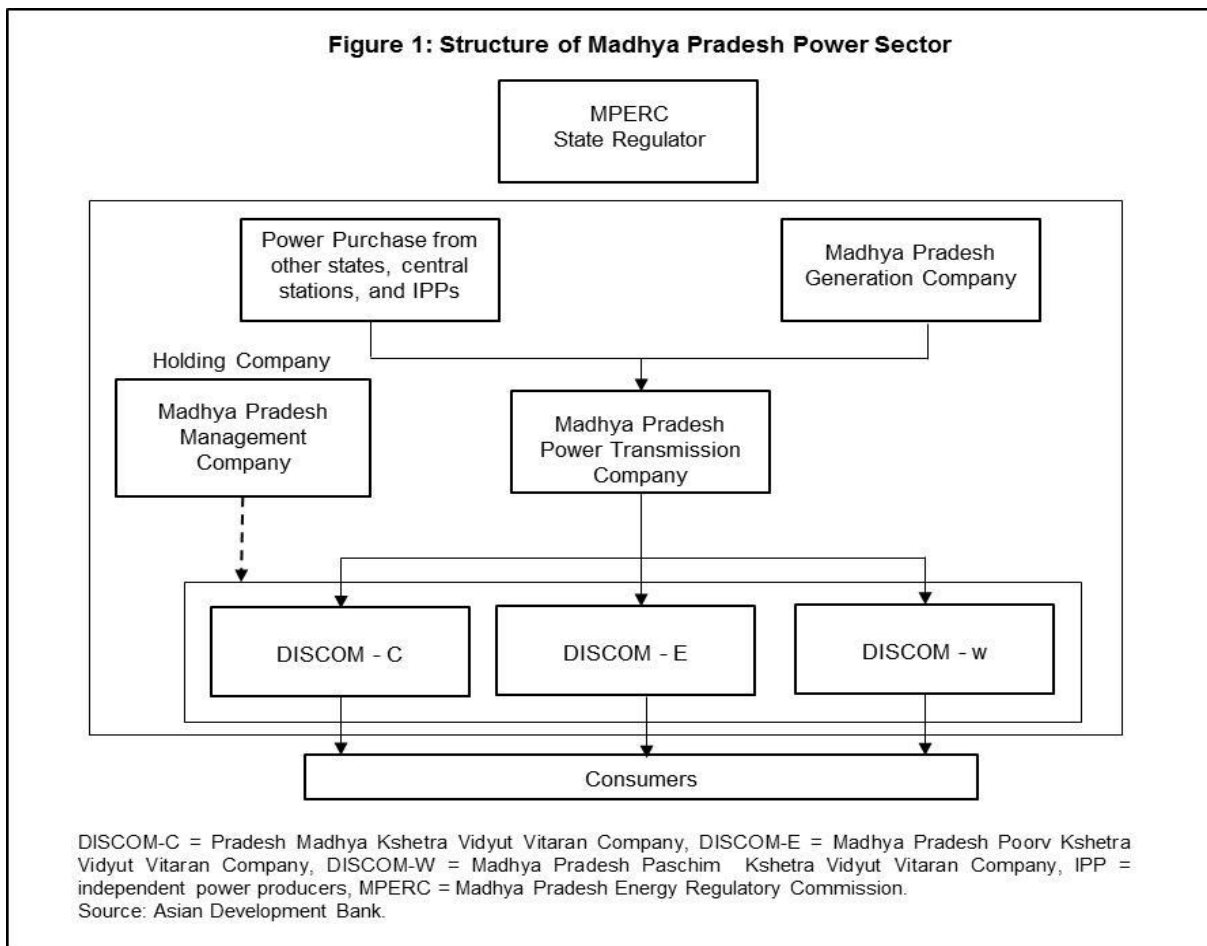


SECTOR ASSESSMENT (SUMMARY): POWER¹

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. The Electricity Regulatory Commission Act, 1998, provided for the establishment of central and state electricity regulatory commissions, and the Electricity Act established their functions. Key functions of the Madhya Pradesh Electricity Regulatory Commission (MPERC) include: (i) rationalization of electricity tariffs; (ii) regulation of power system operations; (iii) reliability and quality standard setting; (iv) issuance of licenses and regulation of licensees; and (v) promotion of competition, efficiency, and economy in the electricity industry. Based on the guidance provided in the central government's Electricity Policy, MPERC determines tariffs for wholesale, bulk, grid, or retail electricity based on tariff petitions submitted to the commission; and determines the tariff payable for use of the intrastate transmission facilities. MPERC has been operational in all aspects to fulfill its mandate, especially comprehensive analysis and determinations of tariff petitions submitted by the sector companies. The most recent tariff order was issued in March 2013, for FY2013–FY2014. Figure 1 shows the structure of power sector in Madhya Pradesh.



