

## FINANCIAL ANALYSIS

### A. Scope of Financial Analysis

1. The Bengaluru Metro Rail Project will support the construction of two new lines (phases 2A and 2B) of the Bengaluru Metro as well as technical assistance on urban development based on transit-oriented development. This financial analysis includes a feasibility assessment for the financing of the capital expenses of the project by way of senior debt. The analysis was carried out in accordance with Asian Development Bank (ADB) guidelines<sup>1</sup> by (i) assessing costs and earnings that would accrue to the project using the discounted cash-flow method, and (ii) calculating the financial internal rate of return (FIRR) over a 30-year period (comprising 5 years of construction and 25 years of operations). Entity-level analysis of the Bengaluru Metro Rail Corporation Limited (BMRCL), including analysis of the entire metro operations, has also been carried out. Since any financial loss of BMRCL during the operation phase is to be backstopped by the Government of Karnataka, the financial health of the state government was also assessed.<sup>2</sup>

### B. Revenue Estimate

2. **Travel demand.** Travel demand was estimated using a four-step travel model with parameters configured to represent Bengaluru.<sup>3</sup> The analysis assumes 2 kilometers (km) of catchment area on either side of the metro railway alignment.

3. Ridership of an initial 2 years in 2025–2026 was discounted as ramp-up period. Also, ridership on the stretch between Bagalur Cross and Airport City stations of Phase 2B would commence only from 2034. Daily ridership for the assessment is captured in Table 1.

**Table 1: Daily Ridership Estimates Taken for Financial Assessment**

Year	Phase 2A	Phase 2B
FY2025	75,754	81,840
FY2031	289,387	311,264
FY2041	432,916	500,831
FY2045	508,596	588,384

FY = fiscal year.

Note: Ridership growth was estimated at 4.11% annum after 2026.

Source: Consultant's estimate based on the report of Bengaluru Metro Rail Corporation Limited.

4. **Average trip length.** Average trip length was estimated based on the (i) average trip length on the existing Bangalore Metro lines, and (ii) expected trip patterns (Table 2).

**Table 2: Estimated Average Trip Length**

Phase	ATL	Remarks
2A	8.5 km	50% of operational length of phase 2A
2B	10–30 km	Depending on trip origin stations, 3 distances were assumed. K. R. Puram to Yelahanka: 10 km, Bagalur Cross to Airport City: 20 km, KIA: 30 km

ATL = average trip length, KIA = Kempegowda International Airport, km = kilometer.

Source: Asian Development Bank.

5. **Average ticket fare per passenger-kilometer.** The average ticket fare per passenger per km is based on the actual fare of ₹2.85 per passenger-km in fiscal year (FY) 2020, with no escalation for the project life, to keep the analysis in real terms. Furthermore, based on past data, it has been assumed that 35% of the total ridership would pay full fare, while the remaining 65% would use a smart card, with a 5% discount on the full fare.<sup>4</sup>

<sup>1</sup> ADB. 2019. *Financial Analysis and Evaluation*. Manila.

<sup>2</sup> Government Order No: UDD 86 PRJ 2019 Bengaluru, dated 16 October 2019.

<sup>3</sup> The four steps are trip generation, trip distribution, mode choice, and route assignment.

<sup>4</sup> Past figures from page 14 of the BMRCL annual report, 2018–2019 and similar data from earlier reports. Assumed figures reflect the FY2020 position. BMRCL. 2018. *Annual Report, 2018–2019*. Bengaluru.

6. **Non-farebox revenue.** Non-farebox revenue includes revenue from contracting out commercial spaces in the station, advertising and naming rights, rights to install telecom cables or towers, and parking fees. Non-farebox revenues have been conservatively estimated at 10% of farebox revenues, with a 2-year initial ramp-up period to reach the 10% level. Estimated total non-farebox revenues for the first 25 years of operations total ₹23 billion.

### C. Project Cost

7. The project cost, including rolling stock and other equipment, is about \$1.845 billion in April 2020 prices, including soft costs and post-construction costs, if any (Tables 3 and 4).<sup>5</sup>

**Table 3: Total Project Cost for Phases 2A and 2B**

		₹ million	\$ million
<b>A Core Capital Costs</b>	<b>Subtotal</b>	<b>117,260.4</b>	<b>1,555.5</b>
	Civil works including land	82,681.2	1,096.7
	Rolling stock and other equipment	34,579.2	458.7
<b>B Soft Costs</b>	<b>Subtotal</b>	<b>19,650.7</b>	<b>260.7</b>
	Departmental and general charges	4,606.7	61.1
	Taxes and duties	12,010.7	159.3
	Contingencies	3,033.3	40.2
<b>C Financial Charges</b>	<b>Subtotal</b>	<b>2,177.7</b>	<b>28.9</b>
<b>Total Project Cost</b>		<b>139,088.8</b>	<b>1,845.0*</b>

Note: Expressed in April 2020 prices. Price variation is excluded, and a conversion rate of \$1 = ₹75.39 is used based on the rates cited in Financial Benchmark India Private Limited (accessed as of 31 March 2020).

