

FINANCIAL ANALYSIS

A. Financial Analysis

1. **Scope of the analysis.** Financial analysis was undertaken in accordance with Asian Development Bank (ADB) guidelines on the *Financial Management and Analysis of Projects*.¹ The analysis covered subprojects other than technical assistance that will (i) be partly or wholly financed from the proceeds of the ADB loan and (ii) generate incremental revenue. These are (i) the expansion of piped sewerage systems in Medan and Yogyakarta and (ii) the construction of decentralized wastewater-treatment plants in low-cost housing complexes in Medan.

1. Financial Analysis of Piped Sewerage Subprojects

2. **Subproject cost estimates.** The cost of expanding the piped sewerage systems as proposed is estimated at Rp229.8 billion in Medan and Rp119.2 billion in Yogyakarta, in constant April 2010 prices. These amounts include taxes, duties, and physical contingencies but not price contingencies, interest during construction, or other financing charges. The construction of the ADB-financed portion of the expansion will commence in 2010. The Medan system will be completed in December 2013, the system in Yogyakarta 1 year later. The residual value of the systems is estimated at 10% of the total construction cost, to be realized at the end of the final year of the 20-year operational period of 2010–2029.

3. **Incremental net cash flows.** These consist of revenue from the sale of house connections and revenue from monthly sewerage charges, net of operating expenditure.

4. **Revenue from the sale of house sewerage connections.** PDAM Tirta Nadi, the provincial water utility that operates the piped sewerage system in Kota Medan, offers sewerage connections in 12 monthly installments, the amount of which varies by customer group. In 2009, the highest applicable charge was Rp320,000. No data on connection charges were available for Yogyakarta, which are based on actual construction cost. Projected revenue from the sale of house connections was based on the following assumptions:

- (i) PDAM Tirta Nadi continues to charge a fee of Rp320,000 in real terms for each newly installed connection (i.e., PDAM will adjust its charge for price inflation);
- (ii) the connection charge is equal to the installation cost borne by PDAM;
- (iii) all connections are assumed to begin generating revenue at the end of the year in which they are added to the system; and
- (iv) these assumptions also apply to the Department for Regional Infrastructure and Settlements of Yogyakarta, which operates the piped sewerage system in Yogyakarta.

5. **Revenue from monthly sewerage charges.** PDAM Tirta Nadi applies a surcharge to the water bill of customers residing in the service area of its off-site sewerage system. It is assumed that the PDAM will maintain existing sewerage charges, which currently fully cover its operation and maintenance (O&M) expenditure, at its 2008 level of Rp264,000 per connection per year throughout the projection period. In contrast, the Department for Regional Infrastructure and Settlements of Yogyakarta covered only 20% of the O&M expenditure of its

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

sewerage system in 2008.² For these reasons, a series of improvements to the existing structure of off-site sanitation charges in Yogyakarta were proposed:

- (i) Increase off-site sanitation charges to cover 100% of O&M expenditure by mid 2014 at the latest, subject to affordability limits estimated as 2.0% of monthly disposable household expenditure (in April 2009, Yogyakarta issued a bylaw stipulating a substantial increase in wastewater charges).³
- (ii) Increase charges once every 2 years, starting in 2013, to compensate the Department for Regional Infrastructure and Settlements of Yogyakarta for general price inflation in the intervening period.
- (iii) Prepare and implement a revenue-improvement action plan to increase collection efficiency from the current 80% to 98% (already achieved by PDAM Tirta Nadi) by 2013.

6. These assumptions result in an average charge, expressed in April 2010 prices, of Rp113,000 per connection per year by the end of 2012, or Rp9,400 per month. This is far lower than tariffs in Medan but, at the same time, represents a 100% increase over the current average sewerage charge of Rp4,650 per connection per month or Rp55,700 per year, which is already substantially higher than the average connection charge of Rp774 per month that was collected before the issuance of the new bylaw.

7. **Operating expenditure (sewerage).** The piped sewerage systems of both Medan and Yogyakarta have substantial excess capacity, with current utilization rates at 50%. For this reason, it was deemed unnecessary to increase the capacity of the off-site treatment facility. This means that incremental operating expenditure applies only to expenditures that vary with the number of households connections. It was assumed that these variable expenditures remain constant in real terms throughout the projection period. City-specific estimates are as follows:

- (i) **Medan.** In 2008, variable expenditure per connection was estimated at Rp86,000 per year, consisting of electricity expenditure and a portion, estimated at 25%, of other operational expenditure.⁴
- (ii) **Yogyakarta.** Based on the same assumptions, the variable operating expenditure per connection was estimated at Rp68,000.

8. The after-tax financial internal rate of return (FIRR) of the Medan and Yogyakarta subprojects is estimated at below the weighted average cost of capital (WACC) of about 2.5%. This suggests that the subprojects' financial feasibility requires external financial assistance, which is proposed in the form of capital grants financed by the Directorate General of Human Settlements (DGHS).

9. **Financing of operating expenditure.** In Medan, PDAM Tirta Nadi already covers the operating expenditure of its existing sewerage system from the cash flow of its wastewater service charges and will need only a 10% weighted average increase in sewerage tariffs at the end of 2012 to maintain an O&M cost recovery rate of at least 100% throughout the project implementation period (Table 1). Yogyakarta expects to achieve full coverage of O&M

² At that time, the system was managed by the Department for the Environment of Yogyakarta. At the end of 2008, the city transferred responsibility for managing the wastewater system to the Department for Regional Infrastructure and Settlements.

