SECOND WATER UTILITIES DATA BOOK

Asian and Pacific Region

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FOREWORD

The *Water Utilities Data Book for the Asian and Pacific Region* was first published by the Asian Development Bank in November 1993. It provided information from 38 utilities in 23 of the Bank's developing member countries (DMCs) and was based mainly on 1990 and 1991 data. The Data Book was well received by stakeholders and has served as a useful reference document. There was need, however, to update it and to expand coverage and analysis.

The *Second Water Utilities Data Book for the Asian and Pacific Region* builds on our experience from the first Data Book. It provides information from 50 water utilities in 31 DMCs and is based largely on 1995 data. Additional features include the results of consumer surveys, a section on private sector participation, comparisons with information in the first Data Book, and greater analytical depth. It is expected that the Data Book will provide a broad perspective of water utility services and institutions in the Asian and Pacific region to the stakeholders. Utilities should also find it useful as a benchmark against which to measure their own performance.

The preparation of the Data Book was made possible through a technical assistance grant of the Asian Development Bank. Much effort has gone into confirming the accuracy and consistency of information provided by a host of utilities. While some discrepancies might seem apparent, these have been minimized by explanatory footnotes. The range and volume of data collected has made analysis more varied and meaningful; the views and conclusions, however, should not be taken as being the official positions of the Bank.

Arthur C. McIntosh, Senior Project Engineer (Water Supply) in the Bank's Water Supply, Urban Development and Housing Division (West) was responsible for the overall production of the Data Book, and directly prepared Part I. He was ably supported by Cesar E. Yñiguez (Consultant), who prepared Parts II and III. Elizabeth V. C. Crisostomo provided invaluable secretarial assistance.

The provision of adequate, safe, and reliable water supplies in the context of an increasing population and rapid urban growth in the Asian and Pacific region will be a major challenge in the 21st century. We hope that this Data Book will contribute in understanding that challenge better, and in helping stakeholders define the best ways of meeting it.

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Country	Utility
Bangladesh	Chittagong Water Supply and Sewerage Authority Dhaka Water Supply and Sewerage Authority
Bhutan	Thimphu City Corporation (Water Supply Unit)
Cambodia	Phnom Penh Water Supply Authority
China, People's Republic of	Beijing Municipal Waterworks Company Shanghai Municipal Waterworks Company Tianjin Waterworks Group Company, Ltd.
Cook Islands	Water Supply Division (Rarotonga)
Fiji	Fiji Public Works Department (Suva)
Hong Kong, China	Water Supplies Department
India	Calcutta Municipal Corporation (Water Supply Department) Chennai Metropolitan Water Supply and Drainage Board Delhi Water Supply and Sewage Disposal Undertaking Brihanmumbai Municipal Corporation (Hydraulic Engineer's Department)
Indonesia	PDAM Kodya Dati II Bandung PDAM DKI Jakarta PDAM Tirtanadi Medan
Kazakstan	Industrial Enterprise Almaty Vodocanal
Korea, Republic of	Seoul Metropolitan Government (Office of Waterworks) Ulsan City Water and Sewerage Board
Kyrgyz Republic	Industrial Enterprise Bishkek Vodocanal
Lao, PDR	Nam Papa Lao (Vientiane)
Malaysia	Johor Water Company Selangor Waterworks Department (Kuala Lumpur) Penang Water Authority
Maldives	Malé Water and Sewerage Company, Ltd.
Mongolia	Water Supply and Sewerage System Company (Ulaanbaatar)
Myanmar	Mandalay City Development Committee (Water and Sanitation Department) Yangon City Development Committee (Engineering Department)
Nepal	Nepal Water Supply Corporation (Kathmandu)

Country	Utility
Pakistan	Faisalabad Development Authority (Water and Sanitation Agency) Karachi Water and Sewerage Board Lahore Development Authority (Water and Sanitation Agency)
Papua New Guinea	The Water Board (Lae District Office)
Philippines	Metropolitan Cebu Water District Davao City Water District Metropolitan Waterworks and Sewerage System (Metro Manila)
Singapore	Public Utilities Board (Water Department)
Solomon Islands	Solomon Islands Water Authority (Honiara)
Sri Lanka	National Water Supply and Drainage Board (Colombo)
Taipei,China	Taipei Water Department
Thailand	Metropolitan Waterworks Authority (Bangkok) Provincial Waterworks Authority (Chiangmai) Provincial Waterworks Authority (Chonburi)
Tonga	Tonga Water Board (Nuku'alofa)
Uzbekistan	Tashkent Vodocanal
Vanuatu	Union Electrique du Vanuatu, Ltd. (Port Vila)
Viet Nam, Soc. Rep. of	Hanoi Water Business Company Ho Chi Minh City Water Supply Company
Western Samoa	Western Samoa Water Authority (Apia)

The section on Private Sector Participation was prepared by Malcolm Jeffery of Northumbrian Water Services Limited.

Special acknowledgment is due to the UNICEF field offices in Almaty, Bhutan, Hanoi, Malé, and Phnom Penh, for their assistance in initiating communications with the water utilities in these cities. The Bank wishes to thank the Resident Project Officer of UNICEF Bishkek for his assistance in recruiting and communicating with the local domestic consultant for Almaty, Bishkek and Tashkent.

Among the Bank staff who assisted, special thanks are due to Mr. Preben Nielsen (Manager, AWWU) for his support and advice, Ms. Elisabetta Capannelli and Mr. Xiaoyan Ye for helping the utilities in Ulaanbaatar and Phnom Penh, respectively, in collecting and gathering the utility data. The communications assistance provided by the Pakistan Resident Mission for Faisalabad and the Bangladesh Resident Mission for Chittagong are also appreciated. Messrs. Jeffry Stubbs, Arjun Thapan, Charoen Bunchandranon, J. Warren Evans and Wouter Lincklaen-Arriens provided advice regarding the sections on the Bank's Strategy, Best Practice in the Sector, and the Suggested Evaluation Criteria. Desktop publishing assistance was provided by Ms. Marites M. Ortega of AWWU, Ms. Judy T. Yñiguez and Ms. Ma. Lourdes J. Maestro of the Printing Unit, under the supervision of Mr. Raveendranath Rajan.

ABBREVIATIONS

Measurement Units and Symbols

gal	gallon
km	kilometer
km^2	square kilometer
l/c/d or lpcd	liters per capita per day
m	meter
m^2	square meter
m^3	cubic meter
m^3/d	cubic meter per day
$m^3/d/c$	cubic meter per day per capita
mm	millimeter
NA	not available or not applicable
sq ft	square feet
sq km	square kilometer
sq yd	square yard
%	per cent
<	less than
>	greater than
"	inch

Unit Conversion

1 gallon	4.546 liters
1,000 gallons	4.546 cubic meters

Abbreviations and Acronyms

ADB	Asian Development Bank
ARV	Annual Rental Value
BMC	Brihanmumbai Municipal Corporation
BMWC	Beijing Municipal Waterworks Company
CMC	Calcutta Municipal Corporation
CMWSSB	Chennai Metropolitan Water Supply and Sewerage Board
CWASA	Chittagong Water Supply and Sewerage Authority
DCWD	Davao City Water District
DMC	Delhi Municipal Corporation
DMC	Developing Member Country of the Bank
DWASA	Dhaka Water Supply and Sewerage Authority
DWSSDU	Delhi Water Supply and Sewage Disposal Undertaking
FDA	Faisalabad Development Authority
GIS	Geographic Information System
GNP	Gross National Product
HC	House Connection
HWBC	Hanoi Water Business Company
JWC	Johor Water Company
KWSB	Karachi Water and Sewerage Board
LDA	Lahore Development Authority
MCWD	Metropolitan Cebu Water District
MIS	Management Information System
MOWEPP	Ministry of Works, Environment and Physical Planning
MWA	Metropolitan Waterworks Authority
MWSC	Malé Water and Sewerage Company
MWSS	Metropolitan Waterworks and Sewerage System

NARV	Net Annual Rental Value
NDMC	New Delhi Municipal Corporation
NPL	Nam Papa Lao
NRW	Non-Revenue Water
NWSC	Nepal Water Supply Corporation
NWSDB	National Water Supply and Drainage Board
O&M	Operation and Maintenance
OR	Operating Ratio
PDAM	Perusahaan Daerah Air Minum
PDR	People's Democratic Republic
PPWSA	Phnom Penh Water Supply Authority
PSP	Private Sector Participation
PT	Public Tap
PUB	Public Utilities Board
PWA	Provincial Waterworks Authority
PWD	Public Works Department
SCADA	Supervisory Control And Data Acquisition
SIWA	Solomon Islands Water Authority
SMWC	Shanghai Municipal Waterworks Company
SP	Stand Pipe
SWD	Selangor Waterworks Department
TA	Technical Assistance
TWB	Tonga Water Board
TWD	Taipei Water Department
TWWC	Tianjin Waterworks Group Co., Ltd.
UFW	Unaccounted For Water
UNELCO	Union Electrique du Vanuatu, Ltd.
US$	United States Dollar
USAG	Water Supply and Sewerage System Company (Ulaanbaatar)
WASA	Water and Sanitation Agency
WSC	Water Supply Company
WSWA	Western Samoa Water Authority
WTP	Water Treatment Plant

METHODOLOGY

In July 1996, the Bank approved technical assistance to prepare the Second Water Utilities Data Book for the Asian and Pacific Region. A consultant and a secretary were recruited to implement the technical assistance. A workshop was held in Manila attended by 12 representatives of utilities, as well as interested Bank staff, to design the utility and consumer survey questionnaires, which were then sent to 51 utilities in 31 developing member countries. Domestic consultants were (in most cases) also recruited to assist the utility in completing the questionnaire, as well as to carry out the consumer survey.

In all, 50 utilities from 31 countries provided data and their names and locations are shown on the map. Of the original 38 utilities included in the first Data Book, only Guangzhou was unable to participate in the Second Data Book. Many clarifications have been sought on the data provided, so that the data finally presented is the best that could be obtained in the circumstances. Nevertheless, the Bank is conscious that not all the data is 100 percent reliable. For that reason, readers should be careful about quoting a specific figure from one utility. If in doubt, it would be best to communicate directly with the utility in question for verification of the data.

Generally, data was provided for 1995 or 1995/96 fiscal years. Many of the water utilities associated with a city water supply also provide services to nearby towns and some are national water authorities. Thus, it was necessary, in the questionnaire and in the presentation of data to differentiate between performance indicators for the utility and performance indicators for the city water supply.

Performance indicators were derived using basic data from the questionnaires and following various computations, the formulae for which are presented on the next page. Computer files were developed comprising detailed tables showing the derivation of the performance indicators. Only a limited number of these tables have been presented directly in the Data Book. In other cases they have been converted into graphs and histograms. Also, since there is such a range of small and large utilities, it was decided for presentation purposes to break down the cities into two groups: those with less than 150,000 connections and those with more than 150,000 connections.

For those who wish to do more detailed analysis of the collected data, the questionnaires have been amended to reflect all the clarifications sought and all of these are available in printed hard copy or in electronic form. Likewise, the full consumer survey data is also available for further analysis.

Mostly, the same format as for the first Data Book has been retained. However, instead of having an executive summary, a more comprehensive sector profile is included. The utility profiles have been improved by inclusion of a mission statement, a summary of the consumer survey findings and the major changes between the figures reported in the first and second Data Books. The city profiles have been improved by inclusion of information on both unaccounted water and non-revenue water. The regional profiles include additional information on capital expenditure, ratio of professional staff to total staff, production metering, non-revenue water, private sector participation, methods of payment collection, annual maintenance expenses and automation of operations.

A suggested evaluation criteria is provided as an appendix. This, or a modified version to suit a particular utility, may be used to measure overall utility performance with time and to compare with other utilities.

The information presented in this Second Water Utilities Data Book was either taken from a water utility questionnaire completed by each utility, from the consumer surveys, or was based on computations using data from the questionnaires. The formulae for the computations are shown below.

1. Service coverage (%):
   = [(number of HC x persons per HC) + (number of PT x persons per PT)] x 100/[total city population]

2. Per capita consumption (l/c/d):
   = [annual water consumption (m^3) for HC x 1,000/365] / [number of HC x persons per HC]

3. Average tariff (US$/$m^3$):
   = [total annual billing (US$)] / [total annual consumption (m^3)]

4. Unaccounted for water (%):
   = [total annual production (m^3) - total annual consumption (m^3)] x 100/[total annual production (m^3)]

5. Operating ratio:
   = [annual O&M cost] / [annual billing]

6. Staff/1,000 connections:
   = [number of utility staff for city] / [number of city connections/1,000]

7. Unit production cost (US$/$m^3$):
   = [annual O&M cost (US$)] / [total annual production (m^3)]

8. People served (persons):
   = [(number of HC x persons per HC) + (number of PT x persons per PT)]

9. Storage capacity (hours):
   = [storage capacity (m^3)] / [daily production (m^3/d)] x 24

10. Cost of water for domestic use (10, 20, 30, and 50 m^3 per month) - use the corresponding tariff structure or tariff rate curves (Figure 31a to 31l) for each water utility; the cost corresponding to each of the above consumption levels is the area under the curve from 0 to the amount consumed plus other monthly charges, if any.

11. Cost of water for domestic use (200 m^3/year):
   = [cost of 16.7 m^3 domestic water in a month] x 12 months

12. Monthly household income (based on per capita GNP);
   = [(per capita GNP)/12] x [average number of persons per household]

13. Nominal collection efficiency (%):
   = [total annual collections (US$) / total annual billings (US$)] x 100

The utilities provided information on non-revenue water (NRW) which was defined as the total production volume (ex treatment plant) minus the total consumption volume which produces revenue divided by the total production volume calculated as a percentage.