¹ This summary is based on the project preparatory technical assistance consultant report. ADB. 2013. *Technical Assistance to India for Preparing Madhya Pradesh Transmission and Distribution System Improvement Project*. Manila. Available upon request.

2. Peak availability in the Madhya Pradesh power sector in FY2012 was 9,692 megawatts (MW) while the estimated unrestricted peak demand was 10,308 MW, resulting in an unmet peak demand of 616 MW. As of 31 March 2013, Madhya Pradesh Power Generating Company has a total generating capacity of 3,722 MW (including 915 MW of hydropower), of which 3,375 MW is allocated for Madhya Pradesh. Catalyzed by the Government of Madhya Pradesh (GOMP) policy of assisting the development of private sector power generation, GOMP has signed 49 memorandums of understanding with private generating companies and about 10,000 MW of independent power producer (IPP) projects are in various stages of implementation. In 2013, the private sector is expected to commission 1,540 MW of generating capacity. According to the generation plan of Madhya Pradesh, from FY2014 to FY2020 a total of 14,554 MW of capacity will be added to the system, and transmission and distribution systems require capacity expansion commensurate with generation expansion.

3. The state has a surplus generating capacity, as estimated for FY2012 and summarized in Table 1. The actual deficits in FY2012 are also shown. The significant surplus indicated for FY2013 is large owing to the planned addition of 1,700 MW of capacity by Madhya Pradesh Power Generating Company. However, the demand growth is expected to raise peak demand to about 15,000 MW by FY2018. In the 12th plan period, 2012–2017, 9,700 MW of generating capacity is planned to be added, inclusive of projects under construction. Madhya Pradesh needs to ensure the generating capacity development program is sustained so that demand continues to be met, with no shortages in the coming years.

Table 1: Generation Capacity Available for Madhya Pradesh

Item	Energy				Peak Capacity			
	Demand (GWh)	Available (GWh)	Surplus/Deficit (GWh) (%)	Demand (MW)	Available (MW)	Deficit (MW)	Deficit (%)	
Actual FY2012	51,783	46,829	(4,954) (9.6)	10,308	9,692 ^a	(616)	(6.1)	
Forecast FY2013	59,431	63,112	3,681 6.	9,494 ^b	11,432	1,939	20.4	

() = negative, GWh = gigawatt-hour, MW = megawatt.

^a Available capacity and energy include allocation from central generating stations.

^b This forecast is lower than the actual peak demand in FY2013 because the demand forecast for FY2014 was prepared in FY2012. This forecast is under review by Madhya Pradesh Power Transmission Company.

Source: Central Electricity Authority.

4. In Madhya Pradesh, Power Grid Corporation has four 765 kilovolt (kV) substations and 11 substations at 400 kV, where power from central stations is received or sent out. Madhya Pradesh Power Transmission Company (MP Transco) also receives power from generating stations at 400 kV, 220 kV, and 132 kV; and its transmission network delivers that power to substations. MP Transco faces the challenge of serving fast-growing demand from the distribution companies. The transmission network was able to meet peak demand in FY2012 with no transmission constraints. However, with sales growth forecast at about 11% per year during 2013 -2017 period. Continuous improvements have to be made in the transmission network to sustain the achievements of recent years. Prudent utility practices have to be followed in planning investments in the transmission system to ensure the reliability and quality of supply provided to distribution companies.

5. Transmission assets should be operated and maintained in accordance with best practices so that they are available at all times. This will ensure that demand can be met at the required quality of service, with minimum transmission losses. Poor availability of transmission assets, especially at peak times, causes poor quality of supply to distribution companies and higher transmission losses, and may require load shedding. The availability of the Madhya

Pradesh transmission system at each voltage level and at the system level has improved during since FY2008 (Table 2). Transmission network losses have declined, approaching the loss level of 3% (Table 3), which is typical of many transmission networks in the South Asian region. In the face of growing demand, MP Transco needs to maintain these higher availability levels and lower loss levels by investing in new equipment for maintenance, streamlining maintenance procedures, and investing continuously in new transmission lines and substations.

