

FINANCIAL ANALYSIS

1. The 2010 financial analysis conducted for the current project¹ was used as a basis and updated for preparing the financial analysis for the proposed additional financing for the Ha Noi Metro Rail System Project (Line 3: Nhon–Ha Noi Station Section). The revised analysis took into account (i) the 2015 updated capital costs, (ii) the updated construction schedule, and (iii) and the dong–Euro-US dollar exchange rates. The updated financial analysis concludes that the project is not financially viable. The financial internal rate of return (FIRR) is –1.22%, with a weighted average cost of capital (WACC) of 0.70%. Based on projected fare revenues, the project is expected to require a total subsidy over its life of \$709 million to remain sustainable. The subsidies are projected to peak at \$81.6 million in 2020 and to decline afterward.

A. Original Financial Analysis

2. **Assumptions.** The original analysis estimated the FIRR for the period 2010-2039 (five years implementation plus 25 years of operation). The estimate took into account the project costs, which comprised of the capital investment and the cost to operate the metro line and carry out routine preventive maintenance (operation and maintenance [O&M] cost). In the context of the FIRR analysis, the initial investment cost included the base cost plus physical contingencies. In addition to the initial investment cost, the analysis took into account investments in additional rolling stock and renewal or replacement of exhausted or expired assets during the 30-year period. The financial projections were in nominal terms, with the domestic and foreign inflation rates based on the ADB forecast. A corporate income tax rate of 25%, based on the government tax law, was assumed to apply. Also, a value-added tax of 10% was applied to all items, including fare rates, except resettlement cost and some general items of incremental administration. An average fare per boarding of D3,282 (2009 constant prices) was assumed for 2016, the first year of operation. Fare rates were assumed to be indexed to domestic inflation, and to increase in real terms based on forecast per capita income growth in Ha Noi. The annual O&M cost were derived from engineering estimates and represented the annual metro running cost plus recurrent maintenance. Assets were assumed to be replaced at the end of their economic life, with a capital spending allowance after 15 years. Depreciation was taken in a straight line over the economic life of the assets as follows: 100 years for underground civil structure; 50 years for above ground civil structure; 30 years for track, power system, and rolling stock; 15 years for other equipment; and no depreciation for land.

3. **Subsidy.** Operating cost, but not capital cost, was anticipated to be covered by fare revenue: the farebox recovery ratio was slightly below 1 during 2015–2016 but thereafter equals or exceeds 1². The project was anticipated to require a total subsidy over the project life of \$935 million. With the subsidy included, the analysis showed a FIRR of 3.2%. Financial statements were estimated based on the assumption that a project debt-service coverage ratio of 1.2 (operating profit before interest, corporate income tax, depreciation, and amortization plus annual subsidy, all divided by debt service) would be maintained until the loans have been fully repaid. Thus, subsidies have to meet any farebox recovery shortfall, equipment and systems

¹ ADB. 2008. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Loan to the Socialist Republic of Viet Nam for the Ha Noi Metro Rail System Project (Line 3: Nhon – Ha Noi Station Section)*. Manila.

² Defined as fare revenue divided by O&M cost, this is a standard industry measure of Ha Noi Metro system's ability to recover costs out of its main-source revenue. A farebox-ratio below 100% indicates that a system is not recovering operating cost, and hence requires an operating subsidy, as well as a capital subsidy. Long-established operating rail metro systems in North America, the United Kingdom, and Japan still depend on a capital subsidy.

refurbishment and replacement cost, required additions to the rolling stock fleet, and repayment of loan principal and interest. The project showed a consistent recovery of annual operating cost out of fare revenue, beginning with the second year of operation.

4. To examine the financial sustainability of the Metropolitan Railway Management Board (MRB)³, projected financial statements were prepared of the MRB as the sole investor in the metro line, based on (i) assumed central budget spending for construction of infrastructure, consultancy and contingencies; (ii) a subloan from Ministry of Finance for O&M systems, rolling stock, station operation, and depot; (iii) a projection period of 2010–2014 (construction) plus 25 years (2015–2039) of operation; (iv) subloan terms; and (v) provision by Ha Noi People's Committee (HPC)⁴ of the input equity. In addition, HPC was required to provide annual cash support to MRB throughout the assessment period in the range of \$19.7 million to \$61.5 million, with peaks in 2020–2021. The HPC's financial support to MRB over the entire period is \$597 million, and the subloan is repaid in 2045. On this basis MRB was expected to be financially sustainable as an investor in the project on behalf of HPC.