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PART III - WATER UTILITY AND CITY PROFILES

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Chittagong Water Supply and Sewerage Authority
Chittagong Water Supply
Dhaka Water Supply and Sewerage Authority
Dhaka Water Supply

Bhutan

Thimphu City Corporation (Water Supply Unit)
Thimphu Water Supply

Cambodia

Phnom Penh Water Supply Authority
Phnom Penh Water Supply

China, People's Republic of

Beijing Municipal Waterworks Company
Beijing Water Supply
Shanghai Municipal Waterworks Company
Shanghai Water Supply
Tianjin Waterworks Group Company
Tianjin Water Supply

Cook Islands

Rarotonga Water Supply Division
Rarotonga Water Supply

Fiji

Fiji Public Works Department
Suva Water Supply

Hong Kong, China

Water Supplies Department
Hong Kong Water Supply

India

Calcutta Municipal Corporation (Water Supply Department)
Calcutta Water Supply
Chennai Metropolitan Water Supply and Sewerage Board
Chennai Water Supply
Delhi Water Supply and Sewage Disposal Undertaking
Delhi Water Supply
Brihanmumbai Municipal Corporation (Hydraulic Engineer's Department)
Mumbai Water Supply

Indonesia

PDAM Kodya Dati II Bandung
Bandung Water Supply
PDAM DKI Jakarta
Jakarta Water Supply
PDAM Tirtanadi Medan
Medan Water Supply

Kazakstan

Industrial Enterprise Almaty Vodocanal
Almaty Water Supply

Korea, Republic of

Seoul Metropolitan Government (Office of Waterworks)
Seoul Water Supply
Ulsan City Water and Sewerage Board
Ulsan Water Supply

Kyrgyz Republic

Industrial Enterprise Bishkek Vodocanal
Bishkek Water Supply

Lao, PDR

Nam Papa Lao
Vientiane Water Supply

Malaysia

Syarikat Air Johor Sdn., Bhd. (Johor Water Company)
Johor Bahru Water Supply
Selangor Waterworks Department
Kuala Lumpur Water Supply
Pihak Berkuasa Air Pulau Pinang (Penang Water Authority)
Penang Island Water Supply

Maldives

Malé Water and Sewerage Company, Ltd.
Malé Water Supply

Mongolia

Water Supply and Sewerage System Company (USAG)
Ulaanbaatar Water Supply

Myanmar

Mandalay City Development Committee (Water and Sanitation Department)
Mandalay Water Supply
Yangon City Development Committee (Water and Sanitation Department)
Yangon Water Supply

Nepal

Nepal Water Supply Corporation
Kathmandu Water Supply

Pakistan

Faisalabad Development Authority (Water and Sanitation Agency)
Faisalabad Water Supply
Karachi Water and Sewerage Board
Karachi Water Supply
Lahore Development Authority (Water and Sanitation Agency)
Lahore Water Supply

Papua New Guinea

The Waterboard (Lae Distirct Office)
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Philippines

Metropolitan Cebu Water District
Cebu Water Supply
Davao City Water District
Davao Water Supply
Metropolitan Waterworks Sewerage System
Manila Water Supply

Singapore

Public Utilities Board (Water Department)
Singapore Water Supply

Solomon Islands

Solomon Islands Water Authority
Honiara Water Supply

Sri Lanka

National Water Supply and Drainage Board
Colombo Water Supply

Taipei,China

Taipei Water Department
Taipei Water Supply

Thailand

Metropolitan Waterworks Authority
Bangkok Water Supply
Provincial Waterworks Authority (Regional Office No.9)
Chiangmai Water Supply
Provincial Waterworks Authority (Regional Office No.1)
Chonburi Water Supply

Tonga

Tonga Water Board
Nuku'alofa Water Supply

Uzbekistan

Tashkent Vodocanal
Tashkent Water Supply

Vanuatu

Union Electrique du Vanuatu, Ltd.
Port Vila Water Supply

Viet Nam, Socialist Republic of

Hanoi Water Business Company
Hanoi Water Supply
Ho Chi Minh City Water Supply Company
Ho Chi Minh City Water Supply

Western Samoa*

Western Samoa Water Authority
Apia Water Supply

APPENDIXES

* **Editor's Note:** From 4 July 1997, under Constitutional Amendment Act (No. 2) 1997, the name of the country was changed from Western Samoa to Samoa. The information was received too late to amend this publication.

TABLES

FIGURES

CURRENCY CONVERSIONS

(As of 1 July 1997)

Country	Currency Unit	Symbol	Rate of Exchange (to US$)
Bangladesh	Bangladesh taka	Tk	43.65
Bhutan	Bhutanese ngultrum	Nu	35.795
Cambodia	Cambodian riel	KR	2,737
China, People's Rep. of	Chinese yuan	Y	8.2907
Cook Islands	New Zealand dollar	NZ$	1.4743
Fiji	Fiji dollar	F$	1.4215
Hong Kong, China	Hong Kong dollar	HK$	7.7468
India	Indian rupee	Rs	35.775
Indonesia	Indonesian rupiah	Rp	2,479
Kazakstan	Tenge	T	75.5
Korea, Rep. of	Korean won	W	886
Kyrgyz Republic	Som	Som	17.3325
Lao PDR	Lao kip	KN	1,022
Malaysia	Malaysian ringgit	M$	2.5245
Maldives	Maldivian rufiyaa	Rf	11.77
Mongolia	Mongolian tugrik	Tug	796.52
Myanmar	Myanmar kyat	MK	6.1806
Nepal	Nepalese rupee	NRs	57.025
Pakistan	Pakistan rupee	PRs	40.6623
Papua New Guinea	Papua New Guinea kina	K	1.3869
Philippines	Philippine peso	P	26.384
Singapore	Singapore dollar	S$	1.4292
Solomon Islands	Solomon Islands dollar	SI$	3.6711
Sri Lanka	Sri Lanka rupee	SLRs	58.4
Taipei,China	New Taiwan dollar	NT$	27.8
Thailand	Thai baht	B	24.65
Tonga	Tongan pa'anga	T$	1.2405
Uzbekistan	Uzbek sum	Sum	60.81
Vanuatu	Vanuatu vatu	Vt	114.65
Viet Nam, Soc. Rep. of	Vietnamese dong	D	11,114
Western Samoa	Western Samoa tala	WS$	2.5199

Note: Rates are market rates sourced from the New York Foreign Exchange, the country's Central Bank or book rates provided by the International Monetary Fund and are officially used by the Bank.

Table 1: SUMMARY OF RESULTS FOR 50 UTILITIES

	Almaty	Apia	Bandung	Bangkok	Beijing	Bishkek	Calcutta	Cebu	Chennai	Chiangmai	Average (50)
Private Sector Participation	–	–	Meter/ Leaks	Production	–	Rehab	–	Source/ Pipe	Pumping	Prod/ Other	24 of 50
Production/Population (m^3/d/c)	0.72	0.67	0.09	0.53	0.34	0.66	0.26	0.08	0.07	0.24	0.32
Coverage (%)	99	100	42	82	100	98	66	23	97	65	81
Water Availability (hours)	24	24	6	24	24	24	10	18	4	20	19
Consumption (l/c/d)	186	337	120	265	96	112	202	173		135	157
UFW (%)/NRW (%)	13/32	50	43/51	38	8	42/47	50	38	20	35/38	35/40
Average Tariff (US$/$m^3$)	0.06	0.05	0.37	0.31	0.05	0.05	0.01	0.66	0.25	0.30	0.36
Water Bill (US$/month)	1	14	8	10	1	1	5	15	3	5	10
Power/Water Bill ratio	1.5	2.6	1.5	3.6	6.1	2.7	1.2	1.5	6.5	3.7	4.0
Public Taps	✓	Nil	✓	Nil	✓	✓	✓	✓	✓	Nil	31 of 50
Metering (%)	54	3	100	100	100	1	0	100	1	100	83
Operating Ratio	0.37	7.73	0.96	0.89	1.30	0.89	5.25	0.55	0.94	0.49	1.05
Staff/1,000 Connections ratio	13.9	15.8	7.7	4.6	27.2	6.9	17.1	9.3	25.9	2.9	11.8*
Management Salary (US$)	1,570	13,940	6,790	36,000	1,900	1,390	3,220	17,810	4,470	27,400	15,010
New Connection (US$)	66	28	78	283	100	115	40	80/12 mo.	41	83	190
Accounts Receivable (months)	5.4	–	1.0	2.0	0.1	7.7	1.5	1.9	5.8	1.2	4.0
Grant Financing (%)	21	100	Nil	Nil	26	28	Nil	Nil	1	26	35 (31)
Commercial Financing (%)	1	–	–	30	–	–	–	–	11	7	(15)
Local Bond Financing (%)	–	–	–	–	–	–	–	–	–	25	(4)
Capital Expenditure/ Connection (US$)	10	40	74	327	298	2	14	66	71	138	90.28
Annual Report	TS	None	TS	GC	TS	TS	TS	GC	GC	GC	40 of 50

* excluding Ulaanbaatar

( ) refers to number of utilities

TS = Type Script
GC = Glossy Covered Report
IF = Intermediate Format
Meter = Meter reading
Leaks = Leak repairs

Prod = Production
Mgmt = Management
Rehab = Rehabilitation
Source = Source development
Pipe = Pipe rehabilitation

B&C = Billing and Collection
MC = Management Contract
Dist = Distribution

Table 1: SUMMARY OF RESULTS FOR 50 UTILITIES *(cont'd.)*

	Chittagong	Chonburi	Colombo	Davao	Delhi	Dhaka	Faisalabad	Hanoi	Ho Chi Minh	Hong Kong	Average (50)
Private Sector Participation	–	Prod/Other	Proposed	B&C	–	B&C	–	–	Production	–	24 of 50
Production/Population (m^3/d/c)	0.14	0.36	0.18	0.13	0.24	0.09	0.09	0.22	0.15	0.40	0.32
Coverage (%)	60	89	58	52	86	42	60	76	52	100	81
Water Availability (hours)	15	16	22	24	4	17	7	18	24	24	19
Consumption (l/c/d)	139	145	165	145	209	95	170	45	136	112	157
UFW (%)/NRW (%)	35	37	35/51	31	26/44	51	30/78	63/71	34	36	35/40
Average Tariff (US$/$m^3$)	0.12	0.46	0.14	0.27	0.03	0.09	0.03	0.11	0.13	0.56	0.36
Water Bill (US$/month)	9	7	1	7	2	11	1	1	6	31	10
Power/Water Bill ratio	2.2	3.7	8.8	2.4	7.7	3.4	18.5	5.0	3.1	1.2	4.0
Public Taps	✓	Nil	✓	Nil	✓	✓	✓	✓	✓	✓	31 of 50
Metering (%)	100	100	94	100	73	74	5	25	100	100	83
Operating Ratio	0.56	0.34	0.53	0.83	1.48	1.01	1.41	0.79	0.96	1.63	1.05
Staff/1,000 Connections ratio	27.7	2.6	7.3	6.2	21.4	18.5	25.0	13.3	6.4	2.8	11.8*
Management Salary (US$)	6,290	27,400	3,140	14,800	5,030	8,020	2,950	1,480	1,980	41,150	15,010
New Connection (US$)	69	83	92	42/12 mo.	15	29	34	76	45	147	190
Accounts Receivable (months)	10.0	1.6	3.2	0.5	4.5	11.0	12.0	0.1	3.4	4.0	4.0
Grant Financing (%)	Nil	26	50	Nil	2	100	Nil	70	90	100	35 (31)
Commercial Financing (%)	–	7	–	–	1	–	–	–	–	–	(15)
Local Bond Financing (%)	–	25	–	–	–	–	–	–	–	–	(4)
Capital Expenditure/ Connection (US$)	5	138	142	13	30	145	31	2	21	95	90.28
Annual Report	None	GC	GC	GC	TS	GC	None	IF	TS	TS	40 of 50

* excluding Ulaanbaatar

( ) refers to number of utilities

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Table 1: SUMMARY OF RESULTS FOR 50 UTILITIES *(cont'd.)*

	Honiara	Jakarta	Johor Bahru	Karachi	Kathmandu	Kuala Lumpur	Lae	Lahore	Malé	Mandalay	Average (50)
Private Sector Participation	Prod/ Mgmt	B&C	Prod/ Leaks	Major Proposal	MC/Dist	Prod/B&C	–	–	Concession	–	24 of 50
Production/Population (m^3/d/c)	0.58	0.11	0.37	0.14	0.11	0.35	0.38	0.33	0.03	0.14	0.32
Coverage (%)	100	27	100	70	81	100	62	84	100	80	81
Water Availability (hours)	23	18	24	1-4	6	24	24	17	24	24	19
Consumption (l/c/d)	251	135	193	157	91	200	146	213	16	110	157
UFW (%)	38	53	21	30/40	40	36	61	40	10	60	35/40
Average Tariff (US$/$m^3$)	0.15	0.61	0.39	0.09	0.14	0.34	0.64	0.20	4.86	1.20	0.36
Water Bill (US$/month)	12	18	7	5	2	14	52	6	25	51	10
Power/Water Bill ratio	1.8	1.0	2.1	12.7	7.8	2.0	1.3	4.9	3.3	1.6	4.0
Public Taps	✓	✓	Nil	✓	✓	Nil	Nil	✓	Nil	✓	31 of 50
Metering (%)	100	100	100	1	83	100	100	24	100	100	83
Operating Ratio	1.26	0.98	0.61	0.77	0.72	0.60	0.39	0.71	0.60	0.22	1.05
Staff/1,000 connections ratio	10.7	5.9	1.2	8.4	15.0	1.1	17.1	5.7	7.6	6.3	11.8*
Management Salary (US$)	6,790	19,370	33,650	4,670	3,030	30,420	13,270	2,950	6,100	4,130	15,010
New Connection (US$)	95	10	50	2	49	4	72	7		485	190
Accounts Receivable (months)	5.4	1.0	2.5	16.8	4.5	0.5	3.0	7.0	1.0	0.2	4.0
Grant Financing (%)	100	8	Nil	99	72	Nil	100	23	Nil	Nil	35 (31)
Commercial Financing (%)	–	–	6	–	–	20	–	–	–	–	(15)
Local Bond Financing (%)	–	–	–	–	–	–	–	–	–	–	(4)
Capital Expenditure/ Connection (US$)	5	180	93	52	38	126	45	4	165	299	90.28
Annual Report	TS	GC	TS	Basic Facts	TS	GC	IF	None	None	None	40 of 50

* excluding Ulaanbaatar

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Table 1: SUMMARY OF RESULTS FOR 50 UTILITIES *(cont'd.)*

	Manila	Medan	Mumbai	Nuku'alofa	Penang	Phnom Penh	Port Vila	Rarotonga	Seoul	Shanghai	Average (50)
Private Sector Participation	Concessions	B&C	–	–	–	–	Concession	–	Meter Reading	–	24 of 50
Production/Population (m^3/d/c)	0.26	0.13	0.25	0.15	0.51	0.12	0.36	0.90	0.47	0.58	0.32
Coverage (%)	67	63	100	100	99	83	98	100	100	100	81
Water Availability (hours)	17	24	5	21	24	12	24	24	24	24	19
Consumption (l/c/d)	202	131	178	78	244	32	273	267	209	143	157
UFW (%)/NRW (%)	44/58	27/29	18	42/45	20	61	26	70	34/35	14	35/40
Average Tariff (US$/$m^3$)	0.23	0.27	0.06	0.63	0.21	0.15	0.49	NA	0.28	0.07	0.36
Water Bill (US$/month)	13	15	1	14	8	5	22	NA	8	2	10
Power/Water Bill ratio	3.2	1.3	7.3	3.1	4.3	2.3	2.0	NA	3.3	4.1	4.0
Public Taps	✓	✓	Nil	✓	✓	Nil	Nil	Nil	Nil	✓	31 of 50
Metering (%)	98	100	67	100	100	88	100	13	100	100	83
Operating Ratio	0.65	1.20	1.08	0.80	0.74	0.61	1.12	NA	0.84	1.19	1.05
Staff/1,000 Connections ratio	9.8	4.9	33.3	16.0	4.4	13.5	5.0	3.5	2.3	6.1	11.8*
Management Salary (US$)	12,410	4,440	5,500	13,970	19,210	250	–	13,570	40,010	3,350	15,010
New Connection (US$)	95/12 mo.	81	8	28	59	164	151	136	1,977	–	190
Accounts Receivable (months)	6.0	0.1	19.7	1.5	2.0	0.9	Nil	NA	1.5	11.1	4.0
Grant Financing (%)	23	15	Nil	Nil	Nil	92	Nil	28	Nil	100	35 (31)
Commercial Financing (%)	34	–	–	17	–	2	–	72	11	–	(15)
Local Bond Financing (%)	18	–	–	–	–	–	–	–	–	–	(4)
Capital Expenditure/ Connection (US$)	61	64	79	18	43	274	102	57	155	38	90.28
Annual Report	GC	TS	IF	GC	GC	TS	IF	None	TS	IF	40 of 50

