	–	kilowatt-hour
MW	–	megawatt

NOTES

- (i) The fiscal year (FY) of India and its agencies ends on 31 March. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2013 ends on 31 March 2013.
- (ii) In this report, "\$" refers to US dollars.

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BASIC DATA

A. Loan Identification

- | | |
|-------------------------------------|---|
| 1. Country | India |
| 2. Loan Number | 2347 |
| 3. Project Title | Madhya Pradesh Power Sector Investment Program (Tranche 4) |
| 4. Borrower | India |
| 5. Executing Agency | Madhya Pradesh Poorv Kshetra Vidyut Vitaran Company Limited (DISCOM-E)
Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited (DISCOM-C)
Madhya Pradesh Paschim Kshetra Vidyut Vitaran Company Limited (DISCOM-W) |
| 6. Amount of Loan | \$90 million
Part A, DISCOM-E: \$20 million
Part B, DISCOM-C: \$20 million
Part C, DISCOM-W: \$50 million |
| 7. Project Completion Report Number | 1574 |

B. Loan Data

- | | |
|----------------------------------|--|
| 1. Appraisal | |
| - Date Started | 12 December 2006 |
| - Date Completed | 14 December 2006 |
| 2. Loan Negotiations | |
| - Date Started | 16 August 2007 |
| - Date Completed | 17 August 2007 |
| 3. Date of Board Approval | 21 August 2007 |
| 4. Date of Loan Agreement | 7 March 2008 |
| 5. Date of Loan Effectiveness | |
| - In Loan Agreement | 5 July 2008 (90 days) |
| - Actual | 11 June 2008 |
| 6. Closing Date | |
| - In Loan Agreement | 31 December 2011 |
| - Actual | 1 May 2014 |
| - Number of Extensions | 2 |
| 7. Terms of Loan | |
| - Interest Rate | London interbank offered rate-based |
| - Maturity (number of years) | Sum of LIBOR and 0.6% |
| - Grace Period (number of years) | 20 years |
| - Commitment fee and IDC | 5 years |
| | \$2.5 million (estimated) |
| 8. Terms of Relending (if any) | |
| - Interest Rate | Relending between the Government of India and the Government of Madhya Pradesh is on the same terms and conditions as those applicable to the Government of India. |

- Second-Step Borrower GOMP on-lending to DISCOMs, with a one percentage point spread
- Maturity (number of years) 20 years
- Grace Period (number of years) 5 years

9. Disbursement

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
31 July 2008	14 February 2014	64.47 months
Effective Date	Original Closing Date	Time Interval
11 June 2008	31 December 2011	42.63 months

DISCOMs-E, W, and C = east, west, and central zone distribution companies, LIBOR = London interbank offered rate.

b. Amount (\$ million) **Loan 2347-Total (Details for each DISCOM in Appendix 2.1)**

Category^a	Original Allocation	Last Revised Allocation	Amount Cancelled	Net Amount Available	Amount Disbursed	Undisbursed Balance^b
1.Equipment	86.20	86.20	0.00	86.20	72.21	13.99
2.Interest & Commitment charges	2.50	2.50	0.00	2.50	1.95	0.55
3.Unallocated	1.30	1.30	0.00	1.30	0.00	1.30
Total	90.00	90.00	0.00	90.00	74.16	15.84

^a There were no works contracts, only turnkey equipment supply and installation.

^b Cancelled on 1 May 2014.

10. Local Costs (Financed)

- Amount (\$) not applicable
- Percent of Local Cost not applicable
- Percent of Total Cost not applicable

C. Project Data1. Project Cost (\$ million) **Loan 2347-Total (Details for each DISCOM in Appendix 2.2)**

Cost	Appraisal Estimate	Actual
Foreign Currency Cost	90.00	74.16
Local Currency Cost	69.70	7.65
Total	159.70	81.81

2. Financing Plan- (\$ million) Loan 2347-Total

Cost	Appraisal Estimate	Actual
ADB Financed	90.00	74.16
DISCOMs (PFC/REC/SBI) ^a	69.70	7.65
Total	159.70	81.81

^a DISCOMs funded local currency from lines of credit with PFC/REC/SBI.

ADB = Asian Development Bank, DISCOMs = distribution company, REC = Rural Electrification Corporation, PFC = Power Finance Corporation, SBI = State Bank of India.

3. Cost Breakdown by Project Item (\$ million) - **Loan 2347-Total (Details for each DISCOM in Appendix 2.3)**

Item	Appraisal Estimate^a			Actual^b		
	Foreign	Local	Total	Foreign	Local	Total
Total Baseline Costs	86.20	40.60	126.80	72.21	7.65	79.86
Unallocated	1.30	15.80	17.10	00.00	0.00	0.00
IDC and Commitment Charges	2.50	13.30	15.80	1.95	0.00	1.95
Total	90.00	69.70	159.70	74.16	7.65	81.81

^a From Periodic Financing Request and Loan Agreement.

^b From Loan Financial Information System.

4. Project Schedule

Item	Appraisal Estimate		Actual	
	Start	End	Start	End
High-Voltage Distribution System	Aug 2007	Dec 2012	Sep 2007	May 2013
Remote Metering	Aug 2007	Oct 2011	Dec 2007	Jun 2012
Supply of 33 kV and 11 kV VCB	Aug 2007	Apr 2009	Jan 2008	Apr 2009
Supply of AAA Raccoon Conductor	Aug 2007	Dec 2008	Mar 2009	Dec 2012
Supply of PVC Cable and AB Cable	Aug 2007	Dec 2010	Feb 2008	Dec 2011
Supply of Fabricated Material and H-beam	Aug 2007	Nov 2011	Mar 2008	Dec 2012
Supply of DTRs	Aug 2007	Nov 2010	Aug 2008	Jan 2010
Bifurcation of Village and Rural Distribution System	Aug 2007	Jul 2012	Aug 2008	Mar 2013

AAA = all aluminum alloy, AB = aerial bundled, DTR = distribution transformer, H = hot-rolled steel, kV = kilovolt, PVC = polyvinyl chloride, VCB = vacuum circuit breaker.

5. Project Performance Report Ratings

Implementation Period	Ratings	
	Outcome	Implementation Progress
From 11 June 2008 to 31 December 2008	Satisfactory	Satisfactory
From 1 January 2009 to 31 December 2009	Satisfactory	Satisfactory
From 1 January 2010 to 31 December 2010	Satisfactory	Satisfactory

From 1 January 2011 to 31 December 2011	On Track
From 1 January 2012 to 31 December 2012	On Track
From 1 January 2013 to 30 September 2013	On Track

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Fact-finding Mission	16–24 October 2006	5	45	a/i,c,f,k,l
Appraisal Mission	12–14 December 2006	5	5	a/i,b,c,d,l
Inception/ Loan Mission	21–25 May 2007	5	5	a/i,b,e,f,l
Loan Review Mission	7–17 January 2008	3	3	a/i,f,d
Inception/ Loan Mission	1–03 September 2008	3	9	a/i,d,f
Loan Review Mission	16–27 March 2009	2	3	a/i,d
Loan Review/Inception	5–15 October 2009	2	10	a/i,d
Special Loan Administration	24–27 November 2009	2	2	g/i,h
Special Loan Administration	6–16 April 2010	2	8	g/i,h
Loan Review Mission	31 August–10 September 2010	2	10	d/i,e
Loan Review Mission	27–28 September 2010	2	4	d/i,e
Loan Review Mission	24 August–2 September 2011	3	14	d/i,e,f
Loan Review Mission	18–25 June 2012	2	16	e,f/i
PCR Mission	7–19 March 2016	2	16	f/i,m

a = senior finance specialist (energy), b = senior project implementation specialist, c = energy specialist, d = project implementation specialist, e = assistant project analyst, f = project officer (energy), g = resettlement and social development officer, h = environment officer, i = team leader (energy), j = senior project assistant, k = social development specialist, l = senior control officer, l = energy specialist, private sector participation, m = PCR consultant.

^a The various inception and loan review missions reviewed all the loans under the MFF. The person days indicated in Table D, is an estimate of days applicable to Loan 2347.

I. PROJECT DESCRIPTION

1. The State of Madhya Pradesh is rural, and most of its residents rely on agriculture for their livelihoods. Much of the state experiences a long dry season, and traditionally crops could be grown only during the monsoon season. With recurring droughts, the only way to increase agricultural production was through use of irrigation, mostly from aquifers, requiring mechanical pumping. Having a secure energy source to operate the irrigation pumps therefore became essential to increase food production. Boosting the power supply was not possible due to an aging and undersized transmission system, exacerbated by an equally outdated and inefficient power distribution system. The Government of India's Integrated Energy Policy¹ (2006) specifically provides for the implementation of technologies that maximize energy efficiency, demand-side management, reduced greenhouse gas emissions, and conservation. The policy also incorporates power sector reforms to control technical and commercial losses from state transmission and distribution utilities.

2. With a view to improving its power supply under the national policy, the Government of Madhya Pradesh assessed the key sector constraints and developed a road map for sector reforms and investments. The reforms included establishment of a power transmission company and three distribution companies (DISCOMs)—one for each of the eastern, central, and western areas of the state²—that were to operate on an independent commercial basis. The road map indicated that substantial investments were required to improve the capacity of the transmission system and the efficiency of the distribution systems operated by each DISCOM. In order to address these deficiencies, the government sought ADB's support to upgrade the power systems in Madhya Pradesh. The Madhya Pradesh Power Sector Investment Program³ was designed to upgrade the overall efficiency of the transmission and distribution systems. The program was developed as a multi-tranche financing facility (MFF) to support implementation of the large investment program (a \$620 million ADB loan) through the independent transmission and distribution system companies in a logical, sequential manner.

3. The first three projects (tranches 1, 2, and 3) under the program were (i) expansion of the transmission capacity through installation of high-voltage transmission lines with related step-down transformer stations and (ii) distribution system improvements for the eastern part of the state. In its appraisal for the program, ADB also developed tranches 4, 5, and 6 with the three DISCOMs to upgrade their distribution systems in a sequential manner based on a preliminary estimate of the upgrading required by each system. The individual loans developed during appraisal of the program, were based on preliminary estimates of actual requirements with the understanding that the scope of work would be adjusted based on actual ground conditions to address the most urgent and cost effective improvements. In order to facilitate this approach, the loan agreement included provision for the required works to be provided through turnkey international competitive bidding (ICB) procedures, which would include detailed surveys and designs, purchase of specified equipment and materials, and installation of the equipment and materials.

¹ Planning Commission, Government of India. 2006. *Integrated Energy Policy: Report of the Expert Committee*. New Delhi.

² Madhya Pradesh Poorv Kshetra Vidyut Vitaran Company Limited (DISCOM-E), Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited (DISCOM-C), and Madhya Pradesh Paschim Kshetra Vidyut Vitaran Company Limited (DISCOM-W).

³ ADB. 2007. *Report and Recommendation to the President to the Board of Directors, Proposed Multi-tranche Financing Facility*. Madhya Pradesh Power Sector Investment Program.

4. In order to address the inefficiencies in power distribution in rural areas of the state not already improved through tranches 1–3, tranche 4 (the project), was planned, designed, and implemented by the three DISCOMs, which are headquartered in Jabalpur (DISCOM-E), Bhopal (DISCOM-C), and Indore (DISCOM-W). The project included (i) segregation of domestic and agricultural consumers; (ii) installation of meters and replacement of single-phase service lines for consumers; (iii) renovation of substations, including addition of bays for expansion and vacuum circuit breakers (VCBs); (iv) construction of high-voltage distribution systems (HVDS), consisting of new 11-kilovolt (kV) high-tension (HT) line and conversion of 440-volt low-tension (LT) line to 11 kV line with distribution transformers (DTRs); (v) remote metering of larger industrial and commercial consumers; (vi) installation of capacitor banks in substations; (vii) metering on existing and new DTRs; and (viii) continuation of capacity building of the DISCOMs' operational and financial management departments, begun under the earlier tranches of the MFF. The project helped to improve the voltage profiles, reduced transmission and distribution losses, eliminated DTR failures, improved agricultural productivity, and addressed non-technical losses by strengthening institutional performance through a focus on improved billing and collection, anti-theft programs, remote metering, and improved collection of tariffs in arrears.

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

5. The massive program of almost \$1 billion was ADB's first intervention in the Madhya Pradesh power distribution system. It would require almost a decade to implement as the capacity of the implementing agencies was limited. Also, the physical requirements would not be clearly known until after the first interventions showed the actual ground conditions. In light of these constraints, the MFF modality was used to enable the implementing agencies to implement projects that would be manageable, given their capacity. The MFF modality also provided them with flexibility to adjust the scope of subsequent projects on the basis of what was most urgently required, thereby maximizing the outcomes to be realized from the available budgets and ADB loans, the amounts of which were specified in the loan agreement. The MFF modality was appropriate. However, ADB's formulation of the MFF included only preliminary design and appraisal of the first tranche, with the DISCOMs being responsible for design and appraisal of subsequent tranches. This led to some overestimation of works and cost estimates as the DISCOMs were newly established and unfamiliar with ADB appraisal procedures.

6. The project was the fourth in the six-tranche program. In accordance with the government and ADB strategies, and the steps outlined in the power sector road map, the focus was on reduction of losses, both technical and non-technical, in the distribution systems. As the DISCOMs were not familiar with ADB-financed projects, and ADB had agreed that the DISCOMs would do the design and appraisal without consultants, the appraisal was based on preliminary estimates of physical requirements, as per procedures prevailing in the DISCOMs. The appraisal for tranche 4 was further complicated by the fact that it took place in mid-2007, before the impact of the work under the first three tranches was known.

