FINANCIAL ANALYSIS

1. The financial analysis of the project is in accordance with the Financial Management and Analysis of Projects (2005) of the Asian Development Bank (ADB).[1] The analysis is to determine the financial stability and sustainability of the proposed investment involving the rehabilitation of power distribution networks in Magway, Mandalay, Sagaing, and Yangon regions, all of which have high electricity demand. The distribution system currently experiences overloading, poor reliability, and extremely high losses. The key benefit of the project is the reduction of energy losses.

2. The scope of rehabilitation works includes (i) upgrading existing 66/11 kilovolt (kV) and 33/11 kV substations; (ii) replacing existing 33 kV and 11 kV distribution lines; (iii) replacing existing 11/0.4 kV transformers; (iv) replacing existing bare low voltage distribution lines with more efficient aerial bundled conductor (ABC) distribution; and (v) replacing existing old revenue meters with digital revenue meters.

3. The analysis was done using a cash flow analysis by projecting future revenue and cost streams from the project in real terms. The future stream of net incremental cash flow is discounted to its present value and financial indicators such as the financial internal rate of return (FIRR) and financial net present value (FNPV) are calculated. The weighted average cost of capital (WACC), which measures the project's cost of funds, is determined based on the source and cost of financing. The calculated WACC is then used as a benchmark to compare with the FIRR and FNPV. The project is considered financially viable if the FIRR exceeds the WACC. Sensitivity analysis was conducted to establish the robustness of the project FIRR to changes in various parameters.

4. The framework for the financial analysis comprises the project investment and financing plans. The project cost estimates are based on information from the technical analysis of expected annual capital expenditure during implementation, including equipment, project management, safeguard costs, consultancies, and physical contingencies. The financing plan identifies sources of debt and equity financing of the project, including the amount of equity contribution from the government.

A. Key Assumptions

5. The following assumptions were used in carrying out the financial analysis:
   (i) **Exchange rate and inflation**. An average exchange rate of MK980 = $1 is assumed for the base year 2013. For the later years, the exchange rate is calculated based on purchasing power parity (PPP), which assumes that the annual change in exchange rate is proportional to the ratio of the local and foreign inflation indexes.
   (ii) **Capital costs**. The total capital cost of the project (excluding price contingencies and financing charges during implementation) used in calculating the FIRR is estimated at $69.5 million inclusive of physical contingencies of $6.3 million, with ADB financing $60.0 million and the Government of Myanmar $13.7 million.
   (iii) **Implementation period**. The project will commence in 2014; construction will be completed in 2016.
   (iv) **Economic useful life**. The operating life of the project is assumed to be 20 years, from 2017 to 2036.

[1] ADB. 2005. *Financial Management and Analysis of Projects.* Manila.

(v) **Benefits.** The project benefit comprises the reduction of distribution losses by 4.0% from the current 18.2% in 2012 to 14.2% over the period 2017–2036. The benefit is valued at the average selling price of MK53/kilowatt-hour (kWh) during the dry months when supply is limited[2] and hence any loss reduction will be realized as incremental sales to meet unsatisfied demand due to the limited supply. Demand is forecast to increase by 14% per annum during 2014–2016[3] in line with Electricity Supply Enterprise (ESE) and Yangon City Electricity Supply Board (YESB) forecasts, 10% per annum during 2017–2026[4], and 7% thereafter. During wet months, when supply is ample to meet distribution system demand, the average buying price of MK40/kWh is used to value the loss reduction benefit, as any loss in the distribution system will translate into lower purchases. Both ESE and YESB, the two project beneficiaries, have minimal generation facilities and purchase all their incremental electricity from the Myanmar Electric Power Enterprise (MEPE) at a fixed price of MK40/kWh. While some operating expense savings will result from lower maintenance required for the rehabilitated assets, this is likely to be small and has not been included in the calculation of benefits.

(vi) **Incremental costs**. As this is a rehabilitation project, it does not have incremental costs. The new assets are depreciated over 33 years on a straight-line basis for the purpose of tax calculations.

(vii) **Tax.** The current corporate income tax rate in Myanmar of 25% is assumed to apply throughout the period of the assessment.

B. Weighted Average Cost of Capital

6. The WACC is calculated as the weighted average cost of equity and debt used to fund the project. The cost of equity is calculated based on benchmarking against the cost of equity of power companies in several less-developed countries including Bangladesh, Indonesia, Thailand, Ukraine, and Viet Nam, and adding a premium of 2.5% to reflect Myanmar's higher country risk. The capital asset pricing model cannot be used to assess the cost of ESE or YESB equity as the equity market in Myanmar is not developed and beta values are not available.

7. The nominal cost of debt is taken as the Asian Development Fund loan's fixed interest rate of 1.5% over the longer term. The loan does not have a maturity premium or commitment fee, and the government has indicated that it will not be charging an onlending margin. The inflation rate used to adjust the nominal values to real values is based on the long-term price escalation factors used by ADB. Given the estimated costs of equity and debt, and the relative proportions of equity and debt in the project capital structure, the WACC is calculated to be 1.38% (Table 1).