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Table 1: SUMMARY OF RESULTS FOR 50 UTILITIES *(cont'd.)*

	Singapore	Suva	Taipei	Tashkent	Thimphu	Tianjin	Ulaanbaatar	Ulsan	Vientiane	Yangon	Average (50)
Private Sector Participation	B&C	–	B&C/Leaks	–	–	–	–	–	–	–	24 of 50
Production/Population (m^3/d/c)	0.46	0.34	0.72	1.28	0.22	0.33	0.23	0.29	0.26	0.12	0.32
Coverage (%)	100	98	99	98	93	100	100	84	54	60	81
Water Availability (hours)	24	24	24	24	12	24	21	24	24	12	19
Consumption (l/c/d)	183	135	262	109	93	101	177	157	172	67	157
UFW (%)/NRW (%)	6/7	43	26/37	14/63	37/53	11	49	33	33/39	60	35/40
Average Tariff (US$/$m^3$)	0.55	0.22	0.39	0.02	0.05	0.06	0.10	0.40	0.13	0.46	0.36
Water Bill (US$/month)	12	11	8	1	3	1	1	16	7	19	10
Power/Water Bill ratio	3.7	2.7	5.5	9.2	1.9	3.8	4.3	2.8	1.7	1.9	4.0
Public Taps	Nil	Nil	Nil	✓	Nil	✓	✓	Nil	✓	✓	31 of 50
Metering (%)	100	100	100	2	99	100	14	100	100	7	83
Operating Ratio	0.60	1.04	0.69	0.85	0.60	1.05	0.74	0.71	0.95	0.27	1.05
Staff/1,000 connections ratio	2.0	8.9	1.1	17.9	25.5	49.9	579.2	0.8	16.1	12.0	11.8*
Management Salary (US$)	145,010	26,030	53,960	1,760	2,330	1,750	600	34,540	1,210	4,270	15,010
New Connection (US$)	350	11	1,079	164	70	362	Nil	902	88	906	190
Accounts Receivable (months)	1.1	6.0	1.7	6.3	4.0	0.1	2.0	0.5	3.3	–	4.0
Grant Financing (%)	Nil	100	Nil	Nil	100	27	100	7	2	100	36 (31)
Commercial Financing (%)	–	–	71	–	–	–	–	–	10	–	(15)
Local Bond Financing (%)	–	–	–	–	–	27	–	–	–	–	(4)
Capital Expenditure/ Connection (US$)	59	70	62	1	28	244	62	191	56	182	90.28
Annual Report	GC	TS	GC	TS	None	TS	IF	TS	TS	None	40 of 50

* excluding Ulaanbaatar

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Almaty

This utility provides consumer satisfaction and sound financial management (except for accounts receivable of 5.4 months) but is weak in water resources management (production/population is 0.72 m^3/day/person), due to use of public taps and little metering. A comparison of average tariff with the tariff structure indicates UFW is much higher than the 13% recorded.

Apia

Although consumer satisfaction is high, this utility has weak management in human, financial and water resources. The situation demonstrates that external technical assistance in operations is in itself no guarantee of improved performance, unless it goes hand in hand with autonomy on key management matters. The totally inadequate metering (2.7%) and very high operating ratio (7.73) reflecting low tariffs, are the principal issues to be addressed.

Bandung

For a city which has had considerable development funding for water supplies over the last 15 years, the condition of this utility needs improvement. Water availability is 6 hours/day, coverage is only 42% and UFW 43%, with many public taps still in use. On the plus side, operating ratio is 0.96, accounts receivable is 1.0 month, staff/1,000 connections ratio is 7.7 and there is no grant financing.

Bangkok

A generally well managed large utility, reflecting good management salaries (US$36,000 p.a.). Uses commercial financing and no grant financing. Coverage (82%) could be improved as well as UFW (38%). Consumption (265 l/c/d) on the high side.

Beijing

Consumer satisfaction is provided in terms of coverage, water availability and consumption. Tariffs are too low (power/water bill ratio is 6.1) and operating ratio (1.30) is too high. Human resource management (staff/1,000 connections ratio is 27.2) needs improvement. UFW is probably more than that indicated (8%) (if average tariff is compared with the tariff structure).

Bishkek

This utility provides consumer satisfaction, but is weak in water resources management (UFW of 42%, production/population is 0.66 m^3/day/person) due to little metering and heavy use of public taps. Financial management is sound, except for accounts receivable at 7.7 months. Human resource management (6.9 staff/1,000 connections ratio) is satisfactory.

Calcutta

The 202 l/c/d consumption contrasts with the low coverage of 66% and low water availability of 10 hours per day. UFW is high at 50% and not helped by many public taps and little metering. The very poor operating ratio of 5.25 can only be offset by municipal revenues as the average tariff of US$0.01/$m^3$ is extremely low. To the utility's credit there is apparently no grant financing.

Cebu

Very low coverage (23%) is the main feature of this utility. The major constraint is availability of water resources. High average tariffs (US$0.66/$m^3$) are offset by high UFW (38%) and low water availability (18 hours). An attempt should be made to reduce use of public taps.

Chennai

A very weak utility with only 4 hours water availability per day, many public taps and little metering. Staff/1,000 connections is very high at 25.9 and accounts receivable weak at 5.8 months. On the plus side, grant financing is almost eliminated and limited commercial financing has been introduced.

Chiangmai

Low coverage (65%) and water availability (20 hours) plus UFW (35%) all need improvement, but financial management is strong (operating ratio of 0.49) with access to local bond financing.

Chittagong

Consumer satisfaction is low in terms of coverage (60%) and water availability (15 hours). Incomplete

production metering and heavy use of public taps need attention. High staff/1,000 connections (27.7) and accounts receivable (10 months) show management deficiencies. Nevertheless, the operating ratio (0.56) is low and no grant financing is utilized.

Chonburi

Local bond financing through PWA is utilized. Coverage (89%) and water availability (16 hours) need improvement as does UFW (37%). Financial management is especially strong (operating ratio is 0.34).

Colombo

Management weaknesses (note low management salaries) are reflected in low coverage (58%), less than 24-hour water supply, high NRW (51%), too low domestic water bill (power/water bill ratio of 8.8), continued use of public taps, incomplete metering and high dependence on government financing (50% grants). Operating ratio (0.53) is good however. Decision to seek PSP in management augurs well for the future.

Davao

A well managed utility with good performance parameters all round. Only area for special attention is the low coverage of 52%. Note the relatively high management salaries.

Delhi

Despite only 4 hours/day water availability, average consumption is high at 209 l/c/d. The very low average tariff of US$0.03/$m^3$ contributes to this (compare the power/water bill ratio of 7.7). Coverage at 86% still requires improvement. The many public taps and the very deficient metering need addressing. With 21.4 staff/1,000 connections, human resource management is not good. Grant financing, although small, should be eliminated and this can be done by improving the operating ratio from a high 1.48.

Dhaka

Consumer satisfaction improvements in coverage (42%) and water availability (17 hours) are needed. Metering must be greatly improved and public taps should be reduced. Accounts receivable (11 months) must be addressed. Grant financing (100%) should be eliminated altogether.

Faisalabad

A very weak utility characterized by 60% coverage, 7 hours/day water availability, an average tariff of only US$0.03/$m^3$ (power/water bill ratio is 18.5), many public taps, very little metering, an operating ratio of 1.41, 25 staff/1,000 connections, accounts receivable of 12 months and NRW of 78%. The only redeeming factor is there is no grant financing.

Hanoi

Consumer satisfaction is low with coverage (76%), water availability (18 hours) and consumption (45 l/c/d). UFW is also very high (63%), reflecting use of public taps and need for major improvements in metering. Financial management is sound.

Ho Chi Minh City

Weaknesses include low coverage (52%) and 90% grant financing. Public taps may also be progressively eliminated. Otherwise, the utility has reasonably good performance parameters, with discipline in human, financial and water resources management.

Hong Kong

Of the larger utilities, it shows the most efficient use of water resources (0.40 m^3/day/person). A high average tariff (US$0.56/$m^3$) is reflected in low consumption (112 l/c/d). Financial improvements in accounts receivable (4.0 months), operating ratio (1.63) and 100% grant financing are necessary.

Honiara

General consumer satisfaction is weakened by use of public taps, high consumption (251 l/c/d) and high operating ratio (1.26). Accounts receivable at 5.4 months is too high.

Jakarta

The very low coverage of 27% reflects severe constraints on water resources. Water availability is also low at 18 hours/day. High UFW of 53% may reflect the unserved urban poor, as well as many public taps. The high average tariff of US$ 0.61/m^3 contributes to the relatively low consumption figure of 135 l/c/d. It is difficult to believe that a major city utility like PAM Jaya needs grant financing. Recently agreed PSP (concessions) should help.

Johor Bahru

Involvement of PSP and high management salaries (US$33,700 p.a.) are reflected in good consumer satisfaction and good performance parameters in management (operating ratio is 0.61; UFW is 21%; staff/1,000 connections ratio is 1.2). No grant financing.

Karachi

Major private sector participation is proposed. The need for this is reflected in the following indicators of insufficient consumer satisfaction and resource management: Coverage: 70%, water availability: 1-4 hours every other day, many public taps, very little metering, power/water bill ratio: 12.7, accounts receivable: 16.8 months and 99% grant financing. On the plus side, the operating ratio is 0.77, staff/1,000 connections is a reasonable 8.4 and UFW nominally 30%.

Kathmandu

Recent PSP involvement in a management contract for the distribution is significant, in light of the low consumer satisfaction and management indicators. Coverage is only 81% and water availability averages 6 hours/day, while consumption is low at 91 l/c/d. UFW is 40% and the many public taps and low level of metering contribute to this. The utility relies on 72% grant financing despite an operating ratio of 0.72.

Kuala Lumpur

Involvement of PSP and high management salaries (US$30,420 p.a.) are reflected in good consumer satisfaction and good performance parameters in management (staff/1,000 connections ratio is 1.1; operating ratio is 0.60). Note no public taps, 100% metering and 0.5 month accounts receivable. No grant financing.

Lae

Features are low coverage (62%), high UFW (61%) and high average tariff (US$0.64/$m^3$). Staff/1,000 connections (17.1) needs attention.

Lahore

Somewhat better than the other two Pakistan utilities, it is still not strong on coverage (84%), water availability (17 hours), UFW (40%) and accounts receivable (7.0 months). Many public taps and very little metering helps neither accountability nor financial independence, although an operating ratio of 0.71 gives some hope for the future.

Malé

The private sector concession to produce and distribute desalinated water has brought exceptionally high tariffs (US$4.86/$m^3$) with extremes of demand management (consumption is 16 l/c/d). The complementary use of rainwater, with this very low consumption, shows that tropical countries can get by on very low use of water. Production/population is exceedingly low at 0.03 m^3/day/person. UFW at 10% is also very low.

Mandalay

Low management salaries are reflected in low coverage (80%), high UFW (60%) and continued use of public taps. However, strong financial management is indicated with very high average tariff (US$1.20) and new connection fee (US$485), low power/water bill ratio (1.6) and no grant financing.

Manila

Two major private sector concessionaires for the distribution of water is the main recent feature of this utility. It is expected that a number of deficiencies will be corrected, including low coverage (67%), water availability (17 hours), UFW (44%), high use of public taps, incomplete metering and high accounts receivable (6 months). However, the very low tariff agreed with the concessionaires will not accomplish much in terms of demand management (consumption is already 202 l/c/d).

Medan

PSP in billing and collection helps to keep staff/1,000 connections to a relatively low 4.9. It is disturbing to see 63% coverage, but encouraging to see 24-hour water availability. UFW is quite low at 27%. Improvements could be made in the operating ratio which stands at 1.2, a higher average tariff (US$0.27/$m^3$) and elimination of public taps.

Mumbai

Water is available for only 5 hours/day, yet consumption is relatively high at 178 l/c/d. Average tariff is very low at US$0.06/$m^3$, contributing to the

1.08 operating ratio. The limited metering is a major handicap, but on the plus side there are no public taps. Human resource management is very weak with 33.3 staff/1,000 connections. Financial management is also weak with 19.7 months of accounts receivable, but there is no reliance on grant financing.

Nuku'alofa

This utility can serve as an example to other island nation utilities. Although a public utility, it has effective autonomy, allowing a high average tariff (US$0.63/$m^3$) to restrict consumption (78 l/c/d) and show that demand management does work. Note the nil grant financing. Improvements can still be made in UFW (42%) and 24-hour water supply (21 hours average).

Penang

An efficiently managed water utility which could do better in terms of demand management (consumption of 244 l/c/d and average tariff only US$0.21/$m^3$). May consider elimination of public taps. Low UFW (20%) is excellent.

Phnom Penh

Consumer satisfaction is low with coverage (83%), water availability (12 hours) and consumption (32 l/c/d). Financial management is sound (operating ratio is 0.61), but UFW (61%) and metering (incomplete), need improvement.

Port Vila

The private sector concession is reflected in generally good management and consumer satisfaction. Tariffs are, however, high and high fees for new connections also contribute to the incomplete coverage (which may be lower than the 98% recorded). Consumption at 273 l/c/d is still too high.

Rarotonga

No tariffs and little metering reflect the lack of autonomy and management in this utility. Unusually, 72% commercial financing was accepted. Very high UFW (70%) and high consumption (267 l/c/d) are the result of poor management of water resources, which is also reflected in the very high production/population ratio of 0.90 m^3/day/person.

Seoul

A well performed utility, which has consumer satisfaction as well as good management of human, water and financial resources. The high management salaries reflect the correlation between reward and performance.

Shanghai

Although consumer satisfaction is high, water resources management could do with some improvement (production/population is 0.58 m^3/day/person, the highest of all the large utilities except Taipei). UFW is probably higher than the figure of 14% given (if average tariff is compared with the tariff structure). Operating ratio (1.19) and 100% grant financing need improvement, as does the 11.1 months accounts receivable.

Singapore

Probably the best managed utility in the region, reflecting the high management salaries (US$145,010 p. a.). Very low UFW (6%). All its capital requirements now come from its own sources revenue.

Suva

Relies 100% on grant financing, but otherwise quite a successful utility in terms of management. (Note the relatively high management salaries). Could improve on UFW (43%) and operating ratio (1.04).