7. The DISCOMs and ADB had agreed, as detailed in the RRP, Section E, that the project would be completed through turnkey ICB contracts, whereby the contractors would provide and install all equipment and materials, and would also conduct detailed surveys and adjust the scope based on on-the-ground conditions, while implementing the project. The ICB contracts were affected by a more than 40% drop in the rupee to dollar valuation that occurred after appraisal, which led to lower foreign currency costs. Furthermore, the DISCOMs were unfamiliar with estimates for the non-technical costs (contingencies, IDC, and commitment fees)

attributable to foreign currency cost and these were over-estimated. The physical works envisaged at appraisal were based on preliminary estimates of physical requirements, and the works constructed reflected the conditions on the ground, which resulted in variation with respect to appraised quantities. Despite these variations, the expected outcomes were generally met, and the project formulation and designs were relevant.

B. Project Outputs

Institutional

8. As required under the program, the DISCOMs were established as separate entities with independent boards, management committees, and internal audit functions. The appointment of senior personnel (managers, accountants, and financial management staff) was completed before the end of 2008. DISCOM personnel were trained through specific programs focused on head office, district, and service centre staff. The capacity building initially focused on project planning; design and implementation of an externally financed initiative, including ADB international competitive bidding (ICB) procedures; quality control; environmental and social safeguards; and accounting and audits.⁴ As the project proceeded, the DISCOM staff were trained in operational and management procedures including routine maintenance and replacement of defective equipment and parts; (ii) computerized billing and collection, (iii) use of remote metering; (iv) public awareness raising, with a focus on the dangers of the HVDS systems relative to theft through illegal tapping; (v) monitoring of power consumption patterns and vigilance regarding increased consumption, with focus on agricultural consumers, and (vi) financial management and information technology. District and subdistrict service centre personnel were well versed in routine maintenance, billing and collection (including collection of accounts in arrears, which remains a challenge), monitoring of power use patterns used to adjust the flat rate for agricultural consumers, and monthly reporting.

Physical Infrastructure

Part A: DISCOM-E

9. Under the project, DISCOM-E was designated Part A. The physical outputs estimated by DISCOM-E during its appraisal, as per the Periodic Financing Request (PFR) of 27 July 2007, were as follows: (i) laying of 1,140 kilometres (km) of 11 kV lines for segregation of domestic and agricultural consumers in rural areas of Sagar district; (ii) installation of single-phase meters for 300,000 consumers and installation of new meters, including shifting of existing meters to accessible locations and replacement of single-phase service lines for 200,000 consumers; and (iii) installation of 33 kV and 11 kV circuit breakers and renovation of 333 substations with outputs of 33 kV to 11 kV. The actual outputs were as follows: (i) 734 km of new 11 kV feeder line for segregation of village and agricultural consumers in rural areas of Sagar district, including 498 25 kilovolt-ampere (kVA) DTRs; (ii) 300,000 consumer meters were deleted from the ADB loan as these were supplied under the Feeder Segregation Scheme/Rajeev Gandhi Garmin Vidutikaran Yojana;⁵ as a consequence of this overlapping scheme, the replacement and shifting of meters to more readily accessible locations for meter reading required only 31,492 new meters (m) and 62 km of single-phase 440 V line; and (iii) the renovation of 333 substations was limited to only 27 under the ADB loan, as the contractor for this work (there

⁴ The project was the first ADB and externally financed initiative for DISCOM-C and DISCOM-W.

⁵ This was a scheme to improve metering in a number of state distribution systems that was underway at the time of project implementation.

were two packages with same firm) was terminated for lack of performance. The uncompleted substations were finished using the DISCOM's own funds.⁶ Subsequently, the loan savings were reallocated to procure 1,335 km of armoured 440 V line and 950 km of Racoon⁷ line to replace existing power lines with more efficient and theft-resistant lines, including 183 100 kVA DTRs to connect this new 33 kV line to the substations. The savings from the cancelled contracts also enabled DISCOM-E to procure 2,199 tons of steel beams and mounts for power poles to carry the new lines. Although the area covered by the project at completion and the specifications were unchanged from those identified at appraisal, less equipment and works were installed, on the basis of ground conditions found by the detailed surveys and testing completed by the ICB contractors. This reduction in works was partially offset by the works completed using the reallocated loan savings. The specific outputs compared with those actually achieved are summarized in the DMF in Appendix 1.

Part B: DISCOM-C

10. The physical outputs estimated by DISCOM-C, as per the PFR, included (i) construction of HVDS in theft-prone areas of Bhopal, Gwalior, Morena, and Amba cities, including conversion of about 185 km of low-voltage lines to 11 kV lines, construction of 48.6 km of new 11 kV lines, and installation of 3,200 low-capacity DTRs; (ii) remote metering of 8,394 industrial and commercial consumers; and (iii) installation of 588 capacitor banks to boost voltage and protect the system against power surges. Actual outputs were lower than estimated, as follows: (i) 115 km of HVDS lines replaced, 30 km of new 11 kV lines, and 3,639 new DTRs installed; (ii) remote metering of 8,394 larger consumers; and (iii) installation of 588 capacitor banks with resistances of 1,200 kVA. The reduction in replacement and new lines, and the increase in the number of step-down transformers were due to adjustments in equipment based on the ground conditions found when the ICB contractors conducted their detailed surveys and testing of existing equipment. The appraised versus actual works are summarized in the DMF, Appendix 1.

Part C: DISCOM-W

11. At appraisal, as detailed in the PFR, DISCOM-W estimated that the following works would be required: (i) conversion of about 1,119 km of low-voltage distribution lines (440 V) to HVDS (11 kV), construction of 714 km of new 11 kV line, and installation of low-capacity DTRs, as required; (ii) bifurcation and/or segregation of agricultural and village loads and lines, including construction of 1,795 km of new 11 kV line; (iii) renovation of 316 11 kV substations, including replacement of DTRs, circuit breakers, and capacitors, and addition of new bays for future expansion; (iv) addition of capacity to power transformers; (v) installation of system metering and DTRs; (vi) installation of 11 kV lines and bays; and (vii) IT enabling services. Actual outputs, based on reduced requirements as determined by the detailed surveys and testing of existing equipment and lines by the ICB contractors, were lower: (i) 746 km of 440 V line converted to 11 kV line, and 176 km of new 11 kV line installed along with 4,791 DTRs; (ii) construction of 1,154 km of new 11 kV line for segregation of lines for agricultural and village loads; (iii) 310 substations renovated with 2,200 DTRs and 784 VCBs; (iv) construction of 12 new 33 kV to 11 kV substations, with 94 DTRs and 20 new bays; (v) installation of 12,026 DTR meters as new or replacement DTRs; (vi) installation of 631 km of new 11 kV line and

⁶ By the time of termination, it was too late for the DISCOM to put the works out for bid under the project.

⁷ Racoon cable is trade name for coated line (polyvinyl chloride and polyethylene coated line) with high transmission efficiency.

replacement of 1,103 km of 11 kV line; and (vii) training of DISCOM staff in improving IT services for remote metering, billing, and collection, and follow-up on customer accounts in arrears. There was some overlap among the first six categories, which meant that some of the reduced amounts in items (i) and (ii) were completed under items (iii)-(iv). The total works completed were generally as estimated at appraisal. A comparison of the estimated works at appraisal and the actual works completed appears in the DMF (Appendix 1).

C. Project Cost

12. At appraisal, as provided in the PFR,⁸ the total cost of the project was estimated at \$159.6 million, comprising \$90 million in foreign currency and \$69.6 million in local currency. At completion, the project cost totaled \$81.81 million, comprising \$74.16 million in foreign currency and \$7.65 million in local currency. The cost breakdown by category for each DISCOM appears in Appendix 2. The foreign currency and ADB loan was utilized only for the ICB contracts, which included equipment supply and installation on a turnkey basis, and for the IDC and commitment charges. The summary of contracts is in Appendix 3. Savings in the ICB contracts and foreign currency were primarily attributed to a lower-than-estimated equipment cost due to competitive bidding and to devaluation of the rupee after appraisal. DISCOM-E also had savings due to (i) termination of two contracts with a cost of more than \$13 million; (ii) reduction in the length of 11 kV distribution lines for technical optimization; and (iii) shifting of 300,000 m from the ADB loan to another program. For DISCOM C, there was only minor reduction in works and reduced disbursements, primarily due to the rupee devaluation. For DISCOM-W, the estimated works were generally achieved, though under different categories than those shown in the PRF; some categories did not specify quantities, and some of the works in those categories offset the reductions in other categories.

13. The DISCOMs accessed ongoing lines of credit from the Power Finance Corporation (PFC), the Rural Electricity Corporation (REC) and the State Bank of India (SBI) to cover their local currency costs. This credit facility is standard procedure in Madhya Pradesh to ensure the DISCOMs have adequate funds to cover (i) normal ongoing expansion and improvements of their distribution systems; (ii) ongoing O&M and parts replacements, and (iii) temporary shortfalls in revenue due to seasonal payments of agricultural consumers, many of whom pay their electrical bills quarterly as crops are sold. The project financing plan is summarized in Appendix 4. There was a major decrease in local currency costs (from \$69.9 million to only \$7.65 million). This is attributable to the following savings: (i) \$16.2 million equivalent in equipment installation cost that was included under the ICB contracts; (ii) \$11 million in taxes and duties, which were much lower than expected (about \$7 million instead of \$18 million) due to ICB procurement from within India and the state for the contracts;⁹ (iii) \$17 million in contingencies, as neither physical nor price contingencies were required; (iv) \$15.8 million in “financing charges” and IDC and commitment fees which were attributed to the DISCOMs in the PFR at appraisal, instead of the ADB loan; and (v) the lower-than-expected physical outputs based on actual conditions.

⁸ Government of India, Ministry of Finance, Department of Economic Affairs. Periodic Financing Request #4, 27 July 2007.

⁹ Ministry of Finance, Department of Economic Affairs, issued a notification for excise duty exemption for ICB contracts under ADB-financed projects, subsequent to appraisal.

D. Disbursements

14. ADB disbursements from ordinary capital resources totaled \$74.16 million (82.40%), out of the original loan amount of \$90 million; \$15.84 million (17.60%) was cancelled as a result of cost savings. Disbursements were through three first-generation imprest accounts established with the Reserve Bank of India and second-generation imprest accounts set up by each DISCOM. These were established and operated in accordance with ADB's Loan Disbursement Handbook. There was one loan reallocation for DISCOM-E. The projected and actual disbursements of loan proceeds are in Appendix 5.

E. Project Schedule

15. At appraisal, all physical subprojects were scheduled to be completed by the end of September 2011. However, at the request of the executing agencies (the DISCOMs), duly endorsed by the government and ADB, the loan closing date was extended twice, from September 2011 to December 2013. The reasons include the original 9-month delay in loan effectivity by the government and the longer time than estimated that the ICB contractors needed to complete the detailed surveys of the condition of components of the distribution systems. As indicated, the outputs were 15–20% lower than estimated, though some outputs increased, all with the intent of optimizing the upgraded distribution systems. As a result, substantial time was required to adjust the revised output. A chronological listing of the main project events is in Appendix 6.

F. Implementation Arrangements

16. The implementation arrangements were as envisaged at appraisal. The DISCOMs, under the direction of their respective managing directors, had overall responsibility for project implementation. A dedicated project management unit (PMU) in each DISCOM, led by a senior chief engineer and staffed by experienced technical, project construction management, and administrative staff, provided overall day-to-day project coordination. To ensure ADB procurement guidelines were consistently and efficiently complied with, design and procurement of all packages were guided and facilitated from the procurement units within the DISCOMs. Superintending engineers for each distribution circle were placed in charge of civil works (installation of mechanical and electrical equipment, power pole erection, testing of equipment, and commissioning of distribution works). Due diligence with respect to financial matters was overseen by the chief financial officer of each DISCOM. Project progress was documented through quarterly progress reports. The project organization of each DISCOM varied slightly, as did the titles of unit heads, but was generally similar. The generic organizational chart for the project is in Appendix 7.

G. Conditions and Covenants

17. Loan covenants were generally met as required (25 of 28), and no covenants were modified, suspended, or waived during implementation. However, the three loan covenants for compliance of debt-service coverage ratio, self-financing ratio, and pension funds could not be fully met within the project time frame. The DISCOMs are continuing systemic management reforms to strengthen billing and collection as well as cash flow management. The covenants on improved financial performance are expected to be complied with by the end of 2018, as the loss reduction programs and rationalization of the power distribution tariff are completed. The delay in meeting these covenants did not affect project execution or operation of project-supplied facilities. The status of compliance with loan covenants is in Appendix 8.

H. Consultant Recruitment and Procurement

1. Consultants

18. At appraisal, it was assessed that the DISCOMs had the required technical design, procurement, construction management, financial, and administrative institutional capacity to implement the project, and that a project implementation consultant was not required. This was in part due to the design of the ICB packages, which required the contractors to complete detailed surveys and equipment testing and adjust the scope for the actual conditions of the systems. The DISCOMs did recruit and fund independent safeguard consultants for preparation of social, environmental management, and related monitoring and reporting. Quarterly and annual reports on the implementation of environmental management plans and related monitoring were submitted to ADB beginning in 2010. The DISCOMs also recruited the services of third-party inspectors to conduct technical monitoring and testing of project equipment and materials. These inspectors checked the specifications at the factory level and conducted testing of completed equipment prior to shipment. The equipment specifications were again checked upon delivery to the project sites, and the operational efficiencies were tested after installation, before the new systems were connected to the grid.