\* Includes costs for rolling stock and signaling and telecommunications, which are not administered by the Asian Development Bank.

Source: Asian Development Bank.

**Table 4: Project Cost by Year**  
(₹ billion)

	FY2021	FY2022	FY2023	FY2024	FY2025	Total*	Total (\$ billion)
Total Project Cost	41.513	21.764	27.288	27.826	20.699	139.089	1.845
% Total Project Cost, including land	29.8%	15.6%	19.6%	20.0%	14.9%	100.0%	100.0%

FY = fiscal year.

\* Small differences in sum total of individual numbers due to rounding.

Source: Asian Development Bank.

8. **Operation and maintenance costs.** Operation and maintenance (O&M) costs such as maintenance, power, and wages are based on the actual O&M costs for the operational phase 1 of the Bangalore Metro, adjusted to the technical specifications of phases 2A and 2B. Maintenance costs have been referenced to core capital costs. Power costs and staff costs carry a quantity variance (real increase) into project lifetime. In real terms, the effective increase is 2.38% per year for power and 1% per year for staff costs. Maintenance costs have been assumed to increase 1.5% per year. The operation costs of the metro were calculated at ₹3.414 billion (in FY2027, after stabilization of ridership).

### D. Weighted Average Cost of Capital

9. Weighted average cost of capital (WACC) was calculated assuming that, out of the project cost of \$1.845 billion, senior debt is \$818 million, while the total equity amount including the subordinate loan is \$1.027 billion. Senior debt is from ADB and the Japan International Cooperation Agency (JICA), with equity and equity-like finance to be contributed by the

<sup>5</sup> Bangalore Metro Rail Corporation Limited will not assume any capital expenses, post-project commissioning, toward replacing assets, procuring additional rolling stock, etc., as all project asset components are expected to have an economic life of at least 30 years, equal to the horizon period for this analysis.

national and state governments. The WACC for the project is 2.629% (Table 6).

**Table 6: Weighted Average Cost of Capital**

Parameter	Units	Loan 2 (JICA)	ADB Loan	Equity	Total
A Means of Finance	\$ million~	318.0	500.0	1,027.0	1,845.0
B Weightage	%	17.24%	27.10%	55.66%	100.00%
C Nominal cost	%	1.42% <sup>a</sup>	2.58% <sup>b</sup>	8.64% <sup>c</sup>	
D Tax rate (domestic)	%	16.69%	16.69%	0.00%	
E Tax adjusted nominal cost	%	1.18%	2.15%	8.64%	
F Inflation rate	%	1.60%	1.60%	4.00%	
G Real cost $[(1+E)/(1+F)-1]$	%	0.00%	0.54%	4.46%	WACC = 2.629%

ADB = Asian Development Bank, BMRCL = Bengaluru Metro Rail Corporation Limited, JICA = Japan International Cooperation Agency, WACC = weighted average cost of capital.

<sup>a</sup> The terms of the JICA loan are assumed to be similar to JICA's existing loan terms with BMRCL.

<sup>b</sup> As of 7 February 2020.

<sup>c</sup> Monthly average of 10-year Government of India's bond yield of 7.138% for period January 2015 to March 2, 2020 sourced from [World Government Bonds/India 10-Year Bonds](#). Project risk premium at 1% and term premium at 0.5% to apply until the immediately following reset date.

Source: Asian Development Bank.

## E. Results of the Financial Analysis of the Project (Phases 2A and 2B)

10. All financial calculations have been done with April 2020 as the base date with no adjustment for inflation to capital costs, revenues, or operating expenses. The post-tax FIRR for the project works out to 1.921%, lower than the post-tax WACC (2.629%). The project is not financially viable without a mechanism to make up financial losses.

11. The profitability projections indicate an operational loss<sup>6</sup> for the first 2 years of operations. The earnings before interest, depreciation, tax, and amortization (EBIDTA) margin of the project works out to about 41% in FY2027 and increases thereafter. The debt service coverage ratio (DSCR) falls below 1.0 in 6 years out of 25 years of the projection period. It is estimated that sponsors may have to provide ₹4,803 million to enable BMRCL to honor its debt service obligations at DSCR of 1.0, or ₹6,970 million when the DSCR is 1.1.

12. **Sensitivity.** Results of the sensitivity analysis are in Table 7.