Taipei

High management salaries are reflected in consumer satisfaction and good human and financial management. However, the high production per population figure (0.72 m^3/day/person) and consumption (262 l/c/d) show room for improvement in water resources management.

Tashkent

Production/population of 1.28 m^3/day/person reflects a very large industrial/commercial consumption of water. Consumer satisfaction is good. Only 6% of the revenues are derived from domestic use, showing a very high "cross-subsidization". Very large use of public taps should be reduced and 100% metering introduced. A comparison of average tariff with the tariff structure indicates UFW is much higher than the 14% recorded.

Thimphu

A very small utility which needs to improve water availability (12 hours) and UFW (37%), as well as metering (incomplete). Human resource management is weak (25.5 staff/1,000 connections), but financial management is sound (operating ratio of 0.60).

Tianjin

Consumer satisfaction is good but there is poor management of human resources (staff/1,000 connections ratio is 49.9) and water resources (UFW near 40% based on average tariff and tariff structure). On the plus side, financial management with local bond financing and low accounts receivable (0.12 month) is good, although operating ratio (1.05) could be improved.

Ulaanbaatar

A weak utility in terms of human resources and water management. High UFW (49%), continued use of public taps, little metering, very high staff/1,000 connections ratio, and non-24-hour supply, all need addressing. Apart from the 100% grant financing, which needs to be reduced, financial management is sound.

Ulsan

A well managed utility (note high management salaries), but could improve on coverage (84%) and reduction in UFW (33%), as well as elimination of grant financing.

Vientiane

The strong points about this utility are its 24-hour supply and low grant financing (1.5%). Coverage (54%) needs improvement as does the high staff/1,000 connections ratio (16.1). Elimination of public taps is also needed.

Yangon

Low consumer satisfaction with coverage (60%), water availability (12 hours) and consumption (67 l/c/d). UFW is high (60%) reflecting use of public taps; needs major improvement in metering. Financial management is strong (operating ratio of 0.27).

Private Sector Participation

Twenty-four of the fifty utilities have some form of private sector participation in operations and this trend can be expected to increase in the next few years. Major private sector management is either underway or proposed in Karachi, Kathmandu, Manila, Port Vila, Malé and Colombo. Other types of private sector participation noted include billing and collection, source development, production, pumping, leak repairs and meter reading.

Production Per Person *(Average – 0.32 m^3/d/person)*

This parameter measures overall efficiency of water resource use. Thus very low figures of Malé (0.03), Chennai (0.07), Cebu (0.08), Bandung (0.09), Dhaka (0.09), Faisalabad (0.09), Kathmandu (0.11), Jakarta (0.11) and Phnom Penh (0.12) reflect a shortage of available water resources. High figures such as Tashkent (1.28), Rarotonga (0.90), Almaty (0.72), Taipei (0.72), Apia (0.67), Bishkek (0.66), Shanghai (0.58), Honiara (0.58) and Bangkok (0.53), reflect either high UFW, or an abundance of water resources for non-domestic purposes.

Coverage *(Average – 81%)*

Out of the 50 utilities, 15 indicate 100% coverage and another 8, coverages from 97%-99%. Dhaka (42%), Bandung (42%), Jakarta (27%) and Cebu (23%) have the lowest coverage, due to shortage of water resources for development. It is of some concern that more than half the utilities studied show a strong need to improve coverage. Apart from development of water resources, more effort needs to be put into advocacy for the sector and public awareness to also increase willingness to pay for new services.

Water Availability *(Average – 19 hours/day)*

Only 26 out of 50 utilities provide a 24-hour water supply. This is of some concern, because it is not only a risk to health, but also affects metering and reduction of unaccounted for water. A number of city utilities are in a very bad way and these include Karachi (4 hours), Delhi (4 hours), Chennai (4 hours), Bandung (6 hours), Kathmandu (6 hours) and Faisalabad (7 hours). As mentioned elsewhere, 100% metering combined with high tariffs can help achieve 100% coverage with 24-hour water supply.

Consumption *(Average – 157 l/c/d)*

There has been considerable debate over the amount of water people need for domestic purposes and the amount they use. Often it has been stated that for religious or other reasons, people in hot tropical countries need to bathe several times a day and they are not wasting water. Be that as it may, when water is in short supply, of necessity, people make do on much much less, such as Malé on 16 l/c/d plus rainwater. Some of the other low consumption uses are Phnom Penh (32 l/c/d), Hanoi (45 l/c/d), Yangon (67 l/c/d), Nuku'alofa (78 l/c/d), Kathmandu (91 l/c/d), Thimphu (93 l/c/d), Dhaka (95 l/c/d) and Beijing (96 l/c/d). By contrast, there are a number of high consumption uses such as Apia (337 l/c/d), Port Vila (273 l/c/d), Rarotonga (267 l/c/d), Bangkok (265 l/c/d), Taipei (262 l/c/d) and Honiara (251 l/c/d). Note, that four out of six of these are island water supplies. One can reflect that Seoul (209 l/c/d), Manila (202 l/c/d), Singapore (183 l/c/d), Jakarta (135 l/c/d) and Hong Kong (112 l/c/d) get by on much less.

Unaccounted for Water (UFW)/ Non-Revenue Water (NRW) *(Average – 35%/40%)*

The worst examples of UFW are Rarotonga (70%), Hanoi (63%), Phnom Penh (61%) Lae (61%) and Mandalay (60%). The best examples are Singapore (6%), Malé (10%), Penang (20%) and Johor Bahru (21%). Given the shortage of water resources, low coverage and low water availability, more must be done by most utilities to reduce UFW. In order of priority this must be , elimination of public taps, 100% metering of production and consumption, repair of visible leaks, elimination of illegal connections and identification and repair of invisible leaks. Strong leadership and disciplined management is essential.

Average Tariff *(Average – US$0.36/$m^3$)*

It is noteable that among the 50 utilities, the average tariff ranges from lows of zero (Rarotonga) and US$0.01/$m^3$ (Calcutta), US$0.02/$m^3$ (Tashkent), US$0.03/$m^3$ (Delhi and Faisalabad) and US$0.05/$m^3$ (Beijing and Apia) to highs of US$4.86/$m^3$ (Malé), US$1.20/$m^3$ (Mandalay), US$0.66/$m^3$ (Cebu),

US$0.64/$m^3$ (Lae) and US$0.63/$m^3$ (Nuku'alofa). The average tariff is a good measure of the financial discipline of a utility and its autonomy to cover operational costs with revenues from tariffs. The average tariff must be the main tool in imposing demand management on the consumer public.

Water Bill *(Average – US$10/month)*

This varies from less than or close to US$1.00 per month for Rarotonga, Colombo, Ulaanbaatar, Hanoi, Beijing, Tianjin, Almaty, Bishkek, Tashkent, Faisalabad and Mumbai to over US$20.00 per month for Lae (US$52/month), Mandalay (US$51/month), Hong Kong (US$31/month), Malé (US$25/month) and Port Vila (US$22/month).

Power/Water Bill Ratio *(Average – 4.0)*

This figure can be a useful proxy for the affordability of water on the one hand, and the appropriate level of water tariff on the other. High ratios of greater than 4:1 indicate both affordability and too low a water tariff. Low ratios of 2:1 or less, indicate the tariff is reasonably high. Thus, Jakarta (1.0), Hong Kong (1.2), Medan (1.3), Lae (1.3), Cebu (1.5), Bandung (1.5), Almaty (1.5), Mandalay (1.6) and Vientiane (1.7) all have relatively high water tariffs. An exception is Calcutta (1.2) which also has an exceptionally low electricity tariff. By contrast, Faisalabad (18.5), Karachi (12.7), Tashkent (9.2), Kathmandu (7.8), Delhi (7.7) and Mumbai (7.3) all have too low a water tariff.

Public Taps

Extensive use of public taps represents not only a lower level of service, but also reduces water accountability and potential revenue, and increases water losses (by wastage). Almost 2/3 of the 50 utilities still have public tap service. It is very noticeable that the better utilities such as Singapore, Kuala Lumpur, Davao, Bangkok and Port Vila, do not have public taps.

Metering *(Average – 83%)*

This is perhaps the single most important area requiring improvement among water utilities. Half the utilities do not have 100% metering of production and consumption (let alone regular replacement of meters). Eight have incomplete metering, six some metering, ten very little metering and one (Calcutta) no metering at all. About 82% of house connections, 17% of public taps, 97% of industrial connections, 80% of commercial connections, and 88% of institutional connections are metered. In all, 83% of all connections are metered. If one assumes only 60% of meters are functioning correctly, (an optimistic assumption) then only 50% of all connections are adequately metered. There is great room for improvement here.

Operating Ratio *(Average – 1.05)*

A low operating ratio means revenues from tariffs cover the O&M costs comfortably. A ratio above one means they do not cover O&M costs. Nevertheless, some utilities include depreciation and debt service in the O&M costs and others do not, so it is not always fair to compare two utilities on this parameter. It is encouraging that 35 of the 50 utilities meet O&M costs. The worst performers are Apia (7.73), Calcutta (5.25), Hong Kong (1.63) and Delhi (1.48), while the best are Mandalay (0.22), Chonburi (0.34), Almaty (0.37) and Lae (0.39).

Staff/1,000 Connections Ratio *(Average – 11.8)*

This varies from lows of 0.8 (Ulsan), 1.1. (Taipei and Kuala Lumpur), 1.2 (Johor Bahru), 2.0 (Singapore) to highs of 49.9 (Tianjin), 33.3 (Mumbai), 27.7 (Chittagong), 27.2 (Beijing), 25.9 (Chennai) and 25.5 (Thimphu). Ulaanbaatar at 579.2 is exceptionally high due to the mainly bulk supplies. Noticeably, those utilities which have low figures, also contract out a number of their services, such as billing and collection and leak repairs. High staff numbers indicate low efficiency.

Management Salaries *(Average – US$15,010 p.a.)*

These range from a low of less than US$1,000 per annum (p.a.) to a high of around US$145,000 p. a. It is not difficult to see a strong correlation between high management salaries and good management. Good examples of this are Singapore, Seoul, Taipei, Hong Kong, Bangkok and Kuala Lumpur. So long as utility staff salaries are tied to government rates, which exclude hiring of highly qualified and experienced professionals, then water utility management will continue to be weak. What governments must recognize, is that a US$100 million per year operation cannot, and should not, be managed by unqualified, inexperienced and underpaid staff.

New Connection Fee *(Average – US$190)*

Despite much talk, little appears to have been done to assist lower income people in financial terms, to

facilitate taking up a direct connection to their households. Only a handful of utilities (mostly those in the Philippines) have introduced payment of the connection fee with a small deposit and the balance in installments with the water consumption charges over a period of 12 or more months. Some house connection fees (Seoul-US$1,977, Taipei-US$1,079, Yangon-US$906 and Ulsan-US$902) are extra-ordinarily high. The continued use of public taps, combined with the affordability of the connection fees, are certainly significant reasons for the low coverage rates in many utilities.

Accounts Receivable *(Average – 4.0 months)*

This parameter is a good measure of the efficiency of a utility in financial management. Generally, if accounts receivable are less than the equivalent of 3 months of sales, then it is manageable. But when it has risen to 6 or more months, it has got out of hand. Examples of the latter include Mumbai (19.7 months), Karachi (16.8 months), Faisalabad (12.0 months), Shanghai (11.1 months), Dhaka (11.0 months) and Chittagong (10.0 months).

Grant Financing *(Average – 35%)*

The percentage of capital investments for a utility, which are financed by grants, is a measure of the extent to which the utility is a drain on the government in terms of subsidies. In general, any utility serving a city of more than one million people should not have to rely on any grant financing, but instead, finance from own sources, government loans, commercial loans or local authority bonds. PWA in Thailand (Chonburi and Chiangmai), Tianjin and Manila are the only examples of the use of local authority bonds. Seoul, Taipei, Vientiane, Chennai, Nuku'alofa, Rarotonga, Bangkok, Manila and Kuala Lumpur have resorted to commercial financing. One hundred percent grant financing is utilized by 10 utilities and no grant financing by 19 utilities. The others have varying portions of grant financing. The utilities which should be weaned off grant financing are Hong Kong, Ho Chi Minh City, Karachi, Kathmandu, Colombo, Phnom Penh, Shanghai and Dhaka.

Capital Expenditure Per Connection
(Average – US$90.28)

It is certainly significant that 16 of the 50 utilities are spending more than US$100/connection per year on capital improvements. Given that coverage is generally inadequate, significantly more funds are needed for capital development, instead of utilities always playing catch-up to try to satisfy demand. Greater advocacy for the sector must be combined with more public awareness.

Annual Report

A responsible water utility will publish a glossy covered annual report on its operations within 6-9 months of the end of the reported year. The report should be closely scrutinized by a regulatory authority, the Ministry of Finance, the management of the utility, donors, the public and even the news media. If it is not produced in a timely manner, it becomes nothing more than an historical record, whereas it should be used as a monitoring device so that improvements can continually be made in operations. Bangkok and Singapore have good examples of timely, useful annual reports, but this is certainly an area in which much improvement is needed. The attention must initially be directed at ensuring quick and accurate auditing of the financial statements.

General Conclusions

The analysis of data indicates that utilities are improving in terms of financial management, but still have a way to go in terms of consumer satisfaction (coverage and hours of water availability) and human and water resources management. Attention needs to be focused on the following twelve points:

(i) Advocacy for more investment in the sector and greater coverage.
(ii) 24-hour water supply.
(iii) Demand management by pricing and public awareness.
(iv) 100 percent metering.
(v) Phasing out of public taps.
(vi) Reduction of UFW/NRW.
(vii) Reduction of staffing levels.
(viii) Reduction of grant financing.
(ix) Higher management salaries.
(x) Appropriate and timely annual reports.
(xi) Installments for payment of connection fees.
(xii) Higher domestic tariffs and improved collection efficiency.

TRENDS FOR 37 UTILITIES FROM FIRST TO SECOND DATA BOOK (1991 to 1995 Data)

Parameter	Change in Average
Water Production (m^3/day)	↑4%
Groundwater	From 12.5% of Production to 10.8%
Connections	↑6%
Public Taps	- 29%
Coverage of Population	From 75% to 79%
Water Availability	18.5 hours to 19.0 hours
Consumption (Domestic)	From 182 l/c/d to 159 l/c/d
Average Tariff	↑8%
Grant Financing	-13%
Staff Numbers	-2.5%
UFW	Unchanged at 35% of Production
Operating Ratio (O&M Cost/Billings)	From 0.97 to 0.89
Accounts Receivable	From 3.3 months of sales to 3.2 months

Comment. It is encouraging that all parameters (except UFW) show an improvement. The increase in water production and new connections represents an annual growth of about 3 percent per annum. The decrease in groundwater use as a percentage of total production can be expected, as few new groundwater developments are possible. The increase in level of services provided by water utilities is indicated with the decrease in use of public taps, increased hours of water availability and increased coverage of population. The fall in per capita consumption may reflect higher tariff levels and some demand management, or may also be due to serving more people with the same amount of water production. Financial management in terms of lower amounts of grant financing, reduced operating ratios, lower accounts receivable and higher average tariffs are a feature of the results. Also the decrease in total staff against an increase in connections is a good trend. However, much more attention needs to be given to reducing UFW, where no real progress has been made in the last four to five years. Not shown here, but of considerable significance, is the rapid increase in private sector participation which has occurred in the last five years.