2. Procurement

19. The DISCOMs took early action to prepare bids, aided by the almost 9-month delay from loan approval to signing of the loan agreement, and the first two ICB contracts were awarded in March 2008. Most of the remaining 44 contracts under the project were awarded by the end of 2008, though the last ICB contract was not awarded until February 2012. ADB assisted in enabling timely project implementation through expeditious procurement approvals, enabled by regular review missions and day-to-day support from India Resident Mission (INRM) to ensure ADB's requirements were met. Procurement of all 46 contracts (DISCOM-E, 12; DISCOM-C, 7; and DISCOM-W, 27) for equipment and installation was done using ICB procedures in accordance with ADB's *Procurement Guidelines* (2006 as amended from time to time).

I. Performance of Consultants, Contractors, and Suppliers

20. The ICB contractors and their suppliers generally implemented the works in accordance with specifications and quality control as per their contracts. However, DISCOM-E had to dismiss one contractor, which had won two contracts for substation renovation and expansion, due to poor performance and excessively slow completion of works, despite many notifications and warnings. As a result of poor performance, the contractor could complete only about 8% of awarded quantities, 27 out of 333 substation renovations. DISCOM-E subsequently completed remaining work of this contract with its own resources. The performance of all other contractors was generally *satisfactory*. The implementation of environmental safeguards by the DISCOMs and contractors in the initial years of implementation (2008-2009) had minimal impact as activities were limited to surveys, designs, and procurement of the ICB contracts. The works were contained within existing road allowances and rights-of-way beginning later in 2009. Environmental monitoring reports were submitted from 2010 through the end of construction. ADB did strengthen the capacity of the DISCOMs' staff and independent environmental consultants through regular review missions and workshops on safeguards, and also issued instructions to the DISCOMs to implement the environmental management plans (EMPs) as part of the ICB contracts. All goods and services procured for the project complied with the specifications and other operational performance standards.

J. Performance of the Borrower and the Executing Agencies

21. The overall performance of the borrower and the executing agencies was generally *satisfactory*. The borrower was the Government of India, and the executing agencies were the three DISCOMs of Madhya Pradesh. All project outputs, including those changed or reduced through contract termination and loan reallocation, were procured, constructed, and commissioned successfully, within the extended loan completion date, and under the budget. Only 2 of 46 contracts were terminated, due to poor performance by the contractor (the related works were completed by DISCOM-E's own resources). The DISCOMs subsequently strengthened the technical evaluation criteria for bid evaluation, to help avoid similar problems with future procurements.

22. Overall, the DISCOMs demonstrated the ability to technically formulate, appraise, and arrange their own counterpart financing and carry out engineering, procurement, and construction of a variety of technically complex electrical distribution projects, including the remaining works in the terminated contracts. However, the DISCOMs overestimated some of the works required from what was expected at appraisal, as per the PFR. The DISCOMs reallocated some of the loan savings realized from the reduced works, to procure additional equipment and materials that were not included at the time of appraisal but were identified as being required to further improve project outcomes, thereby offsetting or replacing some of the reduced outputs. All works conformed to approved specifications and operational standards in a timely manner and within budget. Despite the reduced output, most of the outcomes were achieved.

K. Performance of the Asian Development Bank

23. ADB closely monitored project progress through the 14 periodic review missions (the first 7 from HQ including INRM staff and the second 7 from the INRM) and assessment of quarterly progress reports, and provided useful and proactive advice on a day-to-day basis, on procurement, project management, and capacity building of environmental monitoring procedures. ADB also supported capacity building of DISCOM staff in procurement through specific procurement and contract management clinics. ADB accorded timely approvals that enabled revised project milestones to be achieved that contributed to smooth project execution. Furthermore, ADB, the executing agency, and government officials (from the Ministry of Power and Department of Economic Affairs) conducted regular and annual tripartite meetings with senior DISCOM managers and project staff, which assisted project execution through corrective actions. ADB's overall performance was *satisfactory*.

III. EVALUATION OF PERFORMANCE

A. Relevance

24. The project was *relevant* and consistent with both India's development priorities (footnote 1) and ADB's country and sector strategies.¹⁰ ADB's country strategy was to finance infrastructure projects in key sectors contributing to economic growth. Its power sector strategy focused on (i) reinforcing and expanding existing transmission and distribution systems relating to existing and new generation; (ii) reforming state power sectors with particular emphasis on the State Electricity Board restructuring and commercialization through which the DISCOMs

¹⁰ ADB. 2004. *Country Strategy and Program Update (2005-2007)*: India. Manila.

were established; (iii) rationalizing power tariffs, at bulk and retail levels; (iv) reforming the regulatory framework; and (v) improving energy efficiency. At project completion, ADB's strategy for the power sector in India is in synergy with the Twelfth Five-Year Plan (2013–2017) objectives of the government to develop infrastructure for economic growth and poverty reduction. The MFF modality was appropriate, given that several implementing agencies with different scope, objectives, and states of readiness were involved.

25. Reform of the Madhya Pradesh power sector was continued under the project in line with India's policy and legislative framework. The design of the project was in line with the government's and state's objectives and resulted in increased hours of service to both urban and rural areas (10 and 24 hours per day, respectively), improved power security and voltage levels, and reduced distribution system losses, and helped reduce non-technical and commercial losses by eliminating illegal connections through the conversion of low-voltage to high-voltage lines, the remote metering program for high-usage consumers and the metering program in the urban project areas. Due diligence for the project was carried out by the Madhya Pradesh Electricity Regulatory Commission and relevant government units that monitored project performance. The project incorporated technical optimization to improve the design based on actual ground conditions and was ultimately implemented within the revised project time period and budget. The resultant improved electricity service contributed to the growth of economic activity in the project areas. The project was therefore relevant and will continue to improve distribution system planning, operation, and maintenance of physical facilities and financial procedures of the DISCOMs.

26. The inclusion of detailed GPS surveys, testing of existing equipment, and resultant revision of the scope of works was an efficient method to fine-tune actual needs of the project. The DISCOMs prepared the appraised schedule of quantities based on estimates of on the ground conditions, with the understanding that actual output would be adjusted accordingly, based on the detailed surveys and designs, without changing the outcomes. The actual works required were also adjusted, on the basis of works being completed under earlier tranches of the program. This approach was more efficient and facilitated the targeting of the most urgently required works and timely project execution. Although this approach has led to some changes and reductions in as-built quantities, as compared with appraisal, it not only saved substantial funds and time but strengthened the strategic direction and relevance of the project.

B. Effectiveness in Achieving Outcome

27. The project is rated *less than effective* in achieving its outcome, as some of the actual outputs were lower than the appraised estimates provided in the PFR. The lower outputs were the result of revisions in scope based on what was actually required, as found by the detailed surveys and testing carried out by the ICB contractors. The lower output by DISCOM-E was mainly attributed to termination of two major contracts with values of more than \$13 million (65% of the subloan). The resultant savings were reallocated to complete additional works required to upgrade the distribution system, but these additional works did not utilize all the savings. Despite the reduced outputs, most of the project outcomes were met. For DISCOM-C and DISCOM-W outputs were generally met, though in different categories than specified in the PFR. Distribution losses were reduced significantly (Appendix 1), losses in project areas were reduced from 2008 to 2013 as follows: DISCOM-E from 37.7% to 26.15%, DISCOM-C from 47.3% to 31.9% and DISCOM-W from 35.5% to 23.1%; power distribution now meets local demand requirements, and resultant excess power is transmitted to deficit areas. The reduced losses meet those envisaged at appraisal. Furthermore, customer complaints have

been reduced by half.¹¹ The project has increased voltage levels to consumers and reduced power outages, and provides a reliable supply of electricity in the intended areas. Rural supply increased from 4 to 10 hours per day, while urban supply increased from 12 to 24 hours per day. All project outputs are operating as designed, and the new infrastructure is being maintained. Efficiencies of the distribution system continue to improve as the DISCOMs become more effective in O&M of their systems and reduce non-technical losses through ongoing consumer education and metering programs. The project achieved its outcomes.

C. Efficiency in Achieving Outcome and Outputs

28. The project is rated *efficient* in achieving outcome and output. The project was implemented within budget and within the approved extended time frame. The loan extensions were required in part due to delays in effectivity of the loan agreement, which was beyond the control of the DISCOMs and in part due to the need for readjusting the scope as required by the problems experienced by DISCOM-E. The delays were justifiable, and the resulting changes enhanced the outcomes of the project. The economic internal rate of return (EIRR) for all the outputs of the aggregated DISCOMs is calculated at 21.5%, which is higher than the appraisal estimate of 15.9% and exceeded the assumed hurdle rate of 12%. The higher EIRR is partly attributed to the lower than expected capital investment, resulting from the lower project output, lower than expected equipment prices, and lower than expected local currency costs. Sensitivity analysis of the three main parameters that could affect the project (increase in O&M cost, reduction in value of saved energy losses, and reduction in incremental consumption) indicates that the impact of these combined risks would only reduce the EIRR to 17.2%, further underscoring the robust nature of the project's economic performance. Appendix 9 provides details of the methodology and assumptions underlying the EIRR reevaluation.

D. Preliminary Assessment of Sustainability

29. The project is considered *likely* sustainable. The financial internal rate of return (FIRR) of the aggregated outcomes of the three DISCOMs is calculated to be 6.7%, substantially higher than the project's estimated weighted average cost of capital (WACC) of 0.8%. Details of the FIRR calculations are in Appendix 10. The FIRR reevaluation is lower than the FIRR calculated at appraisal, which was 11.2% for the overall project. The lower FIRR is primarily a consequence of the lower actual equity contribution by the DISCOMs of approximately 11%,¹² instead of the 34% assumed at appraisal. The equity contribution estimated at appraisal was based on information provided by the DISCOMs, which were unfamiliar with ADB's procedures, as per the detailed cost estimate in the PFR for this project. The FIRR is also lower due to the lower than expected foreign currency costs. However, because most of the outcomes were achieved, the DISCOMs' financial performance and position has unequivocally improved as a consequence of the project, with an aggregate increase in net cash flow in excess of Rs500 million per annum. The ongoing institutional training and capacity building, strengthening of billing and collection procedures, and expected tariff increases will help the financial performance of the DISCOMs and sustainability of the improved power systems.

¹¹ Based on Quarterly Progress Report of EA for India: Madhya Pradesh Power Sector Investment Program (Tranche 4).

¹² Composed of 4% equity and 7% local loans.

30. The project has led to a notable improvement in supply reliability and quality in project areas. Customer outages have been significantly reduced, as have distribution losses and equipment failures. Equipment was procured and commissioned under the project in accordance with approved specifications and met or exceeded relevant design standards. The DISCOMs have the in-house capacity to operate and maintain the project facilities effectively and efficiently, and suitable annual budgets have been put in place for maintenance. Technically, the design of all the subprojects and the technology adopted appear to be robust and appropriate. The project has been implemented efficiently, and all outputs are reported to be operating in accordance with design. All commissioned components are expected to operate in an optimal manner and in accordance with design loadings throughout their life span, supporting the project's technical and financial sustainability. Hence the project is *likely* to be sustainable.

E. Impacts

1. Socioeconomic Impacts

31. The overall socioeconomic impact of the project is *significant*. At completion, the project supported sustained economic growth and social development in Madhya Pradesh. The enhanced distribution capacity and reliability facilitated (i) higher productivity of agricultural outputs, (ii) decreased energy charges and lowered maintenance costs of electric appliances, irrigation pumps, and equipment, thereby improving the economic opportunities of farmers, industrial and commercial users, and domestic consumers. The improved electricity supply significantly contributed to increased agricultural production with some farmers increasing annual crop rotations. Implementation of the project provided opportunities for job creation, income growth, and upgrading of local infrastructure, and thus contributed to poverty reduction and sustainable development in both agricultural and urban areas of the project. The improved electricity services achieved through the project contributed to an increase in the state per capita income to Rs37,744 in FY2012 from Rs12,303 in FY2003.

2. Environmental Impacts

32. The project was classified as environment category "B" in accordance with ADB's *Environment Policy (2002)*. The construction works targeted distribution systems and were carried out along existing power lines, road alignments, and rights-of-way. An initial environmental examination report, including environmental management and monitoring plans (EMPs), was prepared and disclosed as Appendix 13 with the RRP. The ICB contracts incorporated environmentally related mitigation to minimize minor construction-related impacts of temporary road closings, safety measures for workers, and danger signage on power poles with high voltage (11 kV and 33 kV) lines. No complaints were received from the public regarding the environmental aspects of the project, and there were no reported safety issues.

3. Social Impact

33. All works were completed within existing rights-of-way on land owned or controlled by the DISCOMs. There was no land acquisition, resettlement, or indigenous people impacts, and preparation of a resettlement plan was not required. At appraisal the project was classified as category C for involuntary resettlement and category C for indigenous people impacts, in accordance with ADB's *Involuntary Resettlement Policy (1995)* and

Policy on Indigenous Peoples (1998). This classification also applied through implementation. No grievances were received.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

34. Overall, the project is rated *successful*. It was relevant, efficient, and though less than effective, its benefits are *likely* to be sustainable. The project resulted in the outcome envisaged at appraisal and was fully in line with the government's development strategy and ADB's sector policy. The project design was adjusted as required during implementation, based on actual ground conditions. This resulted in some adjustment of works, which reduced some outputs under the ADB loan, but since most of the reduced output was completed by the DISCOMs' own funds, the outcomes estimated at appraisal were achieved. The main benefit of the project was the boost to the rural economy resulting from the improved electrical supply. The project also helped the DISCOMs become more sustainable, through increased revenues and improved O&M, billing and collection procedures, and financial management of the DISCOMs.

