

**Water Utility: Perbadanan Bekalan Air Pulau Pinang Sdn. Bhd (PBAPP)**

Penang, Penang, Malaysia

**Contact Details:** Strategic Planning Manager: Kan, , Cheong Weng  
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**Services Provided:** Piped water, , , ,

**Utility Type:** , , , , Joint ownership, ,

**Private Sector Involvement:** , Service Contract, , Lease Contract, , ,

**Source of Raw Water:** , Storage reservoir/impoundment, Direct river abstraction, ,

**Treatment Method:** , Disinfection, Filtration, Flocculation and sedimentation, Aeration, , Other: Dissolved Air Flootation

**Water Supply System description:**

|  |  |   |  |   |  |
|--|--|---|--|---|--|
| Production capacity = 1,166,000 m3/day                         |  | Distribution network = 3,407 km                   |  | Storage capacity = 430,324 m3                 |  |
| Area (sq km)   |  | Area of Responsibility                            |  | Present Service Area                          |  |
| Population   |  | 1,416,900   |  | 1,416,900                                     |  |
| No. of Towns =   |  | Population served = 1,416,064                     |  |   |  |
| <u>No. of connections:</u>                                     |  | Domestic (Households) = 356,628                   |  | Non Domestic = 46,149                         |  |
| Typical service connection length = 20 m                       |  | Connections with operating meter = 402,777        |  |   |  |
| System input volumes: Produced by W.U. = 277.0 million m3/year |  | Bulk water imported = 6.0 million m3/year         |  |   |  |
| Water consumption: Metered cons. = 223.4 million m3/year       |  | % Unmetered cons. = 5% of metered cons.           |  | Ave. meter inaccuracy = 5% of metered cons.   |  |
| Water Sales: Domestic = 133.0 million m3/year                  |  | Non Domestic = 85.8 million m3/year               |  | Bulk Water sales = 4.6 million m3/year        |  |
| <u>System Performance:</u>                                     |  | No. of connections with intermittent supply = N/A |  | Typical duration of supply = 23.9 hours / day |  |
| Chlorine Residuals: Tests required = 3,450 / year              |  | Tests carried out = 3,380 / year                  |  | Tests passed = 3,361 / year                   |  |

**Human Resources (Staff)**

|  |  |                              |  |
|--|--|------------------------------|--|
| <u>Type of employment:</u> , Permanent staff. with contract, , , , Other: Permanent staff - salaried employees |  |                              |  |
| <u>No. of staff (FTE):</u> Corporate Services = 179  |  | Water Supply = 847           |  |
| Other = zero   |  | Total = 1,026                |  |
| <u>Staff Training:</u> No. Trained = 1,026 / year  |  | Training days = 2,052 / year |  |
| Training costs = 0.40% of total operating budget   |  |                              |  |