5. **Results.** The original financial analysis anticipated that a total subsidy over the project life of \$935 million and HPC's financial support of \$597 million would be required. The project showed a consistent recovery of annual operating cost out of fare revenue, beginning with the second year of operation. The WACC of 1.5% was calculated in real terms by removing the effect of domestic and foreign inflation. The free cash flow in real terms—including capital expenditure on equipment renewal, and additional rolling stock to serve expected demand growth, and including the subsidy—yields an after-tax FIRR of 3.2%, which is above the 1.5% WACC. The net present value of the after-tax cash flows including subsidy, when discounted at WACC, was \$281 million. The analysis, however, concluded that if the urban public transport system optimization would not materialize, the starting year daily fare revenue would drop by 40%, and HPC's financial support would increase to \$830 million, up 35% from the base case, which would constitute a substantial increase in the subsidy burden on the central government.

B. Updated Financial Analysis

6. **Assumptions.** Due to the delays in project implementation the FIRR was estimated for 2009–2044 (10 years of implementation, and 25 years of operation). The estimate took into account the same costs as the original analysis but in 2015 prices. The updated financial analysis made the following updates to the original analysis:

- (i) The base year for cost comparison shifted to 2015 from 2009;
- (ii) The projections are in nominal terms, with domestic inflation set at the International Monetary Fund forecast of 5.7% from 2015 onward⁵;
- (iii) The analysis assumed a rate of increase in Metro Line 3 fares during the 25 year analysis period of 5.5% per year in nominal currency. This increase is less than the estimated average dong inflation over that period⁶;

³ The Ha Noi Metropolitan Railway Management Board (MRB), was established by HPC to carry out implementation of those portions of the Ha Noi Metro Rapid Transit (MRT) network not directly operated by Viet Nam Railways.

⁴ The Ha Noi People's Committee is the city government of greater Ha Noi.

⁵ The domestic inflation rate was adjusted to reflect an estimated depreciation of the local currency against the Euro, which is based on the average change in the exchange rate from 2010 to 2015. The external inflation rate was taken from European Central Bank estimates of 1.0%–1.8% per annum.

⁶ This reflects actual operation where fares lag inflation because of government's sensitivity to fare increase on the poor.

- (iv) The dong GDP growth rate over the analysis period has been estimated at 4.5% after opening of line 3 in 2020 in line with real GDP growth of 4.5%⁷;
- (v) All capital costs were updated based on cost estimates prepared by the detailed design and project implementation consultant. The costs and revenue figures are based on 2015 prices and currency exchange rates;
- (vi) The inputs for the WACC for the overall project were revised from those used for the estimate for the current project. The original bond financing rate of 9.0% was raised to 10.2%, based on current rates. The deduction for business tax of 25% from the equity portion of the WACC was removed. The original estimate of domestic inflation was reduced by the adjustment for inflation contained in the dong–US dollar exchange rate. This increased the domestic equity real interest rate equivalent to 6.27%. However, the WACC fell to 0.7% from 1.3%. The project is being financed in US dollars by ADB and in euros by the co-financing institutions, with counterpart funding provided by the Government of Viet Nam in dong. Rates used and the calculation of the WACC are shown in Table 1⁸.

Table 1: Weighted Average Cost of Capital Calculation⁹

Source	Amount 2015 (\$ million)	Weight (%)	Nominal Cost (%)	Corporate Tax rate (%)	Tax- adjusted Nominal Cost (%)	Inflation Rate (%)	Real Cost (%)	Composite Cost (%)
ADB (OCR) loan	357.8	28.00	2.40	25.00	1.80	1.50	0.30	0.08
ADB (CTF) loan	50.0	4.00	0.43	25.00	0.32	1.50	0.00	0.00
AFD loan 1	76.8	6.00	0.25	25.00	0.19	1.50	0.00	0.00
AFD loan 2	122.3	10.00	0.00	25.00	0.00	0.00	0.00	0.00
DGT loan 1	278.0	22.00	1.90	25.00	1.43	1.50	0.00	0.00
DGT loan 2	94.5	8.00	0.00	25.00	0.00	0.00	0.00	0.00
EIB loan 1	81.2	6.00	2.40	25.00	1.80	1.50	0.30	0.02
EIB loan 2	77.8	6.00	0.25	25.00	0.19	1.50	0.00	0.00
GOV Bonds	0.0	0.00	10.20	25.00	7.65	3.70	3.81	0.00
GOV / counterpart funding	120.0	10.00	10.20		10.20	3.70	6.27	0.60
Total	1,258.0	100.00						
Weighted Average Cost of Capital (WACC)								0.70