35. Through the joint efforts of the project stakeholders, including contractors, executing agency and ADB, the project was completed within the revised loan completion schedule. The 18-month extension required to complete the various works and conduct as-built operational testing did not cause any undue impact and led to better overall efficiency and operation of the distribution systems. Project implementation was in line with the country's rules and regulations as well as ADB's safeguard requirements and loan covenants. The cost savings related to findings during the detailed GPS surveys and testing as well as technical optimization, including tapping at the nearest connection point, reduced the length of conversion of the low-voltage distribution lines to high-voltage ones, is a successful example of technical optimization in rural electrification, as summarized in Appendix 11.

36. Industrial, commercial, agricultural, and domestic consumers' electrical equipment is operating more efficiently as a result of proper voltage and reduced surges, resulting in savings in power and equipment maintenance costs, and longer operational life for equipment. The improved power supply has contributed to increased economic activity. Project implementation has strengthened the institutional capacity of the DISCOMs and the managerial and operational competence of their managers and staff. The economic viability of the project has been confirmed with better than projected EIRR, and the financial sustainability has also been confirmed, with the FIRR well above the WACC though lower than estimated at appraisal. The projected direct benefits have been fully realized, and these will be maintained in the longer-term life of project facilities.

B. Lessons

37. Lessons for future ADB projects include the need for capable and committed implementing agencies. The DISCOMs demonstrated that (i) willingness to adopt ADB's requirements for ICB procurement led to more rapid and transparent bidding processes, which led to lower bids and costs; (ii) open communication and willingness to deal with stakeholders—particularly contractors—are helpful in resolving complex technological issues, leading to better resolution of problems in a timely and cost-efficient manner; (iii) a properly administered procurement process lead to better bids with lower prices and better quality of equipment and workmanship of contractors; (iv) the ability to adjust the project

scope to reflect actual field conditions and to apply technical optimization will improve project implementation, lower costs, and result in better outcomes; and (v) assignment of experienced and sufficiently ranked technical managers to run the PMUs, with autonomy to plan, design, and implement the project, will lead to better project implementation. ADB's various clinics regarding environmental and social safeguards, procurement, quality control, monitoring, and reporting are essential for supporting implementing agencies that are new to ADB-financed projects. For future projects of a similar nature, ADB should consider requiring the implementing agencies to recruit the services of a consultant familiar with ADB procedures to assist with preparation of appraisal scope and cost estimates and the PFRs to avoid major changes in scope and the over-estimation of the cost of both ICB contracts and equity contribution, as occurred for this project. Succeeding tranches of an MFF program should ideally be timed to incorporate works included or completed under preceding tranches.

C. Recommendations

1. Project-Related

38. **Future Monitoring.** The project has been implemented, and resulting facilities are operating as planned. The DISCOMs will continue to monitor and evaluate the project impact and report their findings to ADB, through the established project performance management system, to ensure that the project facilities are managed effectively and that the benefits are maximized. Routine maintenance and equipment repairs and replacement should be carried out expeditiously. DISCOMs distribution centers should continue to conduct due diligence and monitoring of the local consumers and their program to install three-phase meters for all irrigation pumps and other electrical equipment greater than 10 horsepower (hp). The ongoing metering programs should be expanded to include all consumers over time.

39. **Further Action or Follow-Up.** The project requires no specific future action from ADB, as most performance targets have been met. However, the DISCOMs will continue to report annually on the progress of meeting their debt-service ratios as required in the loan covenants through 2018, when these are expected to have been achieved.

40. **Timing of the Project Performance Evaluation Report.** All the facilities under the project are operating normally. ADB could undertake a project performance evaluation review in 2016-17.

2. General

41. The favorable experience with the project demonstrates that power distribution projects contribute to sustainable development, economic growth of consumers and beneficiaries, and related poverty alleviation. ADB may consider supporting more distribution projects that are designed to maximize efficiency by reducing distribution system technical losses and metering programs to reduce non-technical losses.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators/Targets	Results
Impact Contributed to sustaining economic growth and social development in Madhya Pradesh. Contributed to meeting the energy demand growth in Madhya Pradesh.	GSDP grows by at least 6% annually in 2007–2012. Energy deficit is reduced from 13% in 2007 to 0% in 2012.	GSDP at constant prices was 9.07% for the 11th Five-Year Plan 2007–2012; state per capita income increased to Rs37,744 in FY2012 from Rs12,303 in FY2003. The state distribution system had a peak demand shortage of 1,005 MW in FY2006-07. Due to the efficiencies and resulting lower losses (savings averaged 17%), achieved through the project, the peak demands were met in FY2013–14.
Outcome Supply quality and reliability improved. Reduction in system losses and improved supply quality and reliability.	Improvement in system reliability, substantial reduction in fault restoration time. Reduced customer complaints about quality of electricity supply. Reduced distribution system losses as per following targets: DISCOM-E 2008: 32.5% 2009: 29.5% 2010: 26.5% DISCOM-C 2008: 40.0% 2009: 37.0% 2010: 34.0% DISCOM-W 2008: 28.0% 2009: 27.0 2010: 25.5%	Achieved Power system reliability improved; 10-hour supply for rural and/or agricultural areas, 24-hour supply for urban areas, fewer interruptions, improved voltage, and lower power surges. Customer complaints reduced by half. Actual distribution system losses achieved: DISCOM-E 2008: 37.72% 2009: 37.23% 2010: 33.45% 2011: 31.54% 2012: 30.40% 2013: 26.02% 2014: 23.68% 2015: 21.69% DISCOM-C 2008: 47.31% 2009: 41.58% 2010: 38.48% 2011: 37.72% 2012: 37.79% 2013: 31.94% 2014: 29.61% 2015: 30.15% DISCOM-W 2008: 35.5% 2009: 30.3% 2010: 29.3%

Design Summary	Performance Indicators/Targets	Results
DISCOMs financial positions improved.	<p>Improved collection efficiency from 92% to 96% by end 2010.</p> <p>Debt-service ratio of 1.2:1 will be maintained from FY2007-08 onwards.</p> <p>Self-financing ratio of 20% (3 years moving average capital expenditure) will be maintained from 2010 onwards.</p>	<p>2011: 26.3% 2012: 23.1% 2013: 23.06% 2014: 22.10% 2015: 21.38%</p> <p>The reduction of losses attributed to the project is 300 GWh per year, as of 2014.</p> <p>Billing and collection improved to 103% in FY2014-15 (including collection of arrears).</p> <p>Not yet achieved. The DISCOMs expect to achieve the financial targets by end 2018.</p>
Outputs	<u>At Appraisal</u>	<u>Actual Achieved</u>
Institutional		
Corporate governance improved.	<p>By December 2007;</p> <ul style="list-style-type: none"> (i) Independent Board (ii) Management committees (iii) Internal audit functions in line with best practices (iv) Internal controllers appointed 	Established on schedule.
Human Resources Strengthened.	<p>By December 2008;</p> <ul style="list-style-type: none"> (i) Managers appointed (ii) Financial and accounting specialists recruited. (iii) Management training programs in operations, financial and commercial functions established. 	<p>For DISCOM HQs: Appointed managers and technical unit heads for operations, information technology, and commercial and financial functions headed by professionals.</p> <p>For DISCOM project implementation: appointed PMU heads, chief, additional chief, and superintendent engineers for electrical equipment, civil works, construction, and O&M.</p> <p>DISCOMs trained their head office, district, and service center staff in project planning, design, and implementation, as well as consumer relationship, public awareness, and vigilance and monitoring</p>

Design Summary	Performance Indicators/Targets	Results
<p>Physical Infrastructure</p> <p>Installation of new HVDS systems; replace LT lines with HT lines, new LT and HT lines for bifurcation of agricultural and urban consumers, DTRs with meters, new and renovated s/s, surge protection with VCBs; improve power factor with capacitors.</p> <p>Install meters on DTRs for agricultural consumers.</p> <p>Provide remote metering for large power consumer.</p> <p>Provide meters for all urban 24 hr per day consumers.</p>	<p>As per the PFR</p> <p>Part A (DISCOM-E) by 2012</p> <p>Feeder Separation-rural areas</p> <p>1,140 km of new HT 11 kV line with 540 nos. of 25 kVA DTRs</p> <p>Consumer metering</p> <p>300,000 single-phase meters and replacement of single-phase line for 200,000 consumers</p> <p>Renovation of substations</p> <p>333, 33/11kV substations including new and replacement VCBs</p> <p>Part B (DISCOM-C)</p> <p>High Voltage Distribution (HVDS)</p> <p>185 km 440 V line converted to 11 kV line 48.6 km of new 11kV line</p>	<p>of power demand, usage, metering, computerized billing and collection of arrears.</p> <p>Part A (DISCOM-E)</p> <p>Feeder Separation-rural areas</p> <p>734 km of new HT 11 kV line with 498 nos. of 25 kVA DTRs.</p> <p>Consumer metering</p> <p>31,492 single-phase meters and 669 three-phase meters installed. The rest of the meters completed under the Rajeev Gandhi Garmin Vidyutikaran Yojana scheme.</p> <p>Replacement of 62 km of new single-phase LT 440 V line.</p> <p>Renovation of substations</p> <p>27 substations renovated, including 960 11 kV VCBs and 320 33 kV VCBs. Contracts terminated owing to lack of performance by contractor. Remaining substations renovated by DISCOM-E.</p> <p>Additional Works Using ADB Loan Reallocation</p> <p>183 nos. 100 kVA DTRs.</p> <p>2,199 metric tons of steel beams and related hardware (mounts for conductor, cable, or line on power poles).</p> <p>1,335 km of armored 440 V line and 950 km of Racocon conductor for new 33 kV line, to replace existing lines with more efficient conductor to reduce losses.</p> <p>Part B (DISCOM-C)</p> <p>High Voltage Distribution (HVDS)</p> <p>115 km of 440 V line cable converted to 11 kV line 30 km of new 11 kV line</p>

Design Summary	Performance Indicators/Targets	Results
	<p>3,200 nos. 11/0.4 DTRs</p> <p>Remote metering</p> <p>8,394 remote meters for higher demand consumers (839 high-voltage, 2,995 three-phase and 4,560 essential services)</p> <p>Capacitor banks</p> <p>588 nos. capacitors (1,200 kVA resistance)</p> <p>Part C (DISCOM-W)</p> <p>Conversion of low voltage to HVDS system</p> <p>Conversion of 1,119 km of 440 V line to 11 kV line 714 km of new 11 kV line and 5,068 DTRs</p> <p>Segregation of agricultural and village distribution systems</p> <p>1,795 km of new 11 kV line</p> <p>Renovation of substations</p> <p>316 substations including DTRs, VCBs, capacitors and additional bays for future expansion</p> <p>Capacity addition of new transformer stations</p> <p>12 nos. 33/11 kV substations</p> <p>System metering and DTRS</p> <p>5,967 Nos Metering on DTRS</p> <p>New 11 kV line and bays for system expansion</p> <p>623 km of new 11 kV installed 1,137 km of 11 kV lines</p> <p>IT enabling services</p>	<p>3,639 nos. 11/0.4 DTRs</p> <p>Remote metering</p> <p>8,394 remote meters for higher-demand consumers installed.</p> <p>Capacitor banks</p> <p>588 nos. capacitors (1,200 kVA resistance)</p> <p>Part C (DISCOM-W)</p> <p>Conversion of low voltage to HVDS system</p> <p>746 km of 440 V line converted to 11 kV line 176 km of new 11 kV line 4,791 DTRs installed</p> <p>Segregation of agricultural and village distribution systems</p> <p>1,154 km of new 11 kV line installed</p> <p>Renovation of substations</p> <p>310 substations renovated, including 2,200 DTRS and 784 VCBs</p> <p>Capacity addition of new transformer stations</p> <p>12 new 33/11 kV substations constructed, with 94 DTRs and 20 bays</p> <p>System metering and DTRS</p> <p>12,026 new DTR meters installed</p> <p>New 11 kV line and bays for system expansion</p> <p>631 km of new 11 kV line installed 1,103 km of 11 kV line replaced</p> <p>IT enabling services</p>

Design Summary	Performance Indicators/Targets	Results
	Quantities not specified	DISCOM staff trained to improve IT services for remote metering, billing and collection, and follow-up on customer accounts in arrears. Installed for all substations in DISCOM.
Activities with Milestones		
(i) Procurement of major equipment: issuance of bidding documents in by July 2007 and first contract awards by February 2008		All the major activities were completed within the revised loan closing date 30 September 2011. However, due to the delay in signing of the Loan Agreement until 7 March 2008, with effectivity on 21 June 2008, advance action for procurement was undertaken. Bidding documents were issued September 2007, with award in August 2008.
(ii) Construction started by January 2008		Construction started in September 2008.
(iii) Commissioning by 2010–2012		Commissioning was completed by 2012.
Inputs		Actual
Foreign Currency (LA)		Foreign Currency (LFIS)
ADB: \$90.0 million		ADB: \$72.20 million (excluding IDC and commitment charges)
Part A (DISCOM-East) \$20.0 million		Part A (DISCOM-East) \$14.4 million
Part B (DISCOM-Central) \$20.0 million		Part B (DISCOM-Central) \$16.6 million
Part C (DISCOM-West) \$50.0 million		Part C (DISCOM-West) \$41.2 million
Local Currency (PFR)		Local Currency (DISCOMs)
Part A (DISCOM-East) \$18.2 million		Part A (DISCOM-East) \$2.70 million
Part B (DISCOM-Central) \$17.3 million		Part B (DISCOM-Central) \$0.35 million
Part C (DISCOM-West) \$34.1 million		Part C (DISCOM-West) \$4.60 million
PFC/REC/SBI loans-N/A		Loans: \$7.65 million. Provided from lines of credit established by the state to support DISCOMs.