THE CONSUMER SURVEY

The results of the consumer survey, which obtained data from 100 randomly selected consumers in each city, are summarized in Tables 2 and 3. In general, the consumer survey shows matters a little worse than that depicted by the utilities, especially in regard to the provision of 24-hour supply. On average, only two-thirds of those interviewed in the consumer surveys receive a 24-hour supply and the average number of hours of water supplied per day is only 11.4. In fact, only in four of the fifty cities do consumers confirm a 100 percent 24-hour supply. This finding can also be translated into the average percentage of people who drink water directly from the tap (a low 33%, despite 80% saying the water quality is satisfactory. Also, it seems that consumers are used to poor service, because an average of 84% of consumers are satisfied with the water utility performance. The average water bill of US$10 compares favorably with the average power bill of US$26. Bottled water use averages only 9%, but especially in the cities of Taipei, Bangkok, Kuala Lumpur, Jakarta, Chiangmai, Chonburi, Chennai and Ventiane bottled water is commonly used. The high average consumption of 36 m^3/month is partly the result of many households having as many as 10 persons, but also does reflect the need for higher tariffs to manage demand better. Another area for improvement is the average number of 3.6 days to respond to the repair of leaks. Unit costs vary greatly, but obviously domestic tariffs need to increase in Colombo, Karachi, Thimphu, Mumbai and Tashkent. Strangely, unit cost of water from public taps is much higher than from house connections in some cities such as Hanoi, Chennai, Kathmandu, Karachi and Port Vila, but much lower than from house connections in cities such as Colombo, Bandung and Shanghai. The consumer survey confirmed that the unit price of water from water vendors can range from 10 to 100 times the unit price from house connections.

In conclusion, water utilities could learn a lot about areas for improvement by having an independent, transparent and representative consumer survey each year. Also, if most people boil and/or filter their water, then these costs and the health implications should be accurately determined by research.

Table 2: SELECTED UNIT COSTS OF WATER FROM CONSUMER SURVEY
(US$/$m^3$)

City Name	House Connections	Public Tap	Water Vendor
Bandung	0.38	0.26	3.60
Bangkok	0.30	–	28.94
Chennai	0.30	0.58	–
Chonburi	0.38	–	19.33
Colombo	0.04	0.02	–
Dhaka	–	0.08	0.84
Hanoi	0.09	0.55	–
Karachi	0.10	1.44	1.14
Kathmandu	0.18	0.24	2.61
Lae	2.20	5.96	–
Malé	5.08	–	11.20
Manila	0.29	–	2.15
Mumbai	0.07	0.07	0.50
Phnom Penh	0.13	–	0.96
Port Vila	0.42	0.86	8.77
Seoul	0.25	14.13	21.32
Shanghai	0.08	0.06	–
Tashkent	0.01	0.02	–
Thimphu	0.03	0.05	–

Table 3: SUMMARY OF CONSUMER SURVEY RESULTS

City	24-hr (%)	Ave. Hours	HC Cons. (m^3)	Water Bill (US$)	Power Bill (US$)	Water Quality OK (%) [1]
Almaty	61	19.0	24	1.49	2.20	91
Apia	64	14.0	–	14.48	37.05	71
Bandung	70	8.6	22	8.23	12.61	85
Bangkok	80	13.0	35	10.45	37.77	89
Beijing	96	–	12	0.76	4.62	100
Bishkek	69	15.0	12	0.69	1.89	96
Calcutta	7	6.6	–	–	–	78
Cebu	79	10.9	30	14.90	21.77	92
Chennai	70	9.8	10	2.91	18.84	92
Chiangmai	74	6.8	26	5.37	19.83	45
Chittagong	4	3.4	90	8.67	18.98	64
Chonburi	47	13.0	19	7.29	26.87	55
Colombo	85	20.0	20	0.79	6.93	99
Davao	77	17.0	33	7.05	16.67	89
Delhi	16	4.9	–	1.76	13.63	91
Dhaka	41	9.0	139	11.16	37.59	67
Faisalabad	8	4.1	5	1.11	20.55	79
Hanoi	43	19.0	12	1.12	5.63	85
Ho Chi Minh	71	8.5	39	5.77	17.87	81
Hong Kong	98	–	–	31.41	36.79	71
Honiara	48	9.4	61	12.44	22.84	57
Jakarta	70	4.8	55	18.35	17.97	90
Johor Bahru	100	–	32	7.39	15.57	99
Karachi	3	3.7	51	5.01	64.59	71
Kathmandu	13	3.4	11	2.04	15.82	70
Kuala Lumpur	83	18.0	50	14.15	28.78	84
Lae	94	10.0	23	51.68	68.51	75
Lahore	6	17.0	58	5.54	26.89	77
Malé	86	–	5	24.48	81.42	76
Mandalay	83	–	41	50.72	79.73	97
Manila	73	13.0	44	12.81	41.52	91
Medan	100	–	45	14.84	19.30	100
Mumbai	14	5.5	19	1.42	10.31	85
Nuku'alofá	57	15.0	22	13.54	42.22	52
Penang	97	–	50	8.20	35.51	76
Phnom Penh	21	11.0	39	4.98	11.62	57
Port Vila	76	12.0	53	22.29	44.16	54
Rarotonga	80	6.9	–	–	–	64
Seoul	99	–	32	8.20	26.83	71
Shanghai	97	–	20	1.52	6.24	84
Singapore	100	24.0	28	12.24	45.03	100
Suva	84	10.0	48	11.19	30.61	96
Taipei	100	24.0	26	7.65	42.25	91
Tashkent	56	13.0	25	0.31	2.87	97
Thimphu	33	7.1	75	2.62	4.99	87
Tianjin	96	–	10	0.86	3.30	93
Ulaanbaatar	57	10.6	–	1.06	4.61	96
Ulsan	93	15.0	26	15.78	44.73	35
Vientiane	87	14.0	47	7.16	12.47	87
Yangon	66	7.3	41	18.54	35.94	83
Average	**65**	**11.4**	**36**	**10.26**	**25.93**	**80**

Notes: [1] Good or satisfactory combined.

Table 3: SUMMARY OF CONSUMER SURVEY RESULTS *(cont'd.)*

City	HC Drink Tap (%)	Bottled Water (%)	Pressure OK (%) [2]	No Interruption Last Month(%)	Repair (days)	WU Rating OK (%) [3]
Almaty	47	–	79	72	1.3	88
Apia	47	19	76	40	3.0	77
Bandung	0	10	57	78	5.1	78
Bangkok	3	43	42	57	7.0	89
Beijing	34	–	93	98	1.1	100
Bishkek	78	–	64	63	1.1	84
Calcutta	52	–	56	72	4.1	82
Cebu	88	–	99	56	4.7	96
Chennai	34	19	90	89	2.5	97
Chiangmai	4	73	50	88	1.7	85
Chittagong	40	7	18	16	2.7	25
Chonburi	8	33	47	67	4.1	76
Colombo	45	–	76	69	3.1	95
Davao	84	1	88	45	1.4	90
Delhi	62	9	64	71	2.2	90
Dhaka	6	–	40	77	–	59
Faisalabad	79	–	45	44	4.5	88
Hanoi	0	–	45	99	9.3	75
Ho Chi Minh	7	1	63	79	4.0	85
Hong Kong	1	2	94	81	–	94
Honiara	57	7	70	20	10.4	75
Jakarta	3	20	92	84	2.5	94
Johor Bahru	59	–	93	90	0.9	100
Karachi	21	5	20	44	6.6	56
Kathmandu	22	3	21	85	9.8	68
Kuala Lumpur	10	23	86	47	3.0	93
Lae	81	–	90	55	13.8	83
Lahore	77	–	100	93	1.5	95
Malé	71	7	81	94	1.5	82
Mandalay	7	–	96	95	1.6	100
Manila	47	4	73	74	6.4	90
Medan	0	4	95	100	1.1	97
Mumbai	58	–	84	83	4.4	86
Nuku'alofá	70	–	58	63	6.1	81
Penang	5	6	93	92	1.7	97
Phnom Penh	6	14	39	79	1.1	59
Port Vila	61	2	69	85	1.9	60
Rarotonga	35	23	73	45	3.1	69
Seoul	0	4	91	92	2.4	84
Shanghai	1	18	79	93	1.5	99
Singapore	17	–	98	96	0.1	100
Suva	77	1	87	72	4.0	91
Taipei	0	25	86	96	1.9	85
Tashkent	54	–	30	49	1.8	88
Thimphu	34	–	96	83	4.5	95
Tianjin	7	2	84	87	1.3	96
Ulaanbaatar	26	–	75	43	2.0	92
Ulsan	0	–	93	71	5.7	85
Vientiane	15	67	67	73	3.9	93
Yangon	30	–	70	64	1.0	76
Average	**33**	**9**	**72**	**72**	**3.6**	**84**

Notes: [2] High or adequate combined; [3] Good or fair combined. WU = Water Utility. HC = House Connection.

PRIVATE SECTOR PARTICIPATION

INTRODUCTION

The international water sector has recently become a more dynamic area of economic activity. Governments, particularly in developing countries, have been under pressure to make sustainable improvements in service standards, without increasing public investment and borrowing. Private sector participation (PSP) in the provision of water services is helping to meet that need. This report identifies the available PSP options, the principal considerations to be taken into account, and how a government or utility should go about entering into PSP arrangements. It illustrates the main features of PSP through an analysis of recent privatization activity involving case studies relating to:

Adelaide, Australia
Buenos Aires, Argentina
Gdansk, Poland
Jakarta, Indonesia
Johor, Malaysia
Macau
Manila, Philippines
Northumbrian Water, United Kingdom
Port Vila, Vanuatu
Santiago, Chile.

BACKGROUND

Water services have traditionally been provided within the public sector, in virtually all parts of the world, for social, economic and political reasons. They may be provided at a variety of levels within government, depending on a country's pattern of service development and the local legislation. Some agencies have an honorable record, with significant technical advances being made and long experience of the provision of safe drinking water.

Public sector provision can also be cost effective, but this is increasingly rare. In many areas, public services are not highly regarded and suffer from under-investment, overstaffing, low levels of pay, limited availability of technical equipment and consequent low morale and productivity. A study of municipal projects in developing countries found that revenues covered only 35 percent of the cost of water, and that unaccounted for water was in the range 40 percent to 60 percent. Staffing levels tend to be in the range 10 to 20 per 1,000 connections, compared with 2 to 3 per 1,000 in an efficient undertaking. This mainly results from:

- avoiding unpopular tariff increases
- increasing employment in public services for social reasons
- giving investment priority to other services such as national defense, social services and support to strategic industries
- failure to enforce quality standards.

In order to correct resultant deficiencies, governments frequently turn to the private sector. They do so to introduce higher levels of management and technical skills, to increase efficiency, and to realize the investment financing capability which private sector companies can bring to the service. Experience has shown that the benefit of major improvement initiatives can be short lived, if the existing utility and its financial framework remain unchanged. Governments therefore also turn to the private sector because improvements, once made, can be more easily sustained.

Government and the community benefit from a better structure for service provision, with more focus on delivering defined standards of service to the customer, a more efficient service, lower tariffs (in most cases), and increased certainty that service improvements can be financed, through the easing of capital constraints.

These benefits have to be balanced against the social costs associated with reducing the number of employees, and with increased tariffs where these are unavoidable. PSP can also have adverse effects on the balance of trade and currency flows, where international contractors and financiers are involved, as profits and financing charges are exported.

The private sector is attracted to participate in water supply to achieve growth and profit objectives. Governments and other stakeholders in the community need to be reconciled to profits being earned from water services. Companies have to provide a reasonable return for their shareholders, and will also be cautious about profitable projects which are cash negative in the early years. They will look for stable government, stable economic conditions, and fiscal and regulatory regimes which prevent future changes adversely affecting profitability. Costs of bidding for projects are over US$1 million for the larger contracts, and companies

will wish to ensure that projects are soundly based before committing such large sums of money, as there will be other projects competing for their attention.

The better PSP projects will refocus the sector on the service standards to be achieved, and will establish a financial and regulatory framework to ensure sustainable delivery of those standards. Given the increased formality involved, and the need for subsequent regulatory or contract management activity, PSP should not be regarded as an easy option, as it requires a significant discipline on the part of government and utility to establish the arrangements. Once set up, however, it does introduce the ability to consistently deliver higher levels of performance and customer satisfaction.

OPTIONS FOR PRIVATE SECTOR PARTICIPATION

There are a number of ways in which the resources and capabilities of the private sector can be mobilized in support of the water sector:

- contracts for services
- management contracts
- leasing contracts (*affermage*)
- operating concessions
- build, operate, transfer (BOT)
- full privatization.

These are summarized in Table 4: Options for Private Sector Participation, which shows the different scope of private sector activity for each alternative. They may be considered as individual options, or as a continuing path through which operational responsibility and risk are progressively transferred to the private sector, at a pace which matches the increased knowledge and supervisory expertise of the utility. The process is not irreversible, and provision may be made for services to be returned to the public sector in the future.

There are a number of features common to the PSP options, which are more significant as the level of private sector involvement increases:

- government must state its aspirations for service standards and service development
- a more realistic view is taken of cost, and therefore the phasing of investment and achievement of service improvements
- consumers expect private sector standards of service, often without considering the potential impact on charges
- the private sector can apply its experience, skills and ingenuity to the problems faced by government
- a realistic approach is taken to risk identification and sharing.

Risks are discussed below in relation to each of the PSP options identified, and fall into the following categories:

Table 4: OPTIONS FOR PRIVATE SECTOR PARTICIPATION

OPTION	EXAMPLE	OPERATION UNDER CONTRACT	SYSTEM MANAGEMENT	MAINTENANCE			INVESTMENT		ASSET OWNERSHIP	DURATION (years)
				planning	tasks	financing	planning	financing		
Contract for services	Santiago	private	public sector	public sector	public sector	public sector	public sector	public sector	Public sector	1 to 3
Management contract	Adelaide	private	private	private	private	public sector	public sector	public sector	Public sector	3 to 5
Leasing contract	Gdansk	private	private	private	private	private	private	public sector	Public sector	10 to 20
BOT	Johor	private	public sector	private	private	private	private	private	Company (time limited)	20 to 30
Concession	Buenos Aires, Jakarta, Macau, Port Vila	private	private	private	private	private	private	private	Company/ public sector	>10
Full privatization	Northumbrian Water	private	private	private	private	private	private	private	Company	Perpetuity

- political, relating to legislative, fiscal and regulatory change
- construction, relating to delays in completion or performance failings
- operational, relating to failure to achieve service standards and reliability
- revenue, relating to income falling below expectations.