Table 2: Transmission Availability (%)

Item	FY2008	FY2019	FY2010	FY2011	FY2012
400 kV	96.56	98.96	99.26	98.40	99.37
220 kV	98.70	98.55	99.09	99.45	99.43
132 kV	98.87	99.00	99.13	99.29	99.46
Overall system	98.16	98.82	99.13	99.23	99.44
Target established by MPERC	97.00	98.00	98.00	98.00	98.00

kV = kilovolt, MPERC = Madhya Pradesh Electricity Regulatory Commission.

Source: Madhya Pradesh Power Transmission Company.

Table 3: Transmission Energy Losses as a Share of Input to the Network (%)

Item	FY2008	FY2019	FY2010	FY2011	FY2012
400 kV	1.20	1.19	1.18	1.18	1.22
220 kV	2.51	2.86	2.56	2.39	2.11
132 kV	1.17	1.03	0.86	0.89	0.92
Overall system	4.09	4.19	3.74	3.51	3.30
Target established by MPERC	4.90				

kV = kilovolt, MPERC = Madhya Pradesh Electricity Regulatory Commission.

Note: Madhya Pradesh Power Transmission Company has not set a loss target for FY2010–FY2013.

Source: Madhya Pradesh Power Transmission Company.

6. Key constraints hamper the service quality and financial viability of the distribution companies are relatively high losses in the network, and subsidies and cross-subsidies. Both of these require close management to ensure that losses and subsidies allowed by MPERC in tariff determination are not exceeded. Losses comprise technical and commercial losses. MPERC establishes a loss reduction target for each distribution company for each year in estimating the annual revenue requirement. Tariff is determined based on the annual revenue requirement and if a company does not meet the targeted loss reduction, it will incur a loss. For the first time, distribution companies met MPERC loss targets in FY2012.

7. Technical and commercial losses in the distribution network have gradually reduced and are at a state average of 27.11% (Table 4). Rapid rural electrification added to the losses owing to (i) new, longer distribution lines to reach interior villages; (ii) the previous practice of providing connections without meters; and (iii) the incomplete feeder separation work that restricts power supply to agricultural water pumping. The reported losses show the combined results of efforts to reduce losses and rapid rural electrification. A number of policy initiatives have been implemented at national and state level to improve the overall management of the network and reduce losses. At state level, the following initiatives are under implementation to minimize commercial losses: (i) a feeder separation program in rural areas to manage commercial losses in power delivery to agricultural activities; (ii) 100% metering of customers; (iii) high voltage distribution systems; (iv) remote metering of distribution transformers; and (v) energy auditing. MPERC has established stringent loss targets for each distribution company from FY2013 to FY2014 with the Madhya Pradesh distribution loss declining to 17.3% by FY2014. New investments are therefore required to extend the distribution network, improve the existing network, and improve customer metering and management.

Table 4: Distribution Losses

Fiscal Year	Distribution Losses Approved by MPERC (%)	Actual Losses (%)
FY2008	35.51	39.52
FY2019	32.77	37.79
FY2010	33.67	36.45
FY2011	31.36	30.99
FY2012	28.28	27.11

MPERC = Madhya Pradesh Electricity Regulatory Commission.

Source: Project preparatory technical assistance consultants.

2. Government's Sector Strategy and ADB Assistance

8. The strategy of GOMP has been to build or contract new generating capacity, expand the transmission network, and expand the distribution network to provide electricity to an increasing share of the population, while investing significantly in new assets and management systems for the reduction of technical and commercial losses. Several rural electrification initiatives are being implemented including: (i) Rajiv Gandhi Grameen Vidyutikaran Yojana funded by the Rural Electrification Corporation of India, to provide access to electricity to all households in rural areas and improve the rural electricity distribution infrastructure; (ii) The Restructured Accelerated Power Development Reforms program is a Government of India Ministry of Power initiative, funded through India's Power Finance Corporation to improve the electricity distribution infrastructure in urban areas; (iii) Feeder separation program to ration supply agricultural customers and to provide 24-hour power supply to other customers. The first two programs initially provided about \$1,060 million and further allocated \$545 million for 2013–2016. The Feeder Separation Program costs about \$1.1 billion and the Asian Development Bank (ADB) provided a \$400 million multitranche financing facility in two tranches.