**Table 7: Sensitivity Analysis—Project**

Parameter	Basis	Low/Base/ High	FIRR (Base=1.921%)		Remarks (WACC = 2.629%)
			Low	High	
Ramp-up years for ridership to stabilize	Years	4/3/2	1.82%	2.03%	FIRR would remain below WACC in all cases.
Moderation to ridership growth rate post 2041	Rate per annum	2.5%/4.11%/4.11%	1.74%	1.92%	FIRR would remain below WACC in all cases.
Increase of NFB revenue from base case	Add or subtract	(-2.5%)/0%/5%	1.80%	2.17%	At NFB revenue = 26.5% of FB revenue, FIRR exceeds WACC.
Sensitivity to project cost estimate	Add or subtract	5%/0%/(5.0%)	1.76%	2.09%	At about a 13% reduction in project cost, FIRR crosses over WACC.
Sensitivity to farebox revenue	Add or subtract	(-10%)/0%/10%	1.37%	2.40%	At about a 16% increase over base FB revenue, FIRR exceeds WACC.
Sensitivity to operating expenses	Add or subtract	5%/0%/(5%)	1.80%	2.04%	FIRR would remain below WACC even for a 20+% reduction in operating expenses.

( ) = negative, FB = farebox, FIRR = financial internal rate of return, NFB = non-farebox, WACC = weighted average cost of capital.

Source: Asian Development Bank.

<sup>6</sup> Defined as operational revenue (farebox and non-farebox) less operational expenses (staff, power, and maintenance expenses). Interest expense: finance cost is not part of operational expenses.

## F. Results of the Financial Analysis—Entity (Phases 1 and 2 + Phases 2A and 2B)

13. The combined profitability projections indicate an operational loss of BMRCL<sup>7</sup> in both FY2025 and FY2026, expected to be the initial 2 years of operation for phase 2 and phases 2A and 2B. An infusion of ₹7,047.2 million may be required during FY2025–FY2026 to maintain operational viability. The DSCR of BMRCL remains below 1.0 times for all years until FY2034. It is estimated that sponsor support to extent of about ₹83.6 billion may be required for BMRCL to honor its debt service obligations at a DSCR of 1.0 (i.e., during FY2021–FY2033).

## G. Financial and Operational Performance of BMRCL

14. Although phase 1 became fully operational in FY2017, operational and financial parameters, represented by ridership, average trip length, revenue per passenger-km, and utilization levels have shown improvement (Table 8). BMRCL achieved an operational surplus from FY2018 (Table 9). Notably, the scheme securing reimbursement of the BMRCL's cash losses from the state government is in place, from FY2018. Operational efficiency improvements (such as conversion of three-car trains to six-car trains), multimodal integration measures, and initiatives to enhance non-farebox revenue are underway (footnote 4). Implementation of phases 2, 2A, and 2B will benefit from phase 1 experience.

**Table 8: Operational Performance of Phase 1**

		FY2017	FY2018	FY2019
Ridership	'000 pax per day	148	299	366
Revenue per pax-km	₹ per pax-km	2.57	2.85	2.81
Average trip length	km per pax	7.92	9.02	9.44
Pax-km per annum	Mio km per annum	428.91	985.05	1,262.50
Metro utilization*	Mio pax per annum	14.34	24.81	29.85

FY= fiscal year, km = kilometer, pax = passenger.

\* Calculated as passenger-km per annum/operational route length.

Source: Bangalore Metro Rail Corporation Limited annual reports and data inputs.

**Table 9: Financial Performance of Bangalore Metro Rail Corporation Limited**  
(₹ million)

Financial Year	FY2016	FY2017	FY2018	FY2019
Farebox revenue	282.89	1,100.98	2,809.98	3,550.16
Other operating income (non-farebox)	166.82	201.80	440.02	473.30
Other income – interest including on deposits, etc.	110.69	148.43	122.13	171.21
<b>Total operational income, phase 1</b>	<b>560.41</b>	<b>1,451.21</b>	<b>3,372.13</b>	<b>4,194.67</b>
<b>Total operating expenses, phase 1</b>	<b>1,148.04</b>	<b>1,723.23</b>	<b>2,629.43</b>	<b>3,359.66</b>
<b>Operational surplus (deficit)</b>	<b>(587.63)</b>	<b>(272.02)</b>	<b>742.70</b>	<b>835.01</b>
Depreciation and amortization	2,445.95	3,642.11	5,157.94	5,839.39
Finance costs	381.86	661.53	1,118.47	1,124.98
<b>Profit (loss) before exceptional items</b>	<b>(3,415.44)</b>	<b>(4,575.65)</b>	<b>(5,533.71)</b>	<b>(6,129.36)</b>
Reimbursement of cash losses from GOK	0.00	0.00	2,022.70	1,163.90
<b>Profit/Loss before Tax</b>	<b>(3,415.44)</b>	<b>(4,575.65)</b>	<b>(3,511.01)</b>	<b>(4,965.46)</b>

( ) = negative, FY = fiscal year, GOK = Government of Karnataka.