ADB = Asian Development Bank, CA = chartered accountant, DTR = distribution transformer, DISCOM = distribution company, FY = financial year, GWh = gigawatt-hours, GSDP = gross state domestic product, hr = hour, HT = high-tension (11kV), HVDS = high-voltage distribution system, IDC = interest during construction, IT = information technology, kV = kilovolt, kVA = kilovolt-ampere, LA = loan agreement, LT = low-tension (440 V), MW = megawatt, PFC = Power Finance Corporation, PFR = Periodic Financing Request, Racoon conductor = trade name for 33 kV conductor, REC = Rural Electrification Corporation, SBI = State Bank of India, s/s = transformer substations (subdistrict service centers).

Source: ADB. 2007. Report and Recommendation of the President to the Board of Directors: Proposed Multitranchise Financing Facility (India: Madhya Pradesh Power Sector Investment Program).

COST BREAKDOWN BY PROJECT CATEGORIES

2.1 LOAN AMOUNT and DISBURSEMENTS for DISCOMS (Amount \$ million)

Loan 2347-Part A: DISCOM-E

Category No.	Category or Subloan ^a	Original Allocation	Amount Disbursed	Undisbursed Balance
1.	Works	0.00	0.00	0.00
2.	Equipment	19.00	14.41	4.59
3.	Interest & Commitment charges	0.50	0.37	0.13
4.	Unallocated	0.50	0.00	0.50
Total		20.00	14.78	5.22

Loan 2347-Part B: DISCOM-C

Category No.	Category or Subloan ^a	Original Allocation	Amount Disbursed	Undisbursed Balance
1.	Works	0.00	0.00	0.00
2.	Equipment	18.90	16.59	2.31
3.	Interest & Commitment charges	0.50	0.52	-0.02
4.	Unallocated	0.60	0.00	0.60
Total		20.00	17.11	2.89

Loan 2347-Part B: DISCOM-W

Category No.	Category or Subloan ^a	Original Allocation	Amount Disbursed	Undisbursed Balance
1.	Works	0.00	0.00	0.00
2.	Equipment	48.30	41.20	7.10
3.	Interest & Commitment charges	1.50	1.07	0.43
4.	Unallocated	0.20	0.00	0.20
Total		50.00	42.27	7.73

^a There were no works contracts, only turnkey equipment supply and installation.

2.2 Project Cost for DISCOMs (Amount \$ million)**Loan 2347-Part A: DISCOM-E**

Cost	Appraisal Estimate	Actual
Foreign Currency Cost	20.0	14.78
Local Currency Cost	18.2	2.70
Total	38.2	17.48

Loan 2347-Part B: DISCOM-C

Cost	Appraisal Estimate	Actual
Foreign Currency Cost	20.0	17.11
Local Currency Cost	17.3	0.35
Total	37.3	17.46

Loan 2347-Part C: DISCOM-W

Cost	Appraisal Estimate	Actual
Foreign Currency Cost	50.0	42.27
Local Currency Cost	34.2	4.60
Total	84.2	46.87

2.3 Cost Breakdown for DISCOMs**Part A-DISCOM-E**

Item	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Total Base line Costs	19.0	12.30	31.30	14.41	2.70	17.11
Unallocated	0.50	2.60	3.10	00.00	00.00	00.00
IDC and Commitment charges	0.50	3.30	3.80	0.37	0.00	0.37
Total	20.00	18.20	38.20	14.78	2.70	17.48

Part B-DISCOM-C

Item	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Total Base line Costs	18.90	10.50	29.40	16.59	0.35	16.94
Unallocated	0.60	3.60	4.20	00.00	00.00	00.00
IDC and Commitment charges	0.50	3.20	3.70	0.52	0.00	0.52
Total	20.00	17.30	37.30	17.11	0.35	17.46

Part C-DISCOM-W

Item	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
Total Base line Costs	48.30	17.80	66.10	41.20	4.60	45.80
Unallocated	0.20	9.50	9.70	00.00	00.00	00.00
IDC and Commitment charges	1.50	6.80	8.30	1.07	0.00	1.07
Total	50.00	34.10	84.10	42.27	4.60	46.87

IDC = interest during construction

Sources: Appraisal Estimate: Periodic Financing Request, 27 July 2007, Government of India (*Madhya Pradesh Power Sector Investment Program*). Foreign currency as in Loan Agreement and ADB's LFIS. Actual local currency as reported by the DISCOMs. There were no loan reallocations.

SUMMARY OF CONTRACTS

PCSS No.	Category No.	Item Description Supply and Install Turnkey Contracts	Contract Amount (ADB Financing) (\$)	Actual Disbursed (\$)
Part A:		DISCOM-East		
0003	01	Feeder Separation in Sagar District	5,530,443	4,294,263
0007	01	Substation works in Jabalpur region	6,424,255	136,549
0008	01	Substation works at Rewa and Sagar areas	6,689,702	0.00 ^a
0033	01	LT works in Jabalpur region	5,525,152	3,913,854
0034	01	LT works in Jabalpur region	4,028,654	2,542,061
0040	01	LT cable	1,517,990	1,474,977
0041	01	Steel beams to mount cable	2,144,341	403,526
0042	01	113 100 kVA 11/0.4 kV DTRs	189,435	169,381
0043	01	79 100 kVA 11/0.4 kV DTRs	111,761	104,926
0044	01	Racoon conductor	606,631	251,762
0045	01	Steel beams to mount Racoon conductor	1,950,303	1,143,986
0047	01	Steel beams to mount Racoon conductor	1,980,105	349,598
Part B:		DISCOM-Central		
0001	01	11 kV capacitor banks for Sanchi area	5,587,092	4,771,789
0002	01	11 kV capacitor banks in Bhopal area	3,376,030	2,952,849
0004	01	HVDS in Bhopal district	3,845,242	2,797,500
0005	01	HVDS in Gwalior City	2,122,273	1,569,211
0006	01	HVDS in Ambah Morena Towa area	4,576,091	3,398,103
0038	01	Remote metering for Gwalior City	697,713	496,850
0039	01	Remote metering for Bhopal City	1,105,942	612,160
Part C:		DISCOM-West		
0009	01	Supply 33/11 kV substations in Indore	3,944,074	3,378,988

^a Completed by the DISCOM from own resources.

PCSS No.	Category No.	Item Description Supply and Install Turnkey Contracts	Contract Amount (ADB Financing) (\$)	Actual Disbursed (\$)
0010	01	Install 33.11kV substations in Indore	281,420	24,505
0011	01	Supply 33/11 kV substations in Ujjain	3,110,354	2,993,662
0012	01	Install 33/11 kV substations in Ujjain	202,554	19,567
0013	01	Supply HVDS in Indore region	3,592,411	2,879,157
0014	01	Install HVDS in Indore Region	189,492	15,942
0015	01	Supply HVDS in Ujjain City	1,289,237	1,001,516
0016	01	Install HVDS in Ujjain City	76,822	6,464
0017	01	Supply LVDS in Ujjain rural areas	3,872,462	3,872,462
0018	01	Install LVDS in Ujjain rural areas	571,804	48,054
0019	01	Supply HDVS in Indore region	6,307,299	6,307,299
0020	01	Install HVDS in Indore region	475,927	47,323
0021	01	Supply HVDS in Ujjain region	2,151,136	2,151,136
0022	01	Install HVDS in Ujjain region	87,860	7,554
0023	01	Supply HVDS in Burhanpur district	3,666,982	3,655,394
0024	01	Install HVDS in Burhanpur district	508,769	50,545
0025	01	Supply HVDS in Burhanpur region	2,949,995	2,659,549
0026	01	Install HVDS in Burhanpur region	504,874	50,159
0027	01	Supply LVDS in Indore region	5,804,337	5,804,337
0028	01	Install LVDS in Indore region	840,573	83,516
0029	01	Supply LVDS in Khandawa City	1,022,706	699,054
0030	01	Install LVDS in Khandawa City	153,373	12,692
0031	01	Supply LVDS in rural Ujjain area	4,388,735	705,773
0032	01	Install LVDS in rural Ujjain area	778,307	64,636
0035	01	Supply DTRs for Indore region	5,251,846	4,003,275

PCSS No.	Category No.	Item Description Supply and Install Turnkey Contracts	Contract Amount (ADB Financing) (\$)	Actual Disbursed (\$)
0036	01	Install DTRs in Indore region	768,869	0 ^a
0046	01	Supply Racoon conductor for Indore	596,560	279,186

ADB = Asian Development Bank, Disst = district, DTR = distribution transformer, GS = galvanized steel, HT = high tension, HVDS = high-voltage distribution system, Dn. = division, kV = kilovolt, O&M = operation and maintenance, LT = low tension, LVDS = low-voltage distribution system, PCSS = procurement contract summary sheet, RS = reinforced steel, PVC = polyvinyl chloride, Racoon conductor = trade name of high-voltage conductor, VCB = vacuum circuit breaker, XLPE = cross linked polyethylene.

Source: Asian Development Bank

^a Completed by the DISCOM from own resources.

PROJECT FINANCING PLAN

(\$ million)

Source	Appraisal Estimate			Actual		
	Foreign	Local	Total	Foreign	Local	Total
ADB	90.00	00.00	90.00	74.16	00.00	74.16
DISCOMs- PFC/REC/SBI	0.00	69.60	69.60	00.00	7.65	7.65
Total	90.00	69.60	159.60	74.16	7.65	81.81

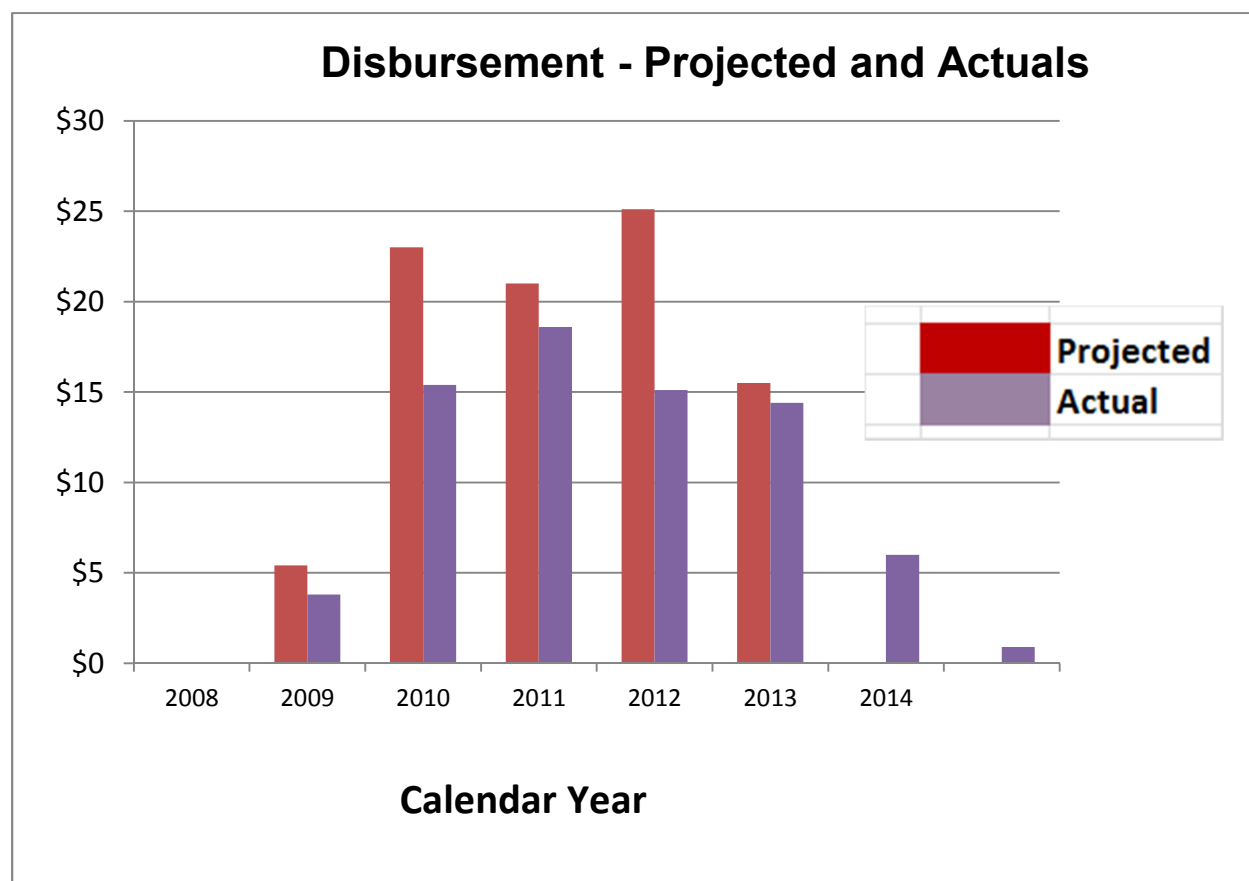
ADB = Asian Development Bank, PFC = Power Finance Corporation, REC = Rural Electrification Corporation,
DISCOMs = Electricity Distribution Companies

Source: Asian Development Bank

PROJECTED AND ACTUAL DISBURSEMENT OF LOAN PROCEEDS
(\$ million)

Calendar Year	Projected		Actual ^a	
	For the year	Cumulative	For the year	Cumulative
2008	5.4	5.4	3.8	3.8
2009	23.0	28.4	15.4	19.2
2010	21.0	49.4	18.6	37.8
2011	25.1	74.5	15.1	52.9
2012	15.5	90.0	14.4	67.3
2013	0.0	90.0	6.0	73.3
2014	0.0	90.0	0.9	74.2

^a Excludes actual interest during construction of \$1.6 million.