Risks need to be managed, and assigned to those parties most able to control them. There is a relationship between risk and reward, and if the private sector is asked to take on risks that are outside its operational control it will expect higher returns. Financing parties will expect not only their own risks to be covered (which helps to reduce borrowing costs), but also those elements which would otherwise threaten the stability of returns.

The scope and nature of PSP will vary from one country to another according to cultural and legal requirements, the status of the utility, and the particular problems being addressed. The way in which PSP is approached by government will have significant implications for the success of the venture in meeting the legitimate aspirations of all parties. PSP is a matter of finding the right balance between varying, and sometimes conflicting objectives.

Contracts for Services

Public sector bodies can contract out services, subject to any prevailing rules or legislation on procurement practices, and subject to the local availability of a sufficiently strong and experienced commercial sector. This outsourcing may be for consultancy and professional support (for capital projects this could relate to design, feasibility studies, and site supervision) or for specific tasks involving administrative or operational activities (for example: mains repair, billing and collection, meter reading, computing and laboratory services, vehicle and plant maintenance). Contracts are likely to be for a limited purpose or a limited period (often subject to annual renewal), and payment could be based on inputs (time and materials), a bid price, or on outputs (volume of work carried out). Ownership of assets, and overall control of the activity remain the responsibility of the utility.

The main reasons for contracting out are to:

- acquire independent advice
- access technical skills which are not available from existing staff
- introduce private sector management expertise
- avoid public sector employment rules
- introduce efficiency savings (maximized by competitive tendering).

The utility will need to consider:

- whether to retain an in house capability for strategic or comparison purposes
- the competence and capacity of the contracting sector
- how to ensure value for money (e.g. through competition)
- how to supervise the contract (e.g. through performance measures)
- how to remunerate the contractor
- what redress is available in the event of non or inadequate performance
- what happens at the end of the contract
- how to ensure a fair allocation of risk between the contracting parties
- what transitional arrangements are needed relating to existing employees whose jobs may be affected
- how to integrate contractual commitment and budgetary provision to ensure continuity of service at renewal dates.

Entering into such arrangements is relatively straightforward, involving:

- identification of need
- specification of service required, with related performance criteria and budgetary or input limits
- advertisement of services required in relevant and appropriate media
- analysis of response
- selection and award of contract
- monitoring of performance and budgetary control.

In contracting out operational and administrative activities, it is important to identify performance standards that are realistic and that can be monitored. Examples are:

- billing system operation:
  - the percentage of bills sent out within 7 days of meter reading
  - the proportion of bills containing errors
- laboratory services:
  - the number of samples routinely analyzed
- maintenance activity:
  - number of maintenance visits

– completion of specified tasks
– number of unscheduled stoppages of equipment.

The arrangement provides flexibility for the utility without long term commitment, and provides an opportunity to establish pilot studies before embarking on more significant outsourcing contracts. The scope and the success of such outsourcing depend on the capacity and expertise of the local business sectors. For smaller utilities, such as Port Vila, Vanuatu there will be little external experience of main laying, or mains refurbishment (for example), and this may well be true in utilities whose populations range up to 500,000. By contrast, in England there is a large and competent contracting sector which organizations such as Northumbrian Water can access on a competitive basis. The public sector utility in Santiago makes extensive use of outsourcing as a method of improving and maintaining high efficiency levels. In Jakarta and Manila, the utilities have used contractors to undertake specific aspects of revenue billing and collection for reasons of efficiency and security.

Management Contracts

Such contracts further extend the principles of contracts for services, involving the private company in delivering a complete and relatively self-contained service. This could range from managing a particular works to a complete service for the whole of the water supply and distribution activity. Consequently the contracts are likely to be subject to formal bidding procedures, and for a somewhat longer duration (3 to 5 years is typical for smaller contracts, but they can range up to 25 years for large projects and those involving revenue collection). The contractor is not required to finance investment to extend or improve facilities. Remuneration is normally by way of a management fee, which could have fixed and variable components. Many of the larger contracts also include revenue collection to improve efficiency, but money is collected on behalf of the utility and revenue risk is not transferred to the private sector. Puerto Rico, Cartegena, Colombia and Kelantan, Malaysia feature this type of arrangement. The contractor has a greater opportunity and motivation to use its expertise to achieve significant efficiency improvements and technological progress. Such arrangements have recently been successfully implemented in Adelaide, Australia and are introducing additional technical expertise, improved efficiency and additional capital program management skills to the sector. Unusually, the private company is also required to develop the capability of the existing State utility to carry out work in the rest of the Asian and Pacific region, and partly for this reason the contract is for a rather longer duration than is customary (15 years). Management contracts have also been used in Puerto Rico to deal with water shortages, failing environmental standards and the continuing subsidy requirements of the utility. Similar progress is being made in such places as Trinidad and Tobago, and Chennai, India.

Because of the nature of management contracts, only operational risk is normally transferred to the private sector. This option is therefore appropriate for those utilities who wish to retain, or who are unable to transfer, responsibility for investment finance to the private sector. It is unlikely that such contracts will require change in national legislation before implementation, and they may therefore enable relatively speedy access to the management and technical expertise of the private sector.

The main reasons for entering into management contracts are to:

- access technical skills which are not available from existing staff
- introduce private sector management expertise
- avoid public sector employment rules
- introduce efficiency improvements (maximized by competitive tendering)
- increase the focus on service standards.

The considerations and the process for entering into such contracts are very similar to that for contracts for services. More detailed definition will be needed in the areas of:

- relative responsibilities of the contracting parties
- performance standards and supervision arrangements
- tendering and contract letting procedures
- basis of remuneration, including tariff policy in those cases where the contractor collects revenue in their own right
- approach to leakage control in distribution contracts
- approach to asset maintenance
- procedures to be followed in the event of a contractual dispute or poor performance
- regulatory authority
- arrangements for investment financing.

Leasing Contracts (Affermage)

Leasing contracts involve a private sector company taking responsibility for managing, operating

and maintaining an existing infrastructure (normally at a small annual "rent"). It will not normally involve financing investment in refurbishing or extending the network or the provision of new facilities, but profits may be reinvested for further improvements. Contracts will typically be of 10 to 20 years duration. This arrangement works well where service provision is established and relatively stable, but not where the existing utility finds it difficult to deliver services effectively, either through lack of technical expertise, or through the constraints of public sector employment and procurement practices.

The lessee assumes responsibility for customer relations and tariff collection (and therefore revenue risk), but has more autonomy in carrying out operational activities. The degree of operational risk is therefore limited, and more easily controlled by the lessee. The balance between risk and opportunity needs to be carefully addressed in the establishment of leasing contracts, and the relative responsibilities of the utility and the lessee must be well documented.

There are many instances of successful lease contracts, notably in France, but among the case studies Gdansk is an example of a contract that did not fully reflect the aspirations of both parties. After some early contractual difficulties, it is delivering improved performance, but is dependent on the municipality organizing the finance to facilitate further service improvements. In Thailand, East Water was set up in 1994 as a subsidiary of the Provincial Waterworks Authority to increase efficiency in water management and to expand raw water coverage quickly without creating a financial burden for government. Water shortages had previously been a major obstacle to economic development in the region. Water sold has increased from 24 million cubic meters in 1993 to around 46 million, and non-revenue water is now down to 5 per cent. There are plans for East Water to become a full private company in the future. Leasing contracts are extensively used in France and Spain, and also exist in Guinea, Africa, North Bohemia, Czech Republic and Antalya, Turkey.

The main reasons for entering into leasing contracts are to:

- access technical skills which are not available from existing staff
- introduce private sector management expertise
- avoid public sector employment rules
- introduce efficiency improvements (maximized by competitive tendering)
- increase the focus on service standards
- increase the financial input of the private sector, to cover working capital.

The considerations and the process for entering into such contracts is very similar to that for management contracts, but provisions relating to unaccounted for water and remuneration of the lessee are likely to be rather more complex, recognizing that these are key risk areas for the lessee. Similarly, utilities will recognize asset maintenance and customer relations as requiring more specific control provisions, to safeguard their own interests.

Operating Concessions (Franchising)

Operationally, concessions are similar to lease contracts, but differ in that the concessionaire is also responsible for financing new investment. In this way, construction, as well as revenue risk, is passed to the private sector, and it provides further incentives on the concessionaire to improve overall efficiency, particularly in relation to the extension of service coverage.

Contracts are likely to be for a longer period (up to 30 years) particularly where the concessionaire is required to finance a large capital investment program. Consequently, there can be a significant lead time to the introduction of concessions, up to two years is not unusual, and this period typically involves significant activity in documenting existing service facilities and arrangements, to ensure that risks are comprehensively identified and addressed. Contracts are normally let through competitive tender, although there are some examples of negotiated contracts, such as those in Jakarta.

In Buenos Aires, the concession introduced additional financing, improvements in efficiency and service standards, while reducing tariffs in the early period of the concession. The contract ensures that local labor is trained and deployed on construction works, adding community benefits to service benefits. Some initial difficulties were encountered in regulating the concessionaire, as regulation is through a new single purpose body. In Jakarta, a modified concession is being used, with concessionaires being remunerated for volumes of water supplied. The incentives are maintained through separate non-revenue water targets, and this may be a more attractive model for those countries where legislation restricts the ability of concessionaires to collect income for themselves. Jakarta is the subject of two negotiated contracts, with the area being divided on a geographical basis. The concessionaires are responsible for introducing the necessary capital financing. A similar division exists in Manila, where competitively bid contracts were awarded in early 1997. For technical and legal reasons, the companies in Manila are also

responsible for a joint venture company managing shared resources. The residuary utility still manages some upstream facilities.

The system of regulation is particularly important in these larger concession arrangements, because of the potential risks to the concessionaire, and it is important that the regulatory system, and the performance objectives on which it is based, are clearly identified in the concession contract. In addition, certain risks would normally be identified and dealt with in the contract, particularly those political risks which are outside the control of the concessionaire.

The main reasons for entering into concession contracts are to:

- access technical skills which are not available from existing staff
- introduce private sector management expertise
- avoid public sector employment rules
- introduce efficiency improvements (maximized by competitive tendering)
- increase the focus on service standards
- increase the financial input of the private sector, to cover working capital and investment costs related to maintaining and improving the system.

The considerations and the process for entering into such contracts are more extensive, reflecting the more complex relationships involved, the potential vulnerability on both sides, and the long term nature of the contract. Typically, the process will include:

(i) government review of:
  - institutional framework, including legislative constraints
  - utility finances
  - existing infrastructure
  - future service standards required, and phasing
  - technical and financial impact of new standards;

(ii) government decision on PSP strategy, including:
  - nature of concession arrangements
  - allocation of residual debt costs
  - extent of government financial support and guarantees
  - in some cases, continued access to loans from international lending agencies, where this is appropriate and available
  - range of acceptable tariffs
  - legal and financial commitments by government itself
  - process for bidding and award of contracts (including any requirement for separate technical submissions and rate bids)
  - arrangements for subsequent contract supervision and regulation; and

(iii) preparation by the utility of:
  - documentation for interested parties (including relevant data)
  - contract documentation
  - procedures for (neutral) support to potential bidders' feasibility studies
  - invitations for expressions of interest
  - invitations for pre-qualification of bidders
  - tender documents (including draft contracts)
  - management of the selection and award process by government and utility (preferably involving independent third parties in a monitoring role).

BOT Schemes

Major investment in new facilities, such as dams, reservoirs and treatment works, has often proved problematic for utilities and governments. BOT schemes evolved to meet this need, and their structure has been heavily influenced by the financial institutions. Their early popularity has declined somewhat, with the realization that failure to properly manage downstream facilities (and in particular, to control leakage) can negate the effect of improved quantity and quality of the water supplied by the project. More attention is now being given to initiatives which address all of a utility's difficulties.

For ad hoc projects, the BOT structure still works well, providing for a company to *Build* a treatment works, to *Operate* it under license, and to subsequently *Transfer* it to the ownership of the utility at the end of a specified period. Because of the capital intensive nature of the contract, the duration will normally be in excess of 10 years. Variants of this approach include:

- BOO – Build, Own, Operate
- BLT – Build, Lease, Transfer
- BTO – Build, Transfer, Operate

Finance is normally arranged through the BOT contractor, using commercial lenders, and in some cases, bilateral loans. The involvement of financiers in the detail of the contract leads to more formal measures for dealing with risks, and a number of guarantees are normally included in the legal arrangements. These include:

(i) by the Concession company:
- a project completion certificate
- performance guarantees
- construction guarantees on standards
- physical condition on transfer

(ii) by the Utility:
- availability of land
- exclusive rights to operate the concession
- payments to the concession company

(iii) by the State:
- income guarantees
- limitation of liability arising from political risk
- limitation of liability arising from exchange rate risk, and

(iv) by other parties:
- partial guarantees for project and credit risk.

The main reasons for entering into BOT contracts are to:

- access the technical skills of the private sector in creating an asset with defined performance characteristics
- use private sector management skills to ensure that the asset is operated efficiently and to defined standards
- ensure that the asset is handed over in good condition at the end of the contract
- access private sector finance, to cover working capital and the costs of building the asset and maintaining it
- increase the focus on service standards

The process for entering into such contracts is likely to be very similar to that for operating concessions, except that the rate bids are likely to be based on output volumes rather than tariffs.

Again, there is a significant preliminary effort in specifying the terms of the BOT scheme and in letting the main contract. Because of the nature of the contract, and the guarantees associated with it, all significant risks will have been identified and allocated to the party most able to influence them. Once the contract has been let, the prime responsibility for service provision rests with the contracting company or consortium, relieving the utility of tasks for which specialist skills may be in short supply (e.g. wastewater treatment facility design, commissioning) and of the undoubted burden of financing the investment. The BOT arrangements in Johor came about mainly through the absence of funding from traditional, government sources.

Full Privatization

This option is essentially a sale of the business by the State, as in the sale of Northumbrian Water, and others, in the United Kingdom. It requires:

- the creation of a new Company
- the transfer into that Company of all assets and liabilities of the former public body
- the sale of the Company as a going concern, via placement or by public share subscription

The main features of full privatization are that it is the most complex, most expensive and has the longest lead time of any option (potentially in excess of 2 years). It is also virtually permanent, with assets passing out of public ownership. For these reasons, it is unlikely that other countries will follow the United Kingdom model and move straight to full privatization without passing through one of the other PSP options first. East Water in Thailand, for example, is a company set up as a subsidiary of the Provincial Waterworks Authority, enjoying a leasing contract for the provision of water services. It plans to fully privatize by public share offer in two stages.

Where full privatization has been achieved, companies will have all of the rights and responsibilities of normal commercial entities, but will have additional constraints identified in the legislation which established them. This recognizes that the provision of water services normally remains a monopoly. Consequently, the consumer needs protection from potential abuse of monopoly power, through increasing tariffs, falling service standards, environmental neglect, and the pursuit of short term profits at the expense of long term service requirements.