³ *Peraturan Daerah Kota Yogyakarta Nomor 7 Tahun 2009 tentang Retribusi Pengelolaan Air Domestik.* This bylaw increases the lowest monthly household wastewater charge from Rp500 to Rp3,000.

⁴ The resulting operating margin of Rp178,000 (Rp264,000 less Rp86,000) reflects PDAM Tirtanadi's ability to utilize its spare capacity at a low incremental cost. It also reflects the capital-intensive nature of piped sewerage systems. Even at this considerable margin, PDAM will still not cover the full cost of the system.

expenditure by the end of 2012 (Table 2). Until then, the city government has committed itself to financing any operational deficits from its own resources. The expected operational deficits are less than 1% of total available cash (defined as revenue over obligatory expenditure) that the city is projected to have at its disposal. To maintain its O&M cost recovery rate above 100% until 2015, Yogyakarta would need to increase its weighted average sewer charges by at least 50% at the end of 2012.

Table 1: Operation and Maintenance Cost Recovery for Off-Site Sanitation in Medan, 2010–2015
(Rp billion)

Item	2010	2011	2012	2013	2014	2015
Revenue from service charges ^a	3.02	3.82	4.82	5.30	5.30	5.30
Operating expenditure	2.61	2.87	3.37	4.01	4.81	5.14
Net cash from operations	0.41	0.95	1.45	1.29	0.48	0.16
O&M cost recovery rate ^b (%)	116	133	143	132	110	103

O&M = operation and maintenance.

^a Assuming an increase of 10% in weighted average sewer charges effective by the end of 2013.

^b Revenue from service charges divided by operating expenditure.

Source: Asian Development Bank.

Table 2: Operation and Maintenance Cost Recovery for Off-Site Sanitation in Yogyakarta, 2010–2015
(Rp billion)

Item	2010	2011	2012	2013	2014	2015
Revenue from service charges ^a	0.80	1.89	2.27	3.40	3.40	3.40
Operating expenditure	1.76	1.94	2.22	2.66	3.14	3.35
Net cash from operations	(0.96)	(0.05)	0.04	0.74	0.26	0.05
O&M cost recovery rate ^b (%)	45	97	102	128	108	101

O&M = operation and maintenance.

^a Assuming an increase of 50% in weighted average sewer charges effective by the end of 2013.

^b Revenue from service charges divided by operating expenditure.

Source: Asian Development Bank.

2. Financial Analysis of On-Site Sewage Treatment Facilities

10. **Overview.** The DGHS will utilize part of the ADB loan to finance the construction of two decentralized wastewater-treatment plants, both in Medan. Each plant will process the wastewater of a single twin block (a low-rise building able to accommodate 96 families). Decentralized wastewater-treatment plants are recommended for two reasons: (i) they are inexpensive to construct, and (ii) maintaining the plants does not require special skills and is inexpensive. The latter is important, as twin blocks are designed for low-income households, who will need to finance O&M. The financial analysis presented here applies to a single decentralized wastewater treatment plant, to be constructed in 2010.

11. **Subproject cost estimate.** The construction cost of a decentralized wastewater-treatment plant, expressed in April 2010 prices, is estimated at Rp536 million. The residual value of the plant is estimated at zero at the end of 20 years of operation, from 2010 to 2029.

12. **Incremental net cash flows.** These consist of revenue from semiannual sewerage charges, net of desludging expenditure. It is estimated that each decentralized wastewater

treatment plant will need to be emptied every 6 months by one or more sludge-collection trucks with a combined capacity of 6 cubic meters. Apart from the collection charges, no financial expenditures are associated with the O&M of the plants. For reasons of efficiency and distributive justice, it is proposed to collect tariffs for sludge collection twice a year from families who lived in the twin block during the past 6 months. The required contribution would be Rp4,700 per family per desludging event (Table 3).

Table 3: Operation and Maintenance Cost Recovery Tariffs of Decentralized Wastewater Treatment Facilities

Item	Medan
Annual sludge collection charge (Rp) ^a	900,000
Number of families	96
Tariff per family (Rp/6 months)	4,700

^a Based on a 6-month collection cycle.

Source: Asian Development Bank.

13. **Weighted average cost of capital.** The construction of the decentralized wastewater-treatment plants will be fully financed by the ADB loan, whose WACC was estimated at 2.4%.

14. **Financial net present value and financial internal rate of return.** The after-tax FIRR of a decentralized wastewater-treatment plant is not defined, because collection charges were set to cover O&M expenditure (i.e., the subproject generates zero net revenue). The financial net present value, discounted at the WACC of 2.4%, of an individual plant is estimated at minus Rp536 million,⁵ or a total financial net present value of minus Rp1.1 billion (2 × Rp536 million). This means that the on-site sewage treatment plants are not considered financially feasible and should be implemented only to capture the economic benefits associated with them.

⁵ The net present value is equal to the construction cost, because desludging charges were set to precisely cover the expenditure thereof, which causes a zero net present value of financial benefits.