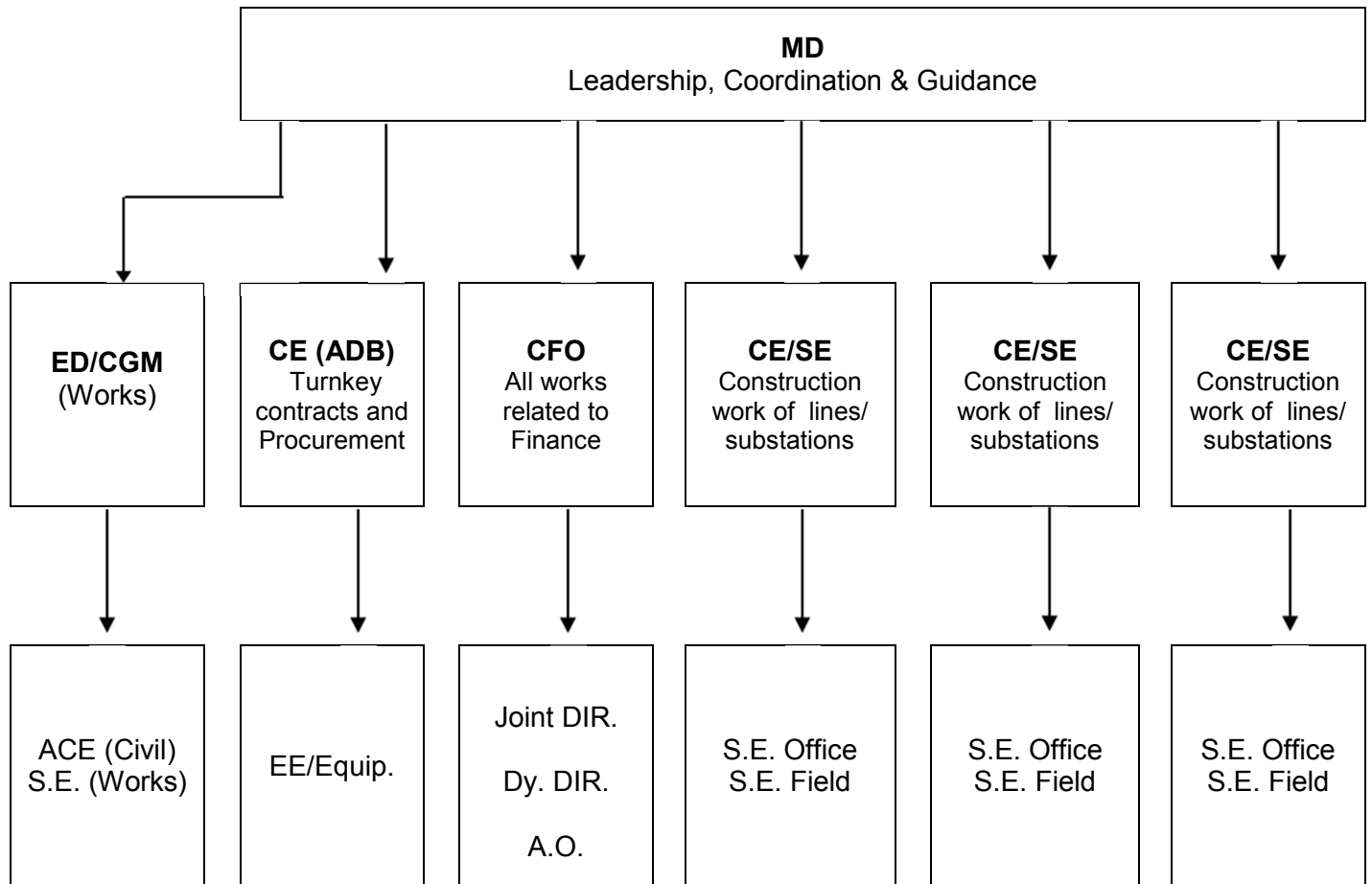


CHRONOLOGY OF MAIN PROJECT EVENTS

Date	Event
2006	
16–24 Oct	Fact-Finding
11 Dec	Management Review Meeting
12–14 Dec	Appraisal Mission
2007	
19 Jan	Staff Review Committee
16–17 Aug	Loan Negotiations
21 Aug	President's Consideration and Approval
21 Aug	ADB Board Approval
2008	
07 Mar	Loan Agreement Signed
11 June	Loan Effectiveness Inception Mission
2008	
07–17 Jan	Review Mission
01–03 Sep	Review Mission
2009	
15–17 Apr	Review Mission
15–20 Jun	Review Mission
24–27 Nov	Special Loan Administration Mission
2010	
6–16 Apr	Special Loan Administration Mission
27–30 Oct	Loan Review Mission
29 Nov–1 Dec	Review Mission
2011	
11–14 Oct	Review Mission
2012	
14–16 Feb	Review Mission
10–14 Dec	Review Mission
2016	
7–19 Mar	PCR Mission

Source: Asian Development Bank.

ORGANIZATIONAL CHART OF DISCOMs



ACE = additional chief engineer, ADB = Asian Development Bank, AO = accounts officer, CE = chief engineer, CFO = chief financial officer, CGM = chief general manager, DIR = director, DISCOM = distribution company, Dy. = deputy, ED = executive director, EE = executive engineer, JR = junior, MD = managing director of DISCOM, S.E. = superintendent engineer, SR = senior, Stn = station,

Note: This organization chart is generic for the three DISCOMs, each of which established a dedicated office for the ADB financed project. Although the responsibilities were similar for each activity, the specific titles of the assigned personnel varied among the DISCOMs.

Source: Distribution Company-East.

STATUS OF COMPLIANCE WITH MAJOR LOAN COVENANTS

Covenant	Reference in Loan Agreement	Responsible Agencies	Status of Compliance
Project Implementation			
The GOMP, acting through DISCOMs shall be the EA for the Project and shall be responsible for the execution of the Project. The Project shall be implemented as follows: (i) Part A-by DISCOM-East; Part B-by DISCOM-Central; and Part C-by DISCOM-West.	LA, Schedule 5, para 2	GOMP/EA/ DISCOMs	Complied.
The project management units (PMUs), established within each DISCOM, shall be headed by a PMU Manager. The PMU Manager shall report all Project related matters to the Chairman and the Managing Directors of the DISCOMs. The PMU shall comprise technical, financial, procurement and safeguard sections.	LA, Schedule 5, para 3	EA/ DISCOMs	Complied.
An investment program Coordinating Committee, chaired by the Chairman and the Managing Director of each DISCOM, shall be established to coordinate and monitor the overall implementation of the investment program. At the national level, the Ministry of Power of the Borrower shall monitor state sector policy and program implementation. The Coordinating Committee shall report to the State's Energy Department through a Program Implementation Unit to be established within the Energy Department and to Madhya Pradesh Electricity Regulatory Commission.	LA, Schedule 5, para 4	GOMP/EA/ DISCOMs	Complied.
The Borrower and the EA shall ensure that all subprojects are selected and approved by the DISCOMs in accordance with the criteria and approval process stipulated in Schedule 4 to the FFA.	LA, Schedule 5, para 5	Borrower/ GOMP/EA DISCOMs	Complied.
Financial and Sector Reforms			
Counterpart Funding. The Borrower and GOMP will ensure and cause the availability and timely release of counterpart funding for the timely implementation of each subproject. GOMP shall provide counterpart staff, land facilities for project activities, and counterpart funds for mitigation of environmental impacts.	LA, Schedule 5, para 6 (a)	Borrower/ GOMP	Complied.
On-lending Agreements. The GOMP shall ensure that on-lending agreements are put in place and that Loan proceeds are promptly made available to each DISCOM.	LA, Schedule 5, para 6 (b)	GOMP/EA	Complied

Covenant	Reference in Loan Agreement	Responsible Agencies	Status of Compliance
<p>Cash Management Responsibilities. GOMP will ensure that the cash management responsibilities are transferred to the DISCOMs from 1 April 2009 and DISCOMs from 1 April 2009, so that the DISCOMs can commence commercially independent operations, with any deficits met by commercial borrowings or other satisfactory means.</p>	LA, Schedule 5, para 7	GOMP/ DISCOMs	Complied.
<p>Audits. The DISCOMs will engage independent private audit firms, whose qualifications, experience and terms to conduct annual financial and procurement audits are acceptable to the Government, GOMP and ADB. To be submitted within 6 months after the close of the related fiscal year.</p> <p>In addition the EAs will ensure that independent auditors whose qualifications, experience, and terms of reference are acceptable to ADB and GOMP conduct (i) energy audit for distribution reconfiguration and corporatization and divestment, and (ii) business process and performance audits in all operational areas.</p>	LA, Schedule 5, paras 8-9	DISCOMs/ ADB/GOMP	Complied.
<p>Corporate Governance. The State will ensure the accountability and transparency of DISCOMs are maintained through the stakeholders meeting and publication of its agendas, actions through the duration of the investment program. The DISCOMs will ensure that the following measures to strengthen corporate governance will have been completed by 31 December 2007:</p> <ul style="list-style-type: none"> (i) independent directors at the board level are recruited; (ii) board-level committees, including audit and risk management committees, are formed; (iii) internal audit functions strengthened and internal audit guidelines in line with best practices are developed (internal audit scope to cover revenue audit and internal audit reports to the audit committee of the board); (iv) internal controllers reporting to the chairmen and managing directors of the respective DISCOMs on a regular basis are appointed. 	LA, Schedule 5, para 10	GOMP/EA DISCOMs	Complied.
<p>Accountability and Transparency. The EA shall ensure accountability and transparency of the DISCOMs is maintained through stake holder meetings and publication of agendas and actions throughout the duration of the Project.</p>	LA, Schedule 5, para 11	GOMP/EA DISCOMs	Complied.

Covenant	Reference in Loan Agreement	Responsible Agencies	Status of Compliance																
Financial Management																			
Debt Service Coverage Ratio. The GOMP shall ensure that the DISCOMs will maintain a debt service coverage ratio of 1.2:1 from 2009 and onwards.	LA, Schedule 5, para 12	GOMP/ DISCOMs	Not Complied. Efforts are being made by DISCOMs for compliance by 2018.																
Self-Financing Ratio. The GOMP shall ensure that DISCOMs maintain historic self-financing ratio of 20% from 2010 onwards (3 years moving average capital expenditure).	LA, Schedule 5, para 13	GOMP/ DISCOMs	Not Complied. Efforts are being made by DISCOMs for compliance by 2018.																
Financial Management. The GOMP, acting through the DISCOMs, shall ensure that the current capacity development program that covers financial management and human resources development is implemented through 2010.	LA, Schedule 5, para 14	GOMP/EA DISCOMs	Complied.																
Commercial Operations																			
Corporate Social Responsibility. GOMP shall ensure that the DISCOMs conduct extensive public awareness campaigns through installing appropriate signs, issuing flyers to the public and placing newspaper and television ads in local language to ensure that people are aware that HVDS networks may result in serious injury or death in case of attempts to illegally connect to overhead circuits.	LA, Schedule 5, para 15	GOMP/ DISCOMs	Complied.																
Tariff. GOMP shall ensure that DISCOMs file Multi-Year Tariff schedule as of 31 October 2007.	LA, Schedule 5, para 16	GOMP/ DISCOMs	Complied.																
Customer Service Centers. The GOMP shall ensure that by not later than 31 January 2009, DISCOMs shall have established, made operational and fully staffed with specialists with appropriate skills, a number of customer service centers in large cities and smaller towns.	LA, Schedule 5, para 17	GOMP/EA DISCOMs	Complied.																
Billing and Collection Efficiency. The GOMP shall ensure that DISCOMs improve collection efficiency by not later than 31 December 2010. DISCOM-East from 92% in 2006 to 96%; DISCOM-Central from 91% to 95%; and DISCOM-West from 92% to 96%.	LA, Schedule 5, para 18	GOMP/ DISCOMs	Complied.																
Loss Reduction. The GOMP shall ensure that agreed power loss reduction targets of DISCOMs are met as follows: <table> <tr> <td></td><td>2007/08</td><td>2008/09</td><td>2009/10</td></tr> <tr> <td>DISCOM-East:</td><td>32.5%</td><td>29.5%</td><td>26.5%</td></tr> <tr> <td>DISCOM-Central</td><td>40.0%</td><td>37.0%</td><td>34.0%</td></tr> <tr> <td>DISCOM-West</td><td>28.5%</td><td>27.0%</td><td>25.5%</td></tr> </table>		2007/08	2008/09	2009/10	DISCOM-East:	32.5%	29.5%	26.5%	DISCOM-Central	40.0%	37.0%	34.0%	DISCOM-West	28.5%	27.0%	25.5%	LA, Schedule 5, para 19	GOMP/ DISCOMs	Complied.
	2007/08	2008/09	2009/10																
DISCOM-East:	32.5%	29.5%	26.5%																
DISCOM-Central	40.0%	37.0%	34.0%																
DISCOM-West	28.5%	27.0%	25.5%																

Covenant	Reference in Loan Agreement	Responsible Agencies	Status of Compliance
Pension Funds. The GOMP shall ensure that the DISCOMs will have legally established trust funds to cover pension arrears by 31 December 2008.	LA, Schedule 5, para 20	DISCOMs	Not Complied. Efforts are being made by DISCOMs for compliance by 2018.
Turnkey Contracts. The DISCOMs shall (i) ensure utilization of turnkey contracts, where appropriate; (ii) negotiate longer terms of guarantees on equipment; and (iii) include long-term maintenance provisions in the turnkey contracts.	LA, Schedule 5, para 21	DISCOMs	Complied.
Recruitment. DISCOMs shall have appointed managers for operations, information technology, commercial functions, and finance; and will have recruited (i) chartered accountants, (ii) information technology specialists, and (iii) specialists in commercial areas. DISCOMs shall have established management training programs in finance, operations, and commercial functions.	LA, Schedule 5, para 22	DISCOMs	Complied.
Safeguards			
Land Availability and Resettlement. Without limiting the generality of Schedule 5 to the FFA, including its Annexes and Attachments, DISCOMs shall, subject to compliance with the relevant provisions of the RF/RPs and EARF/EMP and in accordance with all applicable laws and regulations of the Borrower, ensure continuous monitoring of implementation of the Project. In the event of any social or negative impact caused by implementation of the Project, DISCOMs shall prepare and submit to ADB for approval of an RP prior to commencement of civil works. In the event the DISCOMs need to acquire or make available the land and rights to land free from any encumbrances, and cleared the utilities, trees and any other obstruction from such land, all compensation shall be paid prior to commencement of construction activities in accordance with the schedule agreed under the related civil works contract.	LA, Schedule 5, para 23	Borrower/ GOMP/ DISCOMs/ ADB	Complied.
Labor. DISCOMs shall ensure that all contactors, subcontractors and consultants, if any, comply with the Borrower's labor legislation, including but not limited to safe working conditions and core labor standards.	LA, Schedule 5, para 24	DISCOMs	Complied.
Indigenous Peoples. The DISCOMs shall prepare and implement the Indigenous Peoples Development Plan or appropriate indigenous peoples actions for all works with indigenous peoples issues in accordance with the requirements	LA, Schedule 5, para 25	Borrower/ GOMP/ DISCOMs/ ADB	Complied.