**Customer information**

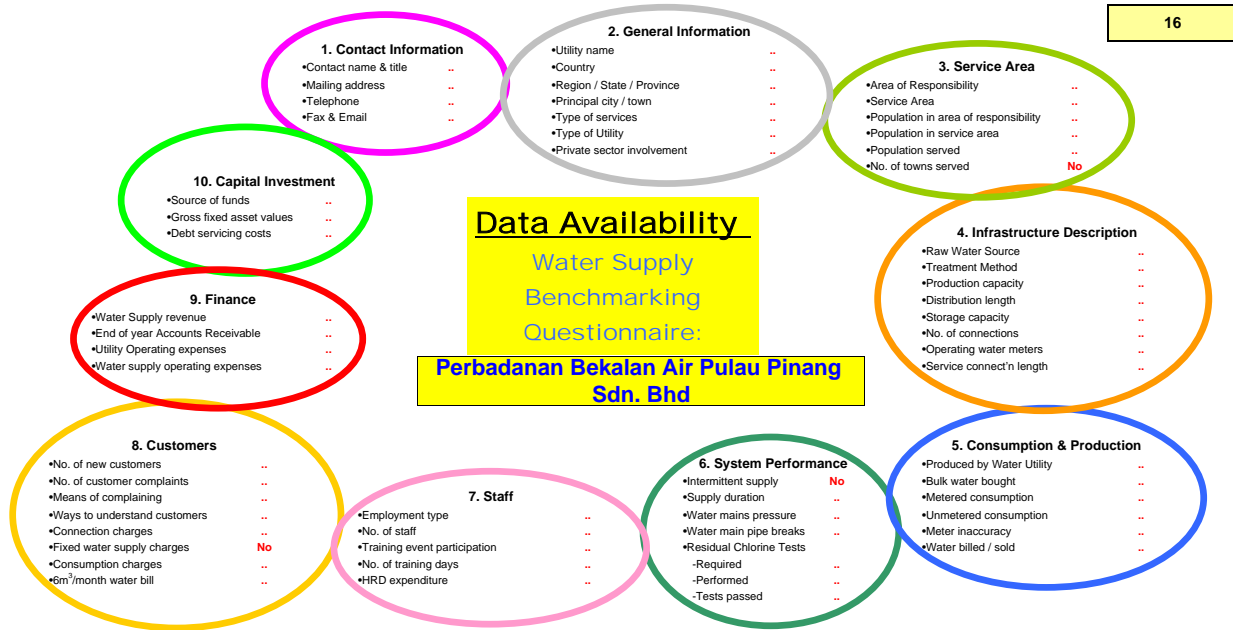
|  |  |                                     |  |
|--|--|-------------------------------------|--|
| Customer interaction: New connections = 27,676 / year  |  | Customer complaints = 49,317 / year |  |
| Complaint method: In person, By telephone, By email, By letter, Other method: PBAPP website                                  |  |                                     |  |
| Understanding customers by: Customer interactions, Responding to complaints, Surveys, questionnaires, etc., Market research. |  |                                     |  |

**Charges & Fees**

|  |                               |   |                |   |                     |
|--|-------------------------------|---|----------------|---|---------------------|
| <u>Typical connection charge:</u>  |                               | Domestic = 1,000MYR / conn.<br>(263 US\$ / conn.) |                | Non Domestic = 6,000MYR / conn.<br>(1,579 US\$ / conn.) |                     |
| <u>Fixed water charge:</u>   |                               | Domestic = N/A                                    |                | Non Domestic = N/A                                      |                     |
| Bulk water sales = N/A   |                               | N/A   |                | N/A   |                     |
| <u>Water consumption tariff</u> (typical of all towns and in each category): |                               |   |                |   |                     |
|  |                               | Tariff Block 1                                    | Tariff Block 2 | Tariff Block 3  | Tariff Block 4      |
| Domestic   | From - To (m <sup>3</sup> )   | 0 - 20  | 20 - 40        | 40 - 60   | >60                 |
|  | Price (MYR / m <sup>3</sup> ) | 0   | 0              | 1   | 1                   |
|  | (US\$ / m <sup>3</sup> )      | \$0.06  | \$0.11         | \$0.14  | \$0.25              |
| Non Domestic   | From - To (m <sup>3</sup> )   | 0 - 20  | 20 - 40        | 40 - 200  | >200                |
|  | Price (MYR / m <sup>3</sup> ) | 1   | 1              | 1   | 1                   |
|  | (US\$ / m <sup>3</sup> )      | \$0.14  | \$0.18         | \$0.24  | \$0.26              |
| Bulk Water   | From - To (m <sup>3</sup> )   |   |                |   |                     |
|  | Price (MYR / m <sup>3</sup> ) | 2   |                |   |                     |
|  | (US\$ / m <sup>3</sup> )      | \$0.42  |                |   |                     |
| Water bill for household consuming 6 m <sup>3</sup> /month =                 |                               |   |                | 2 MYR / month   | (0.54 US\$ / month) |