Companies are therefore subject to quality, environmental and economic regulation. Their prices are controlled and standards are strictly monitored. Legal and financial penalties are available as a remedy for transgressions and can act as a powerful deterrent. Systems of comparative competition can also act as a powerful incentive to outperform target levels of service. There are different systems of price control available. Historically, rate of return control has been the main method, particularly in the United States, but this can remove incentives for efficiency in capital investment, effectively rewarding spending. Medium term price cap control allows the company

to keep efficiency savings until the next price review, when prices are re-set to return efficiency gains to the customers. This maximizes the incentives for efficiency, and has proved extremely potent in the United Kingdom.

The main reason for full privatization is to:

- remove public sector practices relating to employment and procurement
- provide maximum incentives for efficiency gains, which are heavily influenced by the ownership of assets
- increase the focus on service standards
- transfer to the private sector the responsibility for financing working capital and investment costs related to maintaining and improving the system
- provide maximum autonomy to the company in improving overall business performance
- provide competition through share price and potential take over activity, as a further stimulus to efficiency
- ensure that the PSP process is permanent.

Northumbrian Water was privatized in 1989, as part of the privatization of the water industry of England and Wales. Significant improvements in efficiency and service standards have been delivered since that time. This has been achieved by providing economic incentives through price formula (medium term price cap control) along with maximum management autonomy. In addition the certainty of the financial framework, enabled Northumbrian Water to negotiate a 1,400 million pounds sterling multi-currency, revolving loan facility to finance its investment program, and therefore a greater degree of certainty over its ability to deliver planned service improvements. The UK government has subsequently been criticized for selling the businesses too cheaply, and for failing to ensure a reasonable balance between the interests of customer and shareholder. The regulatory framework does provide for imbalances to be corrected through price reviews.

CRITERIA FOR IDENTIFICATION OF PREFERRED OPTION

The main criterion for selecting a particular option, is whether it will deliver the service requirements at an affordable price (at least cost). A number of PSP options are likely to meet this objective, and governments and agencies may wish to specify subsidiary criteria against which options should be evaluated. The choice will depend on political, economic and social factors which vary from one country to another.

The subsidiary criteria most frequently observed include:

- transparency – ensuring clear and objective relationships
- competition – used to help avoid overpricing
- independent regulation – to avoid political and commercial pressures, and to protect customer's interests (price and service standards)
- risks – allocating individual risks to the party most able to control them
- autonomy – ensuring that the service provider can develop independent solutions to problems and has freedom from political interference
- opportunities – obtaining supplementary benefits such as capacity building:

  (i) by stimulating the ability of the country's financial institutions to lend to the water sector,
  (ii) by using local companies to provide more extensive services to the sector, and
  (iii) by involving local communities in the provision of services to the contractor.

- technology/skills transfer – ensuring long term sustainability
- access to funds from multilateral lending agencies
- access to public subsidy
- access to private sector financing
- time – length of time needed before improvements are achieved
- ownership – retaining assets in the public sector.

Table 5: Private Sector Participation Considerations, shows the main features of each option, and identifies the key factors which influence a decision on which PSP option is appropriate for individual circumstances. Table 6: Private Sector Participation Case Study Comparison compares ten water utilities' involvement in different areas of PSP.

CRITERIA FOR SUCCESSFUL PSP

Experience has shown that the most successful PSP arrangements are those which feature:

- whole-hearted government political and financial commitment including:

  (i) endorsement of the tariff policy

Table 5: PRIVATE SECTOR PARTICIPATION CONSIDERATIONS

FEATURE	TYPE OF PSP					
	CONTRACTS FOR SERVICES	MANAGEMENT CONTRACT	LEASE CONTRACT	CONCESSION	BOT CONTRACT	FULL PRIVATIZATION
Objective of PSP	Access to specific skills, and efficiency improvements	Access to management skills and efficiency improvement	Access to management skills and efficiency improvement	Efficiency improvement and access to private finance	Access to private finance and technical skills	Efficiency improvement and access to private finance
Sector strategy required	No	Not essential	Desirable	Desirable	Desirable/Essential	Essential
Competition advisable	Yes, but could be benchmarked	Yes, but may be negotiated after ranking proposals	Yes, but may be negotiated after ranking proposals	Yes	Yes	Yes
Responsibility for customer tariffs	Government	Government	Government	Concessionaire, according to formula	Government	Company, subject to regulatory constraint
Responsibility for investment funding	Government	Government	Government	Concessionaire	Company	Company
Remuneration method	Agreed fee, could be volume based	Fee plus variable component	Tariff revenue	Rates as per bid tariff	Volume related fee	Tariff based
Breadth of management freedom	Low	Medium	Medium to high	High	High	High
Performance criteria needed	Yes	Yes	Yes	Yes	Yes	Yes
Complexity of supervision/ regulation	Low	Medium	Medium	Medium to high (according to size)	Medium to high	High
Concessionary finance available	Not applicable	Possible	Possible	Under specific circumstances only	Under specific circumstances only	No
Capacity building potential	Low	Medium	Medium	Medium	Low	Medium
Examples of successful initiatives	Santiago, Jakarta, Manila and others	Adelaide	Gdansk	Buenos Aires, Jakarta, Macau, Manila, Port Vila	Johor	Northumbrian Water

(ii) endorsement of the personnel policies arising from the change to private sector status

(iii) ensuring access to reliable sources of water to permit improvement in service standards

- a sound legal system which facilitates the involvement of the private sector in all aspects of service provision
- a clear and unambiguous contract
- an appropriate regulatory framework to ensure achievement of required performance
- remuneration arrangements which make it possible for the contractor to finance their activities in the long term, particularly in relation to debt servicing and the required rate of return on investment
- the identification and allocation of risks which might otherwise deter the private sector entrant, or require a higher return
- appropriate provisions to ensure continuity of service in the event of major dispute, and for the resolution of such disputes
- the support of international lending agencies in cases where access to such sources of finance are still needed, or where there are significant programs of lending to ongoing projects
- potential for growth in numbers of service connections

Table 6: PRIVATE SECTOR PARTICIPATION CASE STUDY COMPARISON

Feature	Adelaide	Buenos Aires	Gdansk	Jakarta	Johor
Former body	Corporatised state department	Public company	Regional water utility (municipality controlled)	Government owned and controlled company	Not yet privatised
Nature of PSP	Outsourced management and operations	Concession	Lease contract to public/ private partnership	Two, area based, modified concessions	Coporatised body, supervises concession contract
Functions	Water and wastewater	Water and wastewater	Water and wastewater	Water	Bulk supply of treated water
Remuneration mechanism	Annual fee	Tariff income	Tariff income with rate of return limit	Volumes of water delivered	Fixed and volumetric charges
Period of contract	15 years	30 years	30 years	25 years	20 years
Date of transfer	1996	1993	1993	1998 (planned)	1992
Service area	Adelaide and hinterland	Buenos Aires and 14 districts	Cities of Gdansk and Sopot	Jakarta region	Johor Bahru
Population served (water)	1.2 million	8.6 million	500,000	10 million	2.4 million
Water service coverage before PSP	100%	70%	96%	40%	n/a
Performance targets (water)	– water quality standards – management of capital programme – inward investment	– coverage 100% – UFW from 43% to 25% (over life of concession)	– water quality standards – network rehabilitation	– coverage 70% after 5 years – local water standards – UFW reductions	– national quality standards
Investment	$500 million (including wastewater)	$4 billion (including wastewater)	$100 million over 5 years, then $4 million per annum	$500 million in first 5 years	RM800 million to 1996
Investment Financing	State	Concessionaire with IDB & IFC support	Municipality	Concession companies	Concession company
Tariff regime	Determined by State, income collected by State	Set by bid, adjusted after year one: currently lower by 17%; 5 year reviews	Annual negotiation. No clear mechanism for adjustment	Government controlled	State controlled, not annual
Financial incentives for PSP	None	– Early retirement of 1,600 employees – assets free	None	None	None
Regulation	By State, no problems evident	Ad hoc body; some difficulties over investment	Municipality, complex and unclear	By residual utility	State body for JWC which supervised concession
Employee arrangements	450 employee surplus left with utility	7,600 reduced to 4,000	Allocated to municipality or to JV	No reductions, 80% of staff to be former utility staff	Government controls on reductions

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Table 6: PRIVATE SECTOR PARTICIPATION CASE STUDY COMPARISON *(cont'd.)*

Feature	Macau	Manila	Northumbrian	Port Vila	Santiago
Former body	Various	Government owned and controlled corporation	Regional water authority	Public works department	None, EMOS is a government controlled shareholder company
Nature of PSP	Concession	Concession (2 areas)	Full privatisation	Concession	Service contracts
Functions	Water	Water and wastewater	Water and wastewater	Water	Ad hoc service activities
Remuneration mechanism	Tariff income	Tariff income	Tariff income	Tariff income, minimum rate of return	Fees subject to bid rates
Period of contract	25 years	25 years	In perpetuity according to license conditions	40 years	2 years for service contracts
Date of transfer	1985	1997	1989	1993	Not applicable
Service area	Macau area	Greater Manila	Regional catchment	Port Vila area	Greater Santiago and surrounding area
Population served (water)	450,000	6 million	2.6 million	30,000	5 million
Water service coverage before PSP	Unclear	67%	98%	67%	99%
Performance targets (water)	– 100% coverage – UFW reduction – EU quality standards – 24 hour supply, under pressure	– 98% for water – uninterrupted 24 hour supply – 16 psi minimum pressure – effluent standards	– EU water quality standards – national effluent standards – range of customer standards	– water quality – interruption to supply – programme of works	Improved quality of services and standards
Investment	$60 million over last 11 years	$5-7 billion (water and wastewater)	$900 million (water and wastewater)	Vatu 1.8 billion in first 20 years	$600 million for wastewater over 15 years
Investment Financing	Concession company	Concession company and ADB for ongoing projects	Private sector	Soft bilateral loans	Cash flow and $55 million loan ex World Bank
Tariff regime	Initial financing included soft bilateral loan Annual negotiation Tariffs have reduced in real terms	As bid	Price cap regulation	Government controlled, 5 yearly review	Government controlled
Financial incentives for PSP	None	Some tax breaks	– some debt write off and cash injection – tax breaks	None	Subsidy to low income and rural consumers
Regulation	Government, non contentious	Separate unit, via residuary utility	Independent water, environment and economic regulation	Government query over expertise	Government, based on benchmark performance
Employee arrangements	Inherited from predecessor company, no reductions	– Some redundancy – Provision for further redundancy by companies	At discretion of company	130 local staff retained	Company discretion

FINDINGS OF BANK STUDY TOUR ON PRIVATE SECTOR PARTICIPATION IN WATER SUPPLY (Malaysia, Macau, Vanuatu)

- The overall objective must be economic and social development.
- Although privatization may be considered a process of greater and greater involvement of the private sector (such as in Malaysia), in most cases, it is better to refer to it as private sector participation (PSP).
- The main two reasons for use of PSP are for improved efficiencies in resource management and for greater investment potential.
- PSP is not always needed, if the enabling environment is already appropriate, such as the public sector in Singapore.
- There is no blueprint solution — every utility must be assessed on its own merits.
- A regulatory authority is essential — with no conflict of interest.
- A defined tariff policy, including a mechanism for tariff adjustment is essential.
- A means of providing adequate capital investment must be determined — perhaps outside the PSP.
- Economic, social and environmental costs should be assessed.
- The government should state the objectives of PSP and provide strong commitment.
- Don't rush into PSP — take time to become well informed before making a decision on the exact nature of the PSP. Design of PSP is an art not a science.
- Contracts must be tendered with competition and negotiations with the first ranked conducted in a transparent manner.
- The needs of all stakeholders should be defined and addressed.
- Foreign technical expertise combined with local business-social-cultural knowledge is the ideal combination. The major shareholder should preferably be local.
- Reliable, low cost, water resources and a potential for growth in demand, are two key factors looked for by the private sector in considering PSP.
- Mutual respect between the contractor and the government is needed. The spirit of the contract is often more important than the legal words. Elements of risk should be identified and suitably apportioned according to rewards/ incentives.
- Governments do not usually have expertise in assessing and negotiating PSP contracts — unlike the private sector.
- There is a need for more competition in PSP.
- The first five years is critical for financial matters and the use of soft loans during this period is not only common, but very necessary.
- The top down approach needs good public relations, public awareness and public conditioning to succeed.
- Incentives to improve performance must be provided, but care should be taken that some incentives do not adversely effect others.
- The level of consumer income is a factor to be taken into account.
- The retrenchment of staff needs to be considered — but it is not always necessary.
- Even a very small utility, such as Port Vila in Vanuatu, can be commercially viable under PSP.
- In most cases, PSP leads to improved performance.

Introduction

The Data Book provides information which allows water utilities to assess their rating among one another for various performance parameters. This will identify the good performers. It would be appropriate for the poorer performers to approach the better performers for assistance in improving their operations. This Best Practice section of the Data Book looks at a few best practices which complement the performance parameters used in the Data Book.

Advocacy for Water Supply

There is no doubt that the quality of water supply services in developing countries reflects the lack of advocacy for the sector. More investment is needed, but also more attention needs to be paid to the sustainability of those investments. That means more qualified and better trained staff and better O&M practices. Water supply development promotes economic growth, improves the health and welfare of the people and reduces the burden of women. Failure of a water supply to a major city may have horrendous implications, so we cannot allow development in this sector to lag. It has been said that the most important problem facing mankind in the 21st century will be water, because it is becoming scarce and there is considerable competition for its use. All stakeholders in the sector including consumers, government, utility, donors, and consultants, should be vocal in advocating more investment in this sector.

Competing Water Use

There is much to be done in most developing countries on this subject. With economic analysis of water supply projects now mandatory in the Bank, special case studies are being prepared to look at the competing uses of water resources for water supply and irrigation purposes in particular. Governments need to know in a transparent manner what effective financial subsidies are being provided to the farmers when they are given preference over domestic water supplies in the development and use of water. This is not a simple problem. There are historical, religious, social, political, environmental, financial, economic, and technical considerations to be evaluated in a balanced manner and no two situations will be identical. Governments must be encouraged to provide clear policies and guidelines in the resolution of these matters.

Private Sector Participation

Elsewhere in the Data Book there is a special overview of private sector participation (PSP) in the sector. It will suffice to note here that the contracting out of services to the private sector has noticeably increased in the four years since the first Data Book. Malaysia (Johor and Kuala Lumpur) is a particularly good example. Staff/1,000 connections in Johor Water Company (1.2) and Selangor Waterworks Department (1.4) reflect the use of the private sector in providing bulk water, billing and collection, and leak repairs. Other PSP alternatives being implemented in the region are build-operate-transfer (BOT) of water production facilities, management contracting of O&M, leasing arrangements (otherwise known as *affermage*) and concession agreements. There are normally two main reasons for considering PSP. One reason is the lack of efficiency in the public management of human, financial and water resources, resulting in poor service to the consumer. The other reason is that the private sector can bring in funding for capital development (although the terms of such financing will normally be much more severe than conventional sources such as multilateral development banks). In PSP alternatives, a number of partners may associate. These may include a foreign water supply contractor, a local firm (not necessarily in the water business), the municipality, the water authority and the government.