ADB = Asian Development Bank, OCR = ordinary capital resources, CTF = Clean Technology Fund, AFD = Agence Française de Développement, DGTresor = Direction Générale du Trésor, EIB = European Investment Bank
Source: ADB estimates

7. **Subsidy.** The updated analysis estimated that the opening day fare in 2020 will be equivalent to \$0.22 in constant 2015 currency and \$0.30 in inflated currency. In the updated analysis base case, with the project's full capital cost included, the fare box recovery ratio will be 1.18 in 2022 thereby providing a contribution to the coverage of capital cost. The project is

⁷ A GDP growth rate of 4.5% is conservative since the potential exists for Viet Nam to post a higher growth rate than this over the long term. Asian Development Bank (ADB) and private analysts estimate that Viet Nam's real average annual GDP growth rate during 2015–2020 may be 6%–7%.

⁸ The values used for the overall investment reflect the actual calculated cost as of 1 May 2015. This included the actual contract values for the first five contracts, including those for the underground stations and line. It included the estimates by the project management consultant for the costs of the remaining four contracts, which are mainly for equipment and not subject to large cost variations. This estimate was based on an exchange rate of €1=\$1.1. It also included contingency costs of about \$175 million.

⁹ The current funding commitments total about \$1.376 billion, but the current estimated total cost is \$1.258 billion. The difference reflects a gap between the approved upper limits of funding for local counterpart costs of \$242.2 million and the current estimated local cost requirements of \$120.0 million.

expected to need total subsidies to cover its capital costs of \$709 million over its lifetime. When no subsidy was taken into account, the analysis showed an FIRR of (1.22%), with a net present value of (\$503 million). The sensitivity analysis showed that an increase in the capital investment cost of 10% would result in a FIRR of (1.37%). Table 2 provides a summary of the sensitivity analysis.

Table 2: Sensitivity Analysis

Scenario	FIRR (%)	NPV (\$ million)
Base case	(1.22)	(503)
10% increase in capital investment	(1.37)	(624)
10% increase in O&M cost	(1.55)	(583)
10% decrease in revenue	(1.74)	(625)

() = indicates a negative value, FIRR = financial internal rate of return, NPV = net present value, O&M = operation and maintenance.

Source: ADB estimates

8. The project base case assumed that HPC will have reorganized the city's bus routes by the time the new Metro Line Line 3 starts operating, to link the bus lines with the Metro and optimize the benefits from the overall public transport system. If bus routes reorganization does not materialize, the starting year daily patronage and fare revenue estimates are expected to achieve only 60% of those used for the base case. Under this scenario, the FIRR declines to (3.61%) with a financial net present value of (\$1,020 million). The estimated total subsidy required should bus reorganization not be implemented is \$1.476 billion.

9. Updated projected financial statements of MRB were prepared to reassess its financial sustainability. The updated financial statements indicate that financial support from HPC to MRB will be needed until 2044. In nominal terms, the highest annual financial support from HPC to MRB is forecasted to be \$75.5 million in 2020. It declines thereafter. As an indication of relative magnitude and therefore affordability, this can be compared with the HPC's annual development expenditure and forward budget, which was equivalent to almost \$1,000 million in nominal value during 2011–2014 and is projected to remain at about the same level from 2014 onward. The financial statements analysis determined that (i) central budget grants would total \$457 million in 2019, and (ii) HPC equity in MRB would reach a maximum of \$1,406 million in 2044. The FIRR calculations of the project for the period 2009-2044 and financial statements of the project and MRB prepared for the period 2009-2044 are shown in the supplementary annexes to the linked documents.

10. **Results.** The project is expected to require a subsidy equivalent to a total of \$709 million between 2018 and 2033. This is based on an assumption that the project debt service coverage ratio will be maintained at 1.2 times until the project loans, including the additional financing, have been fully repaid. At a fare of \$0.30 per boarding in 2020, the analysis showed the project consistently recovering annual maintenance and operating costs from fare revenue beginning in the second year of operation. The free cash flow in real terms, including the subsidy and capital expenditure on equipment renewal and additional rolling stock to serve expected demand growth, yields an after-tax FIRR of (1.22%), below the 0.70% WACC. The need for the HPC to carry out its commitment to reorient the bus service so that it links effectively with the metro lines is critical to the metro system's financial sustainability. Without this reorganization of bus lines, the financial performance of the metro is expected to deteriorate with poor fare box recovery, and the overall subsidy requirement is forecast to rise to \$1,476 million. In addition to the physical reorientation of the bus lines, HPC needs to undertake a more comprehensive analysis of the tariffs for all public transport modes before the line 3 goes into service.