Covenant	Reference in Loan Agreement	Responsible Agencies	Status of Compliance
set out in (i) ADB's <i>Policy on Indigenous Peoples</i> (1998), the Indigenous Peoples Development Framework and the (ii) the Borrower's and GOMP applicable laws.			
<p>Environment. Without limiting the generality of Schedule 5 to the FFA, including its Annexes, GOMP acting through the DISCOMs shall implement the Project and operate and maintain all project facilities in accordance with the IEE, EARF, ADB's <i>Environment Policy</i> (2002) and the Borrower's and GOMP's applicable laws, rules and regulations.</p> <p>DISCOMs shall be responsible for the preparation of the IEE and EMP (with budget) in accordance with the Rapid Environmental Assessment checklist. The assessment of this Project concludes the subprojects/works all are categorizes as category B/ DISCOMs shall ensure that subproject bidding documents include all recommendations from the IEE, and related contracts incorporate mitigation measures specified in the EMP. DISCOMs shall ensure that the recommendations of the IEE and EMP approved by ADB and relevant government agencies are adhered to during design, construction and operation phases of the subprojects.</p> <p>DISCOMs shall monitor, audit, and report to ADB twice a year on the implementation of the EMP related to each subproject. DISCOMs shall verify that all associated power projects not financed by ADB will be constructed and commissioned in compliance with the laws and regulations of the Borrower and the GOMP prior to connecting such facilities to the ADB supported distribution networks.</p> <p>DISCOMs shall ensure that (i) the subprojects are not located within national parks and wild life sanctuaries, unless prior environmental clearance is obtained from relevant government agencies; (ii) monuments of cultural or historical importance are avoided; and, (iii) the developed EMP with adequate budget is implemented for each subproject.</p>	LA, Schedule 5, paras 26-29	GOMP/ DISCOMs/ ADB	Complied.
Execution of civil works. The DISCOMs shall ensure that, subsequent to award of civil works contract under any subproject, no section or part thereof under the civil works contract shall be handed over to the contractor unless the applicable provisions of the RF/RP and the EARF/EMP have been complied with. Any changes to the location,	LA, Schedule 5, paras 30-31	DISCOMs/ ADB	Complied.

Covenant	Reference in Loan Agreement	Responsible Agencies	Status of Compliance
land alignment, or environmental impacts on account of detailed designs of related subproject shall be subject to prior approval by ADB and/or the DISCOMs as the case may be, in accordance with the selection criteria and process stipulated in Schedule 4 to the FFA.			
Performance Monitoring and Reporting			
<p>The Borrower shall ensure that within 3 months of the Effective Date, a Project Performance Monitoring System shall have been established by the EA/GOMP in a form and with a composition acceptable to ADB in accordance with the Investment Program and project performance indicators. The DISCOMs shall undertake periodic project performance review, and also for the Investment Program in accordance with the PPMS to evaluate the scope, implementation arrangements, progress and achievements of outcome of the related subproject and overall Investment Program.</p> <p>Without limiting the Generality of Section 2.08 (b) of the Project Agreement, the GOMP, acting through the DISCOMs, shall prepare quarterly progress reports and submit these to ADB within 30 days of the end of each quarter. These reports shall provide (i) a narrative description of progress made during the period (progress on compliance with environment and social requirements including EMP and RF shall also be included), (ii) changes in the implementation schedule, (iii) problems or difficulties encountered, and (iv) work to be carried out in the next period. The progress reports shall also include a summary financial account for the components, including subprojects, consisting of expenditures during the period, total expenditure to date, and reports on environmental, resettlement and benefit monitoring.</p> <p>Without limiting the Generality of Section 2.08 (c) of the Project Agreement, the Borrower shall ensure the submission to ADB of a Project Completion Report within 3 months of physical completion of the Project by the EA, acting through the DISCOMs, and the Facility Completion Report within 3 months of physical completion of the investment program. These reports shall cover a detailed evaluation of the Project and the Facility respectively, covering the design, costs, contractors' and consultants' performance, social, environmental and economic impact, economic and financial rates of return, and</p>	LA, Schedule 5, paras 32-36	Borrower/ GOMP/ DISCOMs/ ADB	Complied.

Covenant	Reference in Loan Agreement	Responsible Agencies	Status of Compliance
other details of the Project and the Facility, as may be requested by ADB.			
<p>ADB, the Borrower and the GOMP, acting through the DISCOMs, shall meet regularly as required to discuss the progress of the Project and any changes to implementation arrangements or remedial measures required to be undertaken towards achieving the outcome of the Project and the Investment Program.</p> <p>A mid-term review of the Project shall be undertaken by ADB and the EA. The mid-term review shall include a review of issues and any problems or weaknesses in implementation arrangements, and agree on any changes needed to achieve the outcome of the Project and the investment program.</p>	LA, Schedule 5, paras 35-36	Government/ GOMP/ DISCOMs/ ADB	Complied.

ADB = Asian Development Bank, DISCOM = power distribution company, EA = executing agency, EARF = environmental assessment and review framework, FFA = financing facility agreement, IEE = initial environmental examination, EMP = environmental management plan, GOMP = government of Madhya Pradesh, LA = loan agreement, PMU = project management unit, RF = resettlement framework, RP = resettlement plan.

ECONOMIC REEVALUATION

A. General

1. This economic reevaluation considers the total project investment as a whole. The reevaluation is based on estimated cost and benefit streams expressed in constant 2014 dollars. Figures from the appraisal evaluation, which were expressed in 2006 values, have been adjusted to 2014 values for the purposes of comparison. The project boundary was defined to be the distribution networks of the three DISCOMS and the existing customers and prospective customers in Madhya Pradesh served through their distribution networks. Analysis was conducted at the subproject level for each DISCOM, following the approach taken at appraisal, and then aggregated to calculate an overall economic internal rate of return (EIRR) for the project.

B. Economic Costs

2. **Project investments.** The domestic price numeraire was used for this reevaluation. Traded inputs were valued at their border-price equivalent values and then adjusted to the domestic price numeraire by multiplying by the shadow exchange rate factor calculated at appraisal (1.05). Non-traded inputs were valued at domestic prices. It was assumed that there are no significant distortions in the wage rates for skilled labor. In the case of unskilled labor, underemployment exists in the economy, and a shadow wage rate of 0.75 was adopted. Taxes, financing charges, and price contingencies were excluded. The annual economic costs used in the economic reevaluation are summarized in Table A9.1.

Table A9.1: Financial and Economic Costs of the Project
(2014 Rs million)

Financial Year ^a	Project Financial Costs	Project Economic Costs
2008	276.9	273.9
2009	1013.0	1003.2
2010	1319.3	1304.2
2011	1096.7	1083.0
2012	1049.4	1034.6
2013	436.0	429.9
2014	65.1	64.3
Total	5256.4	5193.1

^a The financial year is from 1 April to 31 March.

Source: Asian Development Bank estimates, based on annual financial disbursements

3. **Operation and maintenance costs.** Because many of the subprojects would result in a decrease in operation and maintenance (O&M) costs, O&M costs were assessed at the subproject level. For example, upgrades to fault protection facilities at 33/11-kilovolt (kV) substations have resulted in a significant reduction in costs to repair downstream equipment damaged through incorrect operation of circuit breakers at upstream substations. Similarly, the installation of capacitor banks has meant a large decrease in DTR failures. Overall, O&M costs were estimated at approximately 1.2% of capital costs. The specific conversion factor for O&M costs was estimated to be approximately 1.0 and therefore no shadow pricing of O&M costs was undertaken. O&M costs were assumed to apply to the completed portion of subproject, from the second year after the first disbursement.

C. Economic Benefits

4. As noted at appraisal, the principal economic benefits of the investment are incremental consumption and displaced thermal electricity generation. These benefits arise from a reduction in technical and non-technical losses attributable to a high-voltage distribution system (HVDS), rural feeder bifurcation, consumer and DTR metering, capacitor bank and system strengthening subprojects, removal of network constraints, and improved reliability of supply (all subprojects). Removal of network constraints and improved reliability of supply result in an increase in electricity consumption (valued at consumers' willingness to pay). The reduction of technical losses in the distribution network may cause benefits in two ways: (i) in an energy deficit power system, saved energy causes the energy deficit to be lower than otherwise, allowing for incremental consumption of electricity by consumers (valued at their willingness to pay); or (ii) in an energy surplus system, energy saved in reduced distribution losses would reduce output from the marginal generator (a resource cost saving). Overall, Madhya Pradesh was running an energy deficit until about FY2015; load shedding has now been almost completely eliminated. Current projections indicate that surpluses will continue for the foreseeable future. On this basis and for the purposes of this reevaluation, it was assumed that loss reduction would have resulted in incremental output up to and including FY2014, and thereafter it would have resulted in non-incremental output.

5. Overall the DISCOMs have been successful in their efforts to reduce losses: aggregate energy losses reduced from 44% to 27% from 2008 to 2013. However, the project was one of a number of interventions made by the three DISCOMs over the period to reduce technical and non-technical losses (and it is noted that many of the subprojects in this investment targeted reliability and quality of supply rather than loss reduction). To estimate the actual loss reduction that can be reasonably attributed to the project, subproject analysis conducted during appraisal (which was based on load flow analysis) was updated to reflect actual capital costs and physical outcomes of the project. A study conducted under the multi-tranche financing facility regarding the impact on losses of the introduction of HVDS was also reviewed and its findings incorporated.¹ On this basis, aggregate loss reduction achieved by the project was estimated at 300 gigawatt-hours (GWh) per annum (including low-voltage, 11 kV, and 33 kV losses), representing approximately 1% (out of the total loss reduction of 17%). This is a very conservative estimate and includes only 50% of estimated non-technical loss reduction accruing from the project. Because project components were progressively commissioned, a benefit proportional to the value of assets commissioned in each year was assigned from 2009 onward. From 2014 onward, the full benefits of reduced losses were included. The loss reduction attributed to the project may increase after FY2014, when increasing customer demand results in delivery of more power through the DISCOMs' distribution networks. However, for conservatism, it was assumed to remain constant throughout the evaluation period. As noted above, loss reduction was assumed to result in incremental output up to and including 2014 and non-incremental output thereafter.

6. Incremental electricity supplied as a consequence of removal of network constraints was estimated at 66 GWh per annum, on the basis of actual incremental network capacity constructed through the project. Incremental electricity supplied due to improved network reliability was estimated at 71 GWh on the basis of fault statistics supplied by the DISCOMs. Other minor economic benefits incorporated at appraisal included a reduction in DTR failures,

¹ ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility and Technical Assistance Grant to India for the Madhya Pradesh Energy Efficiency Improvement Investment Program*.

reduction in staff costs and reduction in vehicle costs. Although these benefits appear reasonable, they cannot easily be quantified and have therefore been excluded from this reevaluation.

7. Non-incremental output (principally loss reduction beyond FY2014) was valued on the basis of the economic cost of electricity supply in Madhya Pradesh. On the basis of a review of the current and expected generation mix in the state, it was assumed that the marginal cost of electricity from coal-fired thermal plants represents the short-run marginal cost of energy in Madhya Pradesh and that the life-cycle cost of coal-fired thermal plant represents the long-run marginal cost of energy. Marginal costs of existing coal plants were estimated on the basis of the actual historical operating parameters contained in recent tariff petitions submitted by the state-owned generating company. International benchmarks and local data were used to establish the economic capital costs of new plant. Coal fuel was initially valued at its border-price equivalent value, based on the World Bank's coal price forecast and adjusted for the generally lower quality of coal used for power generation in India. On this basis, non-incremental output was valued at Rs4.4 per kilowatt-hour (kWh) up to and including FY2020 and Rs4.7 per kWh beyond FY2020.