**Finances**

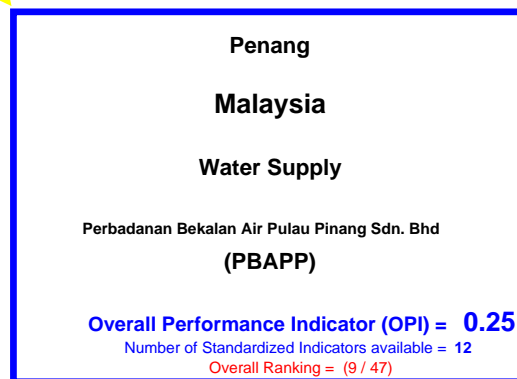
|  |               |                     |                       |                |                      |
|--|---------------|---------------------|-----------------------|----------------|----------------------|
| <u>Revenue:</u>  |               |                     |                       |                | Year end Accounts    |
|  | Water Sales   | Other water related | Subsidies & grants    | Total          | Receivable           |
| MYR / year   | 141,125,106   | 22,708,527          | zero                  | 163,833,633    | 19,556,642           |
| US\$ / year  | \$37,146,495  | \$5,977,265         | zero                  | \$43,123,760   | \$5,147,636          |
| <u>Operating Expenses:</u>   |               |                     |                       |                |                      |
|  | Water supply  | Other services      | Company Overhead      | Total          |                      |
| MYR / year   | 89,703,665    | zero                | 23,150,558            | 112,854,223    |                      |
| US\$ / year  | \$23,611,509  | zero                | \$6,093,615           | \$29,705,124   |                      |
| <u>Water Supply Operating breakup:</u>   |               |                     |                       |                |                      |
|  | Labor         | Electricity         | Chemicals & materials | Contracted out | Other expenses       |
| MYR / year   | 26,257,667    | 22,285,605          | 5,473,222             | zero           | 35,687,171           |
| US\$ / year  | \$6,911,458   | \$5,865,945         | \$1,440,644           | zero           | \$9,393,462          |
| <u>Investment funds source:</u> Own internal funds, , , , , Other method: Loan from Government |               |                     |                       |                |                      |
| <u>Fixed Assets value:</u>   |               |                     |                       |                | Debt Servicing Costs |
|  | Water supply  | Other services      | Company Overhead      | Total          |                      |
| MYR  | 502,637,799   | zero                | 32,374,577            | 535,012,376    | 15,233,673           |
| US\$   | \$132,302,699 | zero                | \$8,521,532           | \$140,824,231  | \$4,009,758          |



## Calculation of Overall Performance Indicator (OPI)

| Customer Indicators                           | Value  | Rank      |
|---|--------|-----------|
| Service Coverage in existing service area (%) | 99.9%  | (8 / 45)  |
| Meter coverage (% with operating water meter) | 100.0% | (1 / 46)  |
| Customer complaints / 1000 connections        | 122.4  | (16 / 41) |

| Water Supply Systems O&M                         | Value | Rank      |
|--|-------|-----------|
| Supply Continuity (% of time water available)    | 99.4% | (35 / 47) |
| Residual Chlorine tests passed (%)               | 99.4% | (14 / 34) |
| Total Unmetered Consumption (% of metered cons.) |       |           |
| Infrastructure Leakage Index [ILI]               | 9     | (10 / 26) |



| Human Resource Indicators                             | Value | Rank      |
|---|-------|-----------|
| Total water related staff / 1000 connections          | 2.5   | (4 / 38)  |
| Investment in staff training (days / staff)           | 2     | (9 / 33)  |
| Ave. cost of employment / staff (% of per capita GNI) | 178%  | (30 / 37) |

| Financial Indicators  | Value  | Rank      |
|---|--------|-----------|
| Operating Cost Coverage (water sales only)                              | 1.25   | (17 / 43) |
| Unit water cost (US\$ / m <sup>3</sup> of system input)                 | \$0.11 | (21 / 43) |
| Water system asset value / Prod'n capacity (US\$ / m <sup>3</sup> /day) | \$113  | (18 / 35) |
| Debt servicing ratio (% of total operating revenue)                     |        |           |