[2] In 2012, hydropower facilities supplied 70% of electricity in Myanmar.
[3] Sales growth in the last 2 years averaged 22% per annum.
[4] For developing countries where electrification is well below 100%, energy elasticity (percentage change in energy consumption to achieve 1% change in national gross domestic product) is more than 1.0x. The current Myanmar electrification rate is 29%. The gross domestic product is projected to be 7%–8% in the next 10 years.

Table 1: Weighted Average Cost of Capital (%)

Item	ADB Financing	Government Financing	Total
A. Proportion of financing	81.87	18.13	100.00
B. Nominal cost	1.50	13.00	
C. Tax rate	25.00	0.00	
D. Nominal cost adjusted by tax	1.13	13.00	
E. Inflation rate	1.80	5.00	
F. Real cost adjusted by tax	(0.66)	7.62	
G. Cost of type of capital	0.00	1.38	1.38
Weighted average cost of capital	**1.38**		

( ) = negative value, ADB = Asian Development Bank.
Source: Asian Development Bank estimates.

C. Financial Evaluation

8. The post-tax FNPV of the projected incremental cash flows discounted at the WACC of 1.38% is $86.7 million. The post-tax real FIRR of the project is 8.82% and is higher than the WACC of 1.38%, which confirms that the project is financially viable. The results of the financial analysis are shown in Table 2.

Table 2: Financial Evaluation
($ million)

Year	Capital Costs	Incremental Operating Expenditure	Incremental Revenue	Cash Flow Before Tax	Tax	Net Cash Flow
2014	22.1			(22.1)		(22.1)
2015	39.6			(39.6)		(39.6)
2016	7.9	0.0	0.0	(7.9)	0.0	(7.9)
2017		0.0	6.7	6.7	1.1	5.6
2018		0.0	7.1	7.1	1.3	5.9
2019		0.0	7.6	7.6	1.4	6.2
2020		0.0	8.1	8.1	1.5	6.6
2021		0.0	8.7	8.7	1.6	7.0
2022		0.0	9.2	9.2	1.8	7.5
2023		0.0	9.9	9.9	1.9	7.9
2024		0.0	10.5	10.5	2.1	8.4
2025		0.0	11.2	11.2	2.3	8.9
2026		0.0	12.0	12.0	2.5	9.5
2027		0.0	12.4	12.4	2.6	9.8
2028		0.0	12.9	12.9	2.7	10.2
2029		0.0	13.4	13.4	2.8	10.5
2030		0.0	13.9	13.9	2.9	10.9
2031		0.0	14.4	14.4	3.1	11.3
2032		0.0	14.9	14.9	3.2	11.7
2033		0.0	15.5	15.5	3.3	12.1
2034		0.0	16.0	16.0	3.5	12.6
2035		0.0	16.6	16.6	3.6	13.0
2036		0.0	17.3	17.3	3.8	13.5
Financial net present value = 86.7						
Financial internal rate of return = 8.82%						
Weighted average cost of capital = 1.38%						

( ) = negative value.
Source: Asian Development Bank estimates.

D. Sensitivity Analysis

9. An analysis was conducted to ascertain the impact of changes in project variables on the base-case FNPV and FIRR, including (i) increase in capital costs, (ii) decrease in revenues, and (iii) delay in project implementation. The results of the sensitivity analysis are summarized in Tables 3 and 4.

Table 3: Financial Net Present Value Sensitivity Analysis

	Variable	Change	FNPV ($ million)	SI[a]	SV[b] (%)
1	Base case		86.7		
2	Capital cost overrun	10%	79.9	(0.78)	(127.9)
3	Revenue Decline	(10%)	72.2	1.68	59.5
4	2 year delay in benefits		67.3	NPV lower by 22.4%	
5	Combination scenario 2+3		65.4		
6	Combination scenario 2+4		60.5		
7	Combination scenario 3+4		54.6		
8	Combination scenario 2+3+4		47.8		

( ) = negative value, FNVP = financial net present value, SI = sensitivity indicator, SV = switching value
[a] The ratio of the % change in the FNPV to the % change in a variable.
[b] Shows % change required in a variable for the FNPV to become zero.
Source: Asian Development Bank estimates.

Table 4: Financial Internal Rate of Return Sensitivity Analysis

	Variable	Change	FIRR (%)	SI[a]	SV (%)[b]
1.	Base case		8.8		
2.	Capital cost overrun	10%	7.8	(1.30)	(76.8)
3.	Revenue decline	(10%)	7.8	1.34	74.4
4.	2-year delay in benefits		8.1	IRR lower by 0.8%	
5.	Combination scenario 2+3		6.9		
6.	Combination scenario 2+4		7.1		
7.	Combination scenario 3+4		7.0		
8.	Combination scenario 2+3+4		6.0		

( ) = negative value, FIRR = financial internal rate of return, SI = sensitivity indicator, SV = switching value.
[a] The ratio of the % change in the FIRR to the % change in a variable.
[b] Shows % change required in a variable for the FIRR to become zero.
Source: Asian Development Bank estimates.

10. The analysis indicates that the project remains viable for various adverse outcomes resulting in changes of single variables including capital cost overrun, revenue decline, and 2-year delay in benefits. The FIRR remains greater than the WACC under all these scenarios. The project is very sensitive to increases in capital costs and revenue decline but is not as sensitive to a 2-year delay in project start-up as indicated by the sensitivity indicator and switching value. The project also remains viable under various combinations of the scenarios indicating that it is financially robust.