9. In line with the government strategy, ADB has provided assistance to the sector through the following programs: the Madhya Pradesh Power Sector Development Program;⁶ the Madhya Pradesh Energy Efficiency Improvement Investment Program,⁷ and the Madhya Pradesh Power Sector Investment Program.⁸ Progress of the implementation of these ADB assistances is satisfactory.⁹ The proposed project is a continuation of similar interventions to help the GOMP to realize its goal to provide 24-hour power supply to power consumers.

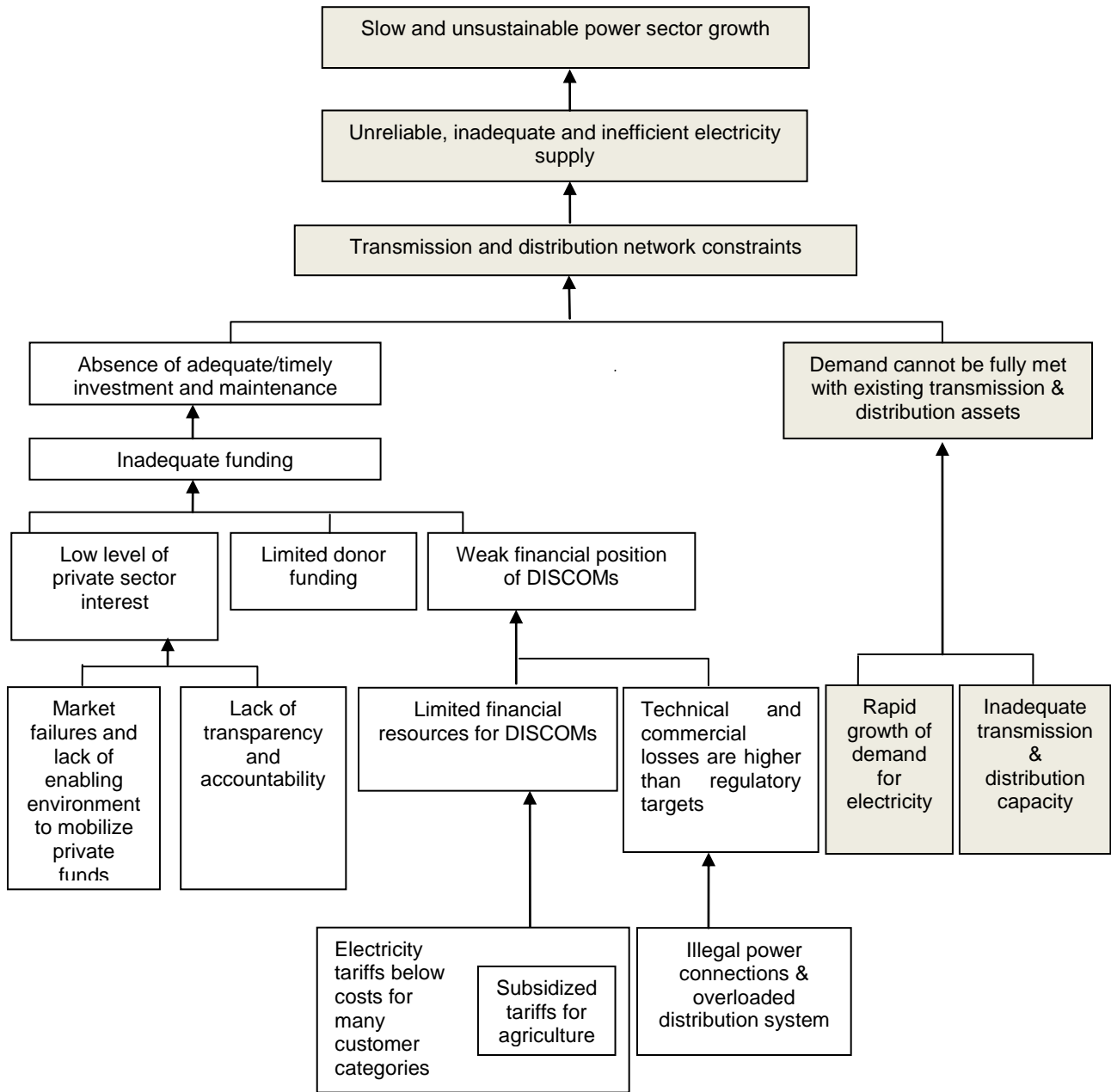
⁶ ADB. 2001. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to India for the Madhya Pradesh Power Sector Development Program*. Manila (Loan 1868-IND and Loan 1869-IND).