**Financial Indicators: Annual expenses & revenue**

| Operating Cost Coverage  |      | Expenses  |   |
|--|------|---|---|
| Operating Cost Coverage (water sales only)                       | 1.25 | Overhead expenses / Total Operating expenses ratio          | 0.21  |
| Operating Cost Coverage (total revenue)                          | 1.45 | Labour costs / Water operating expenses                     | 0.29  |
|  |      | Electricity costs / Water operating expenses                | 0.25  |
|  |      | Chemical & other materials costs / Water operating expenses | 0.06  |
|  |      | Contracted out services costs / Water operating expenses    | 0.00  |
| Revenue  |      | Unit water cost   | (US\$ / m <sup>3</sup> of metered cons.) 0.13 |
| Water sales revenue / Total revenue ratio                        | 0.86 |   | (US\$ / m <sup>3</sup> of system input) 0.11  |
| Subsidies & Grants / Total revenue ratio                         | 0.00 |   |   |
| Revenue Collection period (months)                               | 1.66 | Debt servicing ratio (% of total operating revenue)         | 9.3%  |
| Unit water price - ave. (US\$ / m <sup>3</sup> of metered cons.) | 0.16 |   |   |

**Fixed Assets**

|  |      |
|--|------|
| Corporate Fixed Assets / Total Fixed Assets                | 0.06 |
| Water system asset values                                  |      |
| Asset value / Total water related assets                   | 0.94 |
| Asset value / Prod'n capacity (US\$ / m <sup>3</sup> /day) | 113  |
| Asset value / pipe length (US\$ / m. pipe)                 | 39   |
| Asset value / Customer (US\$ / conn.)                      | 328  |

**System Input**

|   |       |
|---|-------|
| Production capacity utilization (%)   | 65%   |
| Bulk water imported (% of total system input)                                 | 2%    |
| System Input Rate (litres/person/day)   | 539   |
| (m <sup>3</sup> /connection/month)  | 58.0  |
| System Input / Distribution ratio (m <sup>3</sup> /day per km pipe)           | 228.0 |
| System Input / Storage ratio (m <sup>3</sup> /day per m <sup>3</sup> storage) | 1.8   |
| Supply Continuity (% customers with continuous supply)                        | 100%  |
| Supply Continuity (% of time water available)                                 | 99%   |

## Penang Malaysia Water Supply

Perbadanan Bekalan Air Pulau  
Pinang Sdn. Bhd  
(PBAPP)

OPI Ranking = 9 / 47

**Human Resource Indicators**

| Human Resource Utilisation                      |       | Human Resource Development                                |       |
|---|-------|---|-------|
| Overhead staff ratio (% of total FTE staff)     | 17%   | Staff Training participation rate (% staff)               | 100%  |
| Water supply staff ratio (% of total FTE staff) | 83%   | Staff Training duration rate (days / staff)               | 2.0   |
| Total water related staff / 1000 connections    | 2.50  | Investment in staff training (% of direct labour costs)   | 1.37% |
| Direct water supply staff                       |       | Investment in staff training (% of total operating costs) | 0.40% |
| Staff / 1000 connections                        | 2.10  | Human Resources Costs                                     |       |
| Staff / 1000 m <sup>3</sup> /day system input   | 1.10  | Ave. cost of employment / staff (% of per capita GNI)     | 1.78  |
| Staff / 100 km of pipework                      | 24.90 | Contracting out services / in-house Labour costs ratio    | 0.00  |