8. Incremental output (arising from improved reliability, removal of network constraints, and loss reduction prior to FY2015) was conservatively valued at the average end-use consumer tariff in FY2014 (Rs4.9 per kWh), ignoring any consumer surplus likely to accrue (due to inherent difficulties in its estimation).

D. Economic Reevaluation

9. On the basis of the estimates of economic costs and benefits described above, the aggregate economic internal rate of return (EIRR) was recalculated to be 21.5%. This value is higher than the appraisal evaluation of 15.9%, and higher than the assumed EIRR hurdle rate of 12%. Detailed calculations are shown in Table A9.2.

Table A9.2: Reevaluated Economic Costs and Benefits of the Project
(2014 Rs million)

Fiscal Year	Benefits		Costs		Net Benefits
	Incremental Output	Non-Incremental Output	Capital	O&M	
2008	0.0	0.0	273.9	0.0	(273.9)
2009	22.8	21.5	1003.2	3.4	(962.3)
2010	76.9	113.2	1304.2	11.8	(1125.9)
2011	162.8	241.2	1083.0	25.3	(704.2)
2012	247.4	346.7	1034.6	37.7	(478.1)
2013	394.0	449.0	429.9	55.0	358.2
2014	418.4	545.4	64.3	61.8	837.6
2015	444.3	586.7	0.0	62.5	968.6
2016	463.1	1173.4	0.0	62.5	1574.0
2017	463.1	1169.9	0.0	62.5	1570.5
2018	463.1	1169.9	0.0	62.5	1570.5
2019	463.1	1169.9	0.0	62.5	1570.5
2020	463.1	1169.9	0.0	62.5	1570.5
2021	463.1	1169.9	0.0	62.5	1570.5
2022	463.1	1169.9	0.0	62.5	1570.5

Fiscal Year	Benefits		Costs		Net Benefits
	Incremental Output	Non- Incremental Output	Capital	O&M	
2023	463.1	1169.9	0.0	62.5	1570.5
2024	463.1	1169.9	0.0	62.5	1570.5
2025	463.1	1169.9	0.0	62.5	1570.5
2026	463.1	1169.9	0.0	62.5	1570.5
2027	463.1	1169.9	0.0	62.5	1570.5
2028	463.1	1169.9	0.0	62.5	1570.5
2029	463.1	1169.9	0.0	62.5	1570.5
2030	463.1	1169.9	0.0	62.5	1570.5
2031	463.1	1169.9	0.0	62.5	1570.5
2032	463.1	1169.9	0.0	62.5	1570.5
EIRR					21.5%

() = negative, EIRR = economic internal rate of return, O&M = operations and maintenance.

10. **Sensitivity analysis.** In this reevaluation, three parameters may adversely affect the economic viability of the project: increase in the operations and maintenance costs, reductions in the value of saved energy losses, or reductions in incremental consumption. For each of these risks, the sensitivity of the aggregate EIRR was tested and switching values were calculated.² Results of the sensitivity analysis, which are summarized in Table A9.3, reflect the robust economic returns from the project even under a combined downside scenario. It is clear from this reevaluation that the decision to construct the project facilities was correct from an economic perspective.

Table A9.3: Results of Sensitivity Analysis

Sensitivity Parameter	Variation	EIRR	Switching Value
Base case		21.5%	
1 Value of saved losses	- 20%	18.9%	-73%
2 Value of incremental consumption	- 20%	20.1%	-140%
3 O&M costs	+ 20%	21.3%	>1000%
4 Combined (1-3)		17.2%	

EIRR = economic internal rate of return, O&M = operation and maintenance.

² A switching value measures the percentage change in the variable required to reduce the EIRR to the assumed hurdle rate.

FINANCIAL REEVALUATION

A. Background

1. This financial reevaluation considers the project investment as a whole, based on actual cost and benefit streams. The unit of account selected was Indian rupees (Rs). Financial benefits flowing to the Madhya Pradesh DISCOMs consist primarily of an increase in regulated revenue accruing from newly constructed distribution facilities: an annual revenue allowance for the DISCOMs is determined by the jurisdictional regulator, Madhya Pradesh Electricity Regulatory Commission (MPERC), on the basis of MPERC's view of reasonable and efficient capital costs, power purchase costs, operation and maintenance costs, overhead costs, depreciation, interest on loans and on working capital, and return on equity. To assess financial viability, the weighted average cost of capital (WACC) of the investment was calculated and compared with the total investment's financial internal rate of return (FIRR).

B. Evaluation of Project Costs

2. **Project costs.** Project capital costs include equipment, civil engineering and erection costs, project management costs, expenditure on safeguards, purchase of land, and taxes and duty. No physical or price contingencies were charged to the project. Financial charges during construction were excluded from this reevaluation (except as required to calculate the DISCOMs' annual revenue allowance). Total annual expenditure against the project was estimated from actual annual loan disbursements and from the DISCOMs' reported total expenditure from counterpart funds. The project was completed in 2014, and all monetary benefits were converted to 2014 equivalent values in accordance with ADB guidelines, as summarized in Table A10.1.¹

Table A10.1: Conversion of Project Costs to 2014 Price Levels

Year	Foreign Cost (\$ million)	Local Cost (Rs million)	Foreign Price Index (2014 base)	Local Price Index (2014 base)	Foreign Cost (2014 Rs million)	Local Cost (2014 Rs million)	Total Cost
2008	3.8	20.7	92.6	61.88	258.2	33.5	291.7
2009	15.4	70.9	105.6	66.58	927.8	106.6	1,034.4
2010	18.6	112.7	97.8	71.68	1,208.1	157.2	1,365.3
2011	15.1	106.2	95.7	79.30	1,001.0	134.0	1,135.0
2012	14.4	122.7	97.6	87.03	935.8	140.9	1,076.7
2013	6.0	50.4	97.5	93.98	388.4	53.6	442.0
2014	0.9	6.4	100.0	100.00	58.7	6.4	65.1
Total	74.2	490.0			4,778.0	632.1	5,410.1

Note: Foreign price index is based on dollars compared with a basket of currencies (<http://www.fxstreet.com/rates-charts/usdollar-index/>). The local price index is based on the consumer price index published by the Reserve Bank of India.

3. **Operation and maintenance costs.** Actual incremental operation and maintenance (O&M) costs attributable to the project cannot be calculated with any accuracy. MPERC's regulatory allowance for O&M costs (for renovation and maintenance of physical assets) is 2.3% of gross fixed assets, escalated annually at a rate set periodically by MPERC (this means that the DISCOMs are allowed to recover annual O&M costs equal to 2.3% of the capitalized asset value of the project). This O&M cost was used in the revenue allowance calculation. However,

¹ Asian Development Bank, Independent Evaluation Department. 2013. *ADB Guidelines for Preparing Performance Evaluation Reports for Public Sector Operations*. Manila.

as noted in Appendix 9, many of the subprojects would actually result in a reduction in O&M costs. Therefore, O&M costs were estimated at a subproject level, as discussed in the economic reevaluation, resulting in an overall O&M cost of approximately 1.2% of capitalized project cost.

C. Evaluation of Project Benefits

4. **Regulated revenue from new assets.** As noted above, most of the incremental revenue earned by the DISCOMs for the new distribution facilities is calculated in accordance with regulations set by MPERC. MPERC allows DISCOMs to recover electricity purchase costs, interest costs, depreciation charges, O&M costs, working capital charges, and corporate taxes in DISCOMs' end-use tariffs. A return on invested equity of 16% (post-tax) is also included in the annual revenue allowance. For the purposes of this reevaluation, it was assumed that project assets were transferred from capital work in progress to fixed assets progressively from 2011 (that is, it was assumed that regulated revenue was earned only from 2011 onward). Total incremental regulated revenue earned in 2014 was estimated at approximately Rs590 million (in 2014 terms).

5. **Incremental revenue from reduced distribution losses.** Distribution loss trajectories for the three DISCOMs are set by MPERC at the start of each regulatory period. DISCOMs can recover electricity purchase costs in accordance with MPERC's loss trajectories. If DISCOMs achieve loss levels lower than the trajectories set by MPERC, they retain the saving in electricity purchase costs. Conversely, if DISCOMs cannot meet MPERC's distribution loss trajectories, they cannot recover additional electricity purchase costs from customers and instead must absorb them. DISCOMs have not yet met MPERC's loss trajectories, and this has been the main cause of financial losses for them. As noted in the economic reevaluation above, the project has contributed to distribution loss reduction by an estimated 300 gigawatt-hours (GWh) per annum. This loss reduction results in incremental net revenue to DISCOMs. With the state suffering energy and capacity deficits prior to FY2015, the incremental net revenue accrues as additional sales, valued at the DISCOMs' average revenue realization of approximately Rs5.4 per kilowatt hour (expressed in 2014 terms). With the state moving to energy and capacity surpluses from FY2015, loss reduction accrues as reduced electricity purchases, and this was valued at the DISCOMs' average variable electricity purchase cost of approximately Rs1.9 per kWh (also expressed in 2014 terms).

D. Evaluation Basis, Period, and Remaining Value

6. Incremental cash flows earned by DISCOMs from project assets were estimated on the basis of the methodology and assumptions described above. The evaluation period was 20 years from 2008. Assets were assumed to have an average economic life of 35 years, and terminal values were ascribed based on remaining economic life at the end of the evaluation period. Project assets were depreciated on a straight-line basis in accordance with depreciation rates set by MPERC. The project's overall FIRR was reevaluated at 6.7% (pre-tax real), as shown in Table A10.2.²

²As a consequence of years of tax losses, DISCOMs are not expected to pay significant levels of tax for the foreseeable future. Therefore, and since corporate taxes are a pass-through cost anyway, project pre-tax cash flows rather than post-tax cash flows were calculated.

Table A10.2: Financial Reevaluation of the Project
(2014 Rs million)

Fiscal Year	Incremental Revenue	Costs		Net Cash Flow
		Capital	O&M	
2008	0.0	291.7	0.0	-291.7
2009	2.8	1,034.4	5.0	-1036.6
2010	27.6	1,365.3	22.5	-1360.2
2011	312.6	1,135.0	45.8	-868.1
2012	587.3	1,076.7	65.0	-554.5
2013	926.9	442.0	83.4	401.5
2014	831.3	65.1	90.9	675.3
2015	784.3	0.0	92.0	692.3
2016	736.4	0.0	92.0	644.4
2017	691.4	0.0	92.0	599.4
2018	649.2	0.0	92.0	557.2
2019	609.5	0.0	92.0	517.6
2020	572.3	0.0	92.0	480.4
2021	537.4	0.0	92.0	445.4
2022	470.1	0.0	92.0	378.2
2023	442.3	0.0	92.0	350.3
2024	416.2	0.0	92.0	324.2
2025	392.2	0.0	92.0	300.2
2026	370.9	0.0	92.0	278.9
2027	351.6	0.0	92.0	259.6
Terminal value:				176.1
FIRR (Post-tax real):				6.7%

() = negative, FIRR = financial internal rate of return, O&M = operations and maintenance.

7. **Benchmark FIRR.** The assumed hurdle rate for this reevaluation is the project's overall real pre-tax weighted average cost of capital (WACC). The main sources of finance were the ADB loan (approximately 89% of total project costs), which was on-lent to DISCOMs on a back-to-back basis as local currency loans with a 100 basis point on-lending margin, local currency loans from the Power Finance Corporation Limited (from existing lines of credit) carrying a fixed interest rate of 11.5% (approximately 7% of total project costs), and equity in the form of retained earnings (approximately 4% of total project costs). The annual return on equity allowed by MPERC (16%) was adopted as a proxy for the required return on equity. As shown in Table A10.3, the project WACC was re-estimated at 0.8%.³ The project's reevaluated FIRR of 6.7% comfortably exceeds this hurdle rate. The aggregate FIRR calculated during appraisal was 11.2% (post-tax real), and the overall project WACC was 2.6%. The lower FIRR and WACC are primarily a consequence of a much lower equity contribution than was assumed at appraisal (approximately 4% versus 34%). On this basis, even though the reevaluated FIRR is lower than that estimated at appraisal, the project's actual financial performance is acceptable and, from a financial perspective, the investment was justified because the reevaluated FIRR still comfortably exceeds the reevaluated hurdle rate.

³ In accordance with ADB's methodology for WACC calculation, the minimum real cost of each finance source was set to be zero. However, the actual real WACC is negative as a consequence the nominal cost of on-lent ADB funds being less than the rate of inflation.

Table A10.3: Re-estimation of Project Weighted Average Cost of Capital

Source	Amount (Rs million)	Weight (%)	Pre-Tax Nominal Cost (%)	Inflation Rate	Pre-Tax Real Cost (%)	Weighted Pre-Tax Real Cost (%)
ADB loan	3,638.1	88.6	2.7	5.9%	0.0	0.0
PFC loan	297.8	7.3	11.5	5.9%	5.3	0.4
Equity	170.8	4.2	16.0	5.9%	9.5	0.4
Total	4,106.7	100.0				0.8

ADB = Asian Development Bank, PFC = Power Finance Corporation.

CONTRIBUTION TO ADB RESULTS FRAMEWORK

Level 2 Results Framework Indicator	Original Target	Revised Target	Aggregate Output	Methods/Comments
Distribution lines installed or upgraded (kilometers)	8,100		7,000	As a result of technical optimization, more than 1,100 km of lines were reduced due to application of advanced technologies. The intended project coverage and consumers were fully met. The use of GPS in new power line alignments and tapping from the nearest feasible point, resulted in the reduced line length and economic project cost.

ADB = Asian Development Bank, DTR = distribution transformer, km = kilometer, kVA = kilovolt-ampere, kV = kilovolt.