⁷ ADB. 2007. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility for the Madhya Pradesh Power Sector Investment Program*. Manila (Loan 2323-IND; Loan 2324-IND; Loan 2346-IND; Loan 2347-IND; Loan 2520-IND; and Loan 2732-IND).

⁸ 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*. Manila (Loan 2764-IND and Loan 2830-IND).

⁹ Technical Justification (accessible from the list of linked documents in Appendix 2).

PROBLEM TREE



Sector Results Framework (Energy, 2013–2017)

Country Sector Outcomes		Country Sector Outputs		ADB Sector Operations	
Outcomes with ADB Contribution	Indicators with Targets and Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Interventions
Increased and efficient use of energy including renewable energy	<p>Aggregate technical and commercial losses reduced to 20% in 2017 (2011 baseline: 26%)</p> <p>Percentage of electrified villages increased to 100% in 2017 (2012 baseline: 93.8%)</p> <p>Share of new and renewable energy in total installed capacity increased to 25% by 2017 (2012 baseline: 12%)</p> <p>Transmission capacity for inter-regional power flows increased to 65,550 MW by 2017 (2012 baseline = 27,750 MW)</p> <p>11,000 MW of savings achieved through demand-side management and energy efficiency during the 12th Plan (baseline = 0)</p>	Energy system expanded, improved, and well managed	<p>Non-renewable generation capacity (including hydropower) increased by 88,537 MW during the 12th FYP as compared with 11th FYP</p> <p>Hydropower generation capacity increased by 10,897 MW during the 12th FYP as compared with 11th FYP</p> <p>Grid-connected renewable power generation capacity increased by 30,000 MW during the 12th Plan as compared with 11th Plan</p> <ul style="list-style-type: none"> - Wind power generation capacity increased by 15,000 MW during the 12th FYP as compared with 11th FYP - Solar power generation capacity increased by 10,000 MW during the 12th FYP as compared with 11th FYP - Small hydropower generation capacity increased by 2,100 MW during the 12th FYP as compared with 11th FYP - Biomass and other generation capacity increased by 2,900 MW during the 12th FYP as compared with 11th FYP <p>110,340 ckm of power transmission lines installed or upgraded by 2017 compared with 11th FYP</p> <p>1.3 million ckm of power distribution lines installed or upgraded during the 12th Plan as compared with 11th Plan^a</p> <p>46,825 MW of non-renewable generation capacity (private sector) installed during the 12th FYP as compared with 11th FYP</p>	<p>(i) Planned key activity areas</p> <ul style="list-style-type: none"> • solar power (20% of funds) • hydro-power (15% of funds) • other renewable (10% of funds) • electrical power transmission (40% of funds) • electrical power distribution (15% of funds) <p>(ii) Pipeline projects 13 projects amounting to \$1,948 million for 2013-2015 (including 4 projects categorized as EGM)</p> <p>(iii) Ongoing projects 26 ongoing loans amounting to \$3,682 million as of 31 December 2012 (including 2 projects categorized as EGM)</p>	<p>(i) Planned key activity areas Approx. 1,500 MW of solar power; hydro power, wind power installed/ upgraded; transmission investments totaling approx. \$1.75 billion; and distribution investments of about \$1 billion</p> <p>(ii) Pipeline projects 1,250 MW of solar power; hydro power, wind power installed/ upgraded; \$1.5 billion transmission system investments; \$970 million of distribution system investments</p> <p>(iii) Ongoing projects 885 MW of hydro power being installed; 7,760 ckm of transmission lines being installed/ upgraded; 104,481 ckm of distribution lines being installed/ upgraded</p>

ADB = Asian Development Bank, AT&C = aggregate technical and commercial, ckm = circuit kilometer, CSP = concentrated solar power, GWh = giga-watt hours, IREDA = Indian Renewable Energy Development Agency, kV = kilovolt, km = kilometer, LV = low voltage, MFF = multitranché financing facility, MW = megawatt, MVA = megavolt amperes, PV = photovoltaic, T&D = transmission and distribution.

^a This includes 135,000 ckm of 33KV lines, 560,000 ckm of 11 KV lines and 610,000 ckm of LV lines.

Source: Government of India and Asian Development Bank estimates.