Source: Audited annual reports of Bangalore Metro Rail Corporation Limited.

## H. Fiscal Situation of Government of Karnataka

15. A summary of the fiscal position of the state government is in Table 10. The gross domestic product (GDP) of Karnataka state rose steadily during FY2017–FY2022. The annual

<sup>7</sup> Defined as operational revenue (fare box and non-farebox) less operational expenses (staff, power, and maintenance expenses). Interest expense / finance cost is not part of the operational expenses).

growth rate (at constant prices) of Karnataka's GDP (9.6%) in FY2019 exceeded the national GDP growth rate (7.2%) according to advance estimates for FY2019.<sup>8</sup>

16. It is noted from Table 10 that (i) state government finances maintain a surplus on revenue account (revenue surplus since FY2005); (ii) the fiscal deficit remains less than 3% of the estimated state GDP; and (iii) most importantly, against a ceiling norm of 25% prescribed under the Karnataka Fiscal Responsibility Act, the aggregate term liabilities hover around 20% of the state GDP (since FY2011).

17. As per the state government's budget for FY2020–FY2021,<sup>9</sup> the fiscal deficit declined in FY2020 to 2.28% of the state GDP, compared with 2.73% in FY2019. The state budget for FY2021, presented in March 2020, projected a fiscal deficit of 2.55% of the state GDP, acknowledging the economic slowdown caused by the coronavirus disease 2019 (COVID-19). However, the state government has yet to evaluate the exact impact of COVID-19 on the state's economy. The economic slowdown could undermine the state's ability to finance operational losses. Therefore, covenants need to be included in the loan agreement to (i) ensure that the state government will finance the metro's operational losses, (ii) limit BMRCL's external debt exposure, and (iii) ensure periodic fare revisions to improve the financial sustainability of BMRCL.

18. Like many metro projects, the project's rationale is based on its economic viability and urban environment, rather than on financial viability. BMRCL, as a special purpose vehicle jointly by the national and state government, will own, operate, and maintain the new metro lines. BMRCL is in the nature of a project company, dependent on government and state government funding for capital expenditures, and backstopped by the state government for operational losses. Any sovereign borrowing is through the national government, while nonsovereign borrowing is limited and/or backstopped by the state government. There is a clear institutional mechanism for financial sustainability of the metro whereby any future operational loss will be backstopped by the state government (footnote 2).

**Table 10: Fiscal Status of Government of Karnataka**  
(₹ billion)

Particulars	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022
	Acc	Acc	RE	BE	Proj	Proj
Total revenue receipts	1,332.1	1,470.0	1,659.0	1,818.6	2,002.2	2,207.4
Total revenue expenditure	1,319.2	1,424.8	1,657.0	1,816.1	1,992.4	2,200.9
Surplus on capital account	12.9	45.2	1.9	2.6	9.8	6.5
Surplus (deficit) on capital account	(299.6)	(356.2)	(403.6)	(423.1)	(523.6)	(578.7)
Indicators						
Interest payments / TRR	9.0%	9.5%	9.4%	10.5%	11.4%	12.3%
State GDP	11,173.3	13,108.8	14,081.1	15,883.0	17,716.8	19,732.4
Total liabilities	2,213.2	2,462.32	2,855.08	3,272.09	37,85.87	4,358.11
Total liabilities / state GDP (%)	19.8%	18.8%	20.3%	20.6%	21.4%	22.1%
Fiscal surplus (deficit)	(286.7)	(311.0)	(401.7)	(420.5)	(513.8)	(572.2)
Fiscal surplus (deficit) / state GDP	(2.6%)	(2.4%)	(2.9%)	(2.6%)	(2.9%)	(2.9%)
Revenue surplus or deficit / TRR (actual) (%)	1.0%	3.1%	0.1%	0.1%	0.5%	0.3%
Revenue surplus or deficit / state GDP	0.1%	0.3%	0.0%	0.0%	0.1%	0.0%

( ) = negative, Acc = audited accounts, BE = budget estimate, FY = fiscal year, GDP = gross domestic product, Proj = projected, RE = revised estimate, TRR = total revenue receipts.

Source: Government of Karnataka. 2019. [Medium Term Fiscal Plan, 2019–2023](#). Bengaluru.

<sup>8</sup> Government of Karnataka. 2019. [Medium Term Fiscal Plan, 2019–2023](#). Bengaluru.

<sup>9</sup> Government of Karnataka. 2020. [Budget 2020–21](#). Bengaluru.