**Distribution**

|  |      |
|--|------|
| Distribution / customer (m. pipe per connection)               | 8.5  |
| Storage / customer (m <sup>3</sup> per connection)             | 1.10 |
| Residual Chlorine  |      |
| Sampling compliance (%)  | 98%  |
| Tests passed (%)   | 99%  |
| Non Revenue Water (UFW)  |      |
| % of System Input  | 21%  |
| m <sup>3</sup> / km / day                                      | 47.9 |
| m <sup>3</sup> / connection / day                              | 0.41 |
| NRW adjusted for continuous supply (% of System Input)         | 21%  |
| Unbilled Authorized & Unauthorized Cons. (% of metered cons.)  | 0%   |
| Unmetered cons. due to meter inaccuracies (% of metered cons.) | 5%   |
| Total Unmetered Consumption (% of metered cons.)               | 5%   |
| Infrastructure Leakage Index [ILI]                             | 9.00 |
| Mains failures ratio (breaks / km pipe / year)                 | 0.50 |

**Water consumption**

|  |        |
|--|--------|
| Bulk water exported (% of total metered cons.)       | 2%     |
| Average domestic water charges (% of per capita GNI) | 1%     |
| Metered consumption rate                             |        |
| - Domestic (litres/person/day)                       | 257    |
| - Total Cons. (litres/person/day)                    | 423    |
| (m <sup>3</sup> /conn/month)                         | 45     |
| Total consumption - metered & unmetered              |        |
| (litres/person/day)                                  | 445.00 |
| (m <sup>3</sup> /conn/month)                         | 48.00  |
| Domestic share of total metered consumption (%)      | 60%    |
| Non Domestic share of total metered consumption (%)  | 38%    |

**Demography**

| Average town / city size (persons / town)                    | #N/A  |
|--|-------|
| Population density in area of responsibility (persons/sq.km) | 1,374 |
| Population density in existing service area (persons/sq.km)  | 1,374 |
| Average Household size (persons / domestic connection)       | 4     |
| Customer Interactions  |       |
| Customer complaints / 1000 connections                       | 122   |

**Connections**

|   |      |
|---|------|
| Service Coverage in area of responsibility (%)    | 100% |
| Service Coverage in existing service area (%)     | 100% |
| Domestic / Non-Domestic connections ratio         | 7.7  |
| Domestic / Non-Domestic consumption rate ratio    | 1.5  |
| New connection growth rate (% / year)             | 7%   |
| New domestic connection cost (US\$ / connection)  | 263  |
| New domestic connections (% of per capita GNI)    | 2%   |
| Meter coverage (% with operating water meter)     | 100% |
| Billed unmetered consumption (% of metered cons.) | 0%   |

# Water Sales & Production Information

Perbadanan Bekalan Air Pulau Pinang Sdn. Bhd

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**Water Production**  
277,000,000 m3/year  
98% of Water Input

**Bulk Water Import**  
6,000,000 m3/year  
2% of Water Input

**Total Water Input**  
283,000,000 m3/year  
23,583,333 m3/mth

**Unaccounted for Water (UFW)**  
21% of Water Input

**Adjusted UFW for 24/7 supply**  
21% of Water Input

**Metered Water Consumption**  
18,616,667 m3/mth

**Domestic**  
11,083,333 m3/mth

**Non Domestic**  
7,150,000 m3/mth

**Bulk Water Sales**  
383,333 m3/mth

Water Connections = 356,628  
X  
31.1 m3/mth/conn

Water Connections = 46,149  
X  
154.9 m3/mth/conn

**Unmetered Consumption**  
968,067 m3/mth  
4% of Water Input

**Unbilled Authorised & Unauthorized Consumption**  
0% of metered consumption

**Meter inaccuracy**  
5% of metered consumption

Total Unmetered =  
5% of metered consumption

**Distribution System water losses (Current Annual Real Losses (CARL))**  
47,983,196 m3/year  
3,998,600 m3/mth  
17% of Water Input

**Hours / month offline**  
5.0 hours/month  
(Adjusted by)

**CARL for 24/7 (continuous) supply**  
48,314,297 m3/year

**Unavoidable Annual Real Losses (UARL)**  
5,337,542 m3/year  
X

**Infrastructure Leakage Index (ILI)**  
9.1

**Length of distribution mains**  
3,407 km

**Water Connections**  
402,777 x 20m.  
= 8,056 km

**Average Pressure**  
25 m