Service to the Urban Poor

It is time for developing countries to give specific attention to providing formalized piped water supply services to the urban poor, regardless of whether or not they have land tenure. This is best done through a metered bulk supply which is paid for by the community. First, it addresses the question of equitable development (not just for the rich). Second, it dramatically reduces the unit cost of water to the poor. Third, it will reduce the health risk not only to the poor, but also to the people who make daily contact with them. Fourth, the utility will gain more water to serve others and more revenue too. Fifth, it will help to stamp out corruption and exploitation

of the poor. Sixth, it will help to mobilize urban poor communities to help themselves. It is significant, that in Manila, with the recent privatization of water supply services a formal policy of service to the urban poor will be introduced.

Autonomy

Autonomy is manifested in the three main areas of staffing, finance and procurement of goods and services. Singapore's Public Utilities Board (PUB) is an excellent example of a public utility which pays its staff and management well and so obtains top quality performers. With many water utilities having an annual turnover of more than $10 million, it is in the public interest to have the best qualified and experienced staff managing these funds. Singapore PUB also has a small but efficient staff with a staff/1,000 connections ratio of 2.0. Utilities need autonomy in finance. This means a clearly defined tariff policy and freedom to implement that policy. It also means financial authority to make decisions and have them implemented quickly. Especially in matters which affect O&M, the utility must have the autonomy to make procurement at short notice, without being bound up in bureaucracy. The Metropolitan Waterworks Authority (MWA) in Bangkok is a good example of a utility which has financial autonomy and a performance which allows it to obtain considerable capital financing from the local bond market. In the Bank's experience, autonomy also goes hand in hand with strong leadership and management skills. MWA and Singapore PUB exhibit these qualities too. Brain drain is a problem for especially the relatively small developing countries. This can be minimized in this sector through increased autonomy of water utilities. If the enabling environment which exists in Singapore and Bangkok cannot be replicated in other countries, then autonomy must be sought through artificial means, such as introduction of the private sector into at least the management functions.

Tariffs and Financial Management

In setting tariffs, the first consideration must be a consistent transparent tariff policy endorsed by the government. Subsidies given by the government to the sector as well as so called "cross-subsidies" within the sector need to be clearly outlined. Demand management through higher rates for high consumption and a lifeline rate where there are urban poor, should be considered in the tariff structure. The mechanism for tariff adjustments must be defined. Ideally an independent regulatory authority should be established to monitor and approve tariffs. This is essential when the private sector becomes involved in the management of water supplies. Tariffs should take into account loan covenants agreed with major funders of capital works. Particularly in the larger cities, the grant financing of water supply investments needs to be phased out, so that the burden on the government to provide these subsidies is eliminated. At the same time, water utilities need to generate from tariffs a cash flow which will cover O&M costs, debt servicing (both capital repayment and interest) and provide a contribution to capital investment. The utility should aim initially to have an average tariff not less than the average incremental cost of water and then eventually aim to meet the full economic cost of water (which will include environmental costs).

Affordabilty and Willingness to Pay

In the past, when water was not scarce, it was common practice to design water supply schemes based on relatively fixed engineering design criteria such as a domestic consumption of 200 l/c/d. Now that water is scarce and there is competition for it, water consumption must be estimated on the basis of the price people will pay for it. Tonga and the Maldives are good examples of high tariffs and low consumption figures, all dictated by the scarcity of water. When it comes to the design of new or expanded facilities, we should always remember that everyone already has access to water, even though it may be of poor quality and in not a very convenient location. It is easy to over-estimate demand by assuming that everyone not having a piped water supply will automatically connect to the new scheme. In fact, there are numerous examples of people making the choice to stay with their dug well at no cost, rather than connect to the new piped scheme at considerable cost. This is where public awareness and hygiene education campaigns prior to the project can help. One way of assessing affordability is to check the water bill against the power bill. When the ratio is low then one can normally assume that the water tariff is affordable.

24-Hour Water Supply

It is of some concern that a number of water authorities in developing countries seem to be quite happy to operate water supplies with less than 24-hour service to consumers, quoting the some for all, rather than all for some axiom. This exposes consumers to a high health risk from contamination entering distribution

pipework during vacuum conditions created in the distribution pipework when water is absent. It makes accurate measurement of consumption impossible. Also there is evidence that more water is consumed under less than 24-hour supply, because people leave their taps open to fill storage, which can often then overflow to waste. It is also noticeable that once less than 24-hour water supply is accepted, the hours of service progressively deteriorate down to one or two hours per day. Water authorites must resist the requests of politicians to continually extend services on the periphery of the urban areas. Malé, with only 16-18 l/c/d domestic consumption, provides an excellent illustration of the prerequisites for a 24-hour supply; i.e.; full and accurate metering, a tariff sufficiently high to introduce demand management, and timely collection. It is not valid for a utility to claim it does not have enough water for 24-hour supply, especially when domestic consumption figures are 160-200 l/c/d.

Operation and Maintenance

It can readily be seen from the Data Book, that utilities have differing definitions of O&M. So much of what should be considered as O&M, is in fact left to investment projects to rectify. This applies to replacement of pipes, pumps, valves, water meters, instrumentation and service vehicles and particularly to the reduction of unaccounted for water. If tariff policies and loan covenants are to include references to O&M, then it is essential that every water utility clearly define O&M. More prestige must be given to those associated with O&M, if the quality of O&M is to be improved. Too often it plays second fiddle to development. This is a management concern. Consumer satisfaction must be paramount in O&M activities. Particularly, queries about billing and notification of breakdowns or leaks must be quickly addressed. The utility must make it easy for the consumer to pay the water bill. In Sri Lanka, a number of consumers don't pay their bill on time because the monthly billing is so small that it costs as much to go and pay the bill as the amount of the bill. It is also noticeable from the Data Book that a number of utilities are now only reading meters every 3 or 4 months. Preparation and timely publication of an Annual Report on operations is essential for the accountability of the utility to the government and the public.

Unaccounted for Water

In the reduction of unaccounted for water, the utility can start with a policy of phasing out public taps, wherever possible. The corollary of this, is that the price of a new connection must be made affordable, by allowing the consumer to spread payment over two or three years. Next comes 100 percent metering of production and consumption, with regular replacement of meters to ensure accuracy. Repair of all visible leaks is necessary. That should go without saying, yet many utilities neglect even that fundamental. Elimination of illegal connections should be done, hand in hand with mapping of the distribution system. A house to house survey can identify suspected illegal connections. For those with no registered connection, the house can be checked for taps and an analysis of the water coming from the taps carried out. For those with a registered connection, the actual consumption can be checked against the expected demand from the household occupants. If this is significantly lower than average, then the taps inside the house can be checked one by one against registration on the meter, for the presence of a possible second unmetered connection. Finally, invisible leaks can be traced with leak detection equipment. It makes sense, for reduction of unaccounted for water to be a normal maintenance task, carried out on a zonal basis, where a specific local area is the responsibility of a specific maintenance crew. In a number of the studied utilities it would be appropriate for one person to be responsible for 500-1,000 connections and get to know the area intimately so as to combat UFW, water wastage and illegal connections.

Monitoring of Performance

Every utility, must be able to measure its performance. This means its own performance with time, and its own performance in comparison with other utilities. It can be seen from the Data Book that a number of utilities have incomplete data. For example, only part of production and part of consumption is metered. Furthermore, in many utilities the meters are not all working, so consumption can only be estimated. It is time for utilities to carefully distinguish between NRW and UFW. If every utility sets itself performance targets in terms of consumer satisfaction, management of human, financial and water resources, then it will have a control mechanism for measuring improvements. A "suggested evaluation criteria" for utilities is given in Appendix 3.

Research

Universities in the Asian and Pacific region are always looking for relevant real life research topics. The

water supply sector has a number of these begging for further study. These include: (i) competing water uses and subsidies; (ii) domestic water consumption uses and needs; (iii) consumption patterns under intermittent water supply; (iv) subsidies to the water supply sector; (v) elasticity of price versus demand; (vi) service to the urban poor; (vii) affordability, willingness to pay and cost recovery; (viii) illegal connections; (ix) an historical overview of groundwater use; (x) an overview of the use of bottled water; (xi) the cost of boiling and filtering water; and (xii) a comparison of the health status of those who drink tap water, with those who boil or filter water from the same system.

TOWARDS EFFECTIVE WATER POLICY

A. The Challenge

The Bank is formulating a policy to help its developing member countries (DMCs) meet the rapidly increasing demands on their water resources and water services. The proceedings of a regional consultation workshop were published in 1996 in three volumes entitled *Towards Effective Water Policy in the Asian and Pacific Region*. The workshop agreed that:

1. Water has become the critical natural resource in most countries of the Asian and Pacific Region.

2. National action programs are needed to manage water resources and improve water services that will sustain human and economic development in each country in the coming decades.

3. Governments should provide leadership, commitment, and a focus on principles to direct an effective water sector development process in each country.

4. To catalyze investments in integrated water sector programs in the Region, the Asian Development Bank should target the water sector in its operations with a long-term perspective and through effective partnerships.

B. Principles for Effective Water Policy

The policy consultation results were captured in a set of seven generic water policy principles. These principles help to provide a holistic focus on water sector development, which was envisaged by the Dublin Conference on Water and the Environment in 1992. An important distinction is made between the *management of water resources* and the *delivery of water services.* Both are essential and interdependent water sector functions. These principles are being taken into account in the formulation of the Bank's water sector policy.

The provision of water and sanitation services through autonomous and accountable service providers is an important water subsector. Water and sanitation services in the region can, however, no longer be considered independently from national water policies and the need to improve the management of scarce water resources. In each country, therefore, water and sanitation strategies need to be formulated that are based on a national water policy.

Principles for essential water sector functions:

1. *National* water resources development and management should be undertaken in a holistic, determined, and sustained manner to meet national development goals and protect the environment.

2. Planning, development, and management of specific *water resources* should be decentralized to an appropriate level responding to basin boundaries.

3. Delivery of specific *water services* should be delegated to autonomous and accountable public, private, or cooperative agencies providing measured water services in a defined geographical area to their customers and/or members for an appropriate fee.

Crosscutting principles for successful water sector activities:

4. Water use in society should be *sustainable* — with incentives, regulatory controls, and public education promoting economic efficiency, conservation of water resources, and protection of the environment — within a transparent policy framework.

5. *Shared* water resources within and between nations should be allocated efficiently for the mutual benefit of all riparian users.

6. Water sector development activities should be *participatory* and *consultative* at each level, leading to commitment by stakeholders and action that is socially acceptable.

7. *Successful* water sector development requires a commitment to sustained capacity building, monitoring, evaluation, research, and learning at all levels, to respond effectively to changing needs at the national, basin, project, service entity, and community level.

C. The Bank's Strategic Roles

The Bank's Medium-Term Strategic Framework defines three developmental roles to assist DMCs in any targeted sector in the Bank's operations, including the water sector:

1. Providing integrated investment packages of policy support, capacity building, and investment services to the sector in the context of a long-term partnership with selected DMCs.

2. Catalyzing investment in the region and promoting policy change, capacity development, and greater public and private sector investment in the sector in the Bank's DMCs over a sustained period.

3. Developing regional cooperation by supporting comparative analysis and exchange of experience on priority regional issues (such as this publication); representing regional concerns at global fora; and supporting regional cooperation among DMCs.

D. A Strategy for Urban Water Supply

Based on the above broad framework for water sector management, and taking into account the state of water utilities in the region (as established in the Data Book), the emerging strategy of the Bank in the urban water supply subsector is given below.

Objective

To improve the health and livelihood of people in the Bank's developing member countries through provision of equitable, cost-effective, and sustainable investments in water supply and sanitation. This means also leveraging policy reforms through such investments.

Background

The strategy recognizes and addresses some of the major constraints in the urban water supply subsector including, but not limited to: lack of autonomy in institutions; inefficiencies in the management of human, financial, and water resources; lack of defined national sector policy; lack of defined tariff policy; excessive subsidies; inequities and inadequacies in coverage; low levels of service; poor maintenance; weaknesses in public awareness; lack of advocacy for and investment in the sector; and lack of planning and development in terms of comprehensive water resources management.

National Policies

National policies should start with one for comprehensive water resources management and a defined strategy to implement it. The water supply subsector needs its own policy which can be articulated in a brief statement. Finally, within the water supply subsector, the government needs to clearly define a tariff policy, including the mechanism for making periodic revisions to tariffs.

Institutions

Autonomy in institutions can be attained by two means: through appropriate legislation and commitment of the Government to give that autonomy, or by allowing the private sector to take over some of the institution functions. The enabling environment in a given country is the key factor in the choice of the appropriate option. In general, management should be at the lowest practicable level. Decentralization of national authorities, devolution of responsibilities to local authorities, and community participation and responsibility are all encouraged. Public relations and public awareness, including hygiene education and water conservation need to be strongly developed. Utilities must produce an audited annual report on their operations within the year following the reported period.

Human Resource Management

The Bank will encourage institutions to develop a small number of permanent employees who are well-qualified and represent the best people who can be obtained from the open market. The utility should have adequate numbers of fully-qualified and experienced staff, particularly financial management personnel. Staff need to be given the opportunity to

accept responsibility and have incentives for good performance. A strong training program which facilitates learning from others in the region and beyond is necessary.

Financial Resource Management

The Bank is interested in four main areas of financial management in water utilities. The first is that the utility has well-qualified and trained staff appropriate to the volume of funds being handled. Second, is the need for independence from government subsidies. This means phasing out grant financing for capital investments and tapping nongovernment sources of financing, such as commercial banks and local bond issues. Third, is maintaining a healthy cash flow which allows revenues from tariffs to meet O&M costs, plus debt servicing (capital repayments and interest), plus a contribution to capital investment. Fourth, is the need to reduce accounts receivable to the lowest practicable amount. In order to achieve the necessary financial viability, water utilities should maintain average tariffs at least at the level of the incremental financial cost of new water supplies. Ultimately however, the utility should be aiming to meet the full economic cost of water (which will include associated environmental costs).

Water Resources Management

At the water supply subsector level, water needs to be carefully managed all the way from source to drain. This means fully metering all production sources and all consumer outlets, and ensuring the accuracy of such metering is maintained by regular replacement of the meters, at intervals recommended by the manufacturer (in the range of 6-8 years for good quality domestic water meters). The difference between unaccounted for water and non-revenue water should be clearly established and monitored as efforts are made to reduce both. Repair of visible leaks, full and accurate measurement of all consumption, identification of illegal connections, up-to-date mapping, and identification and repair of invisible leaks, will all contribute to the reduction of UFW. The Bank strongly encourages water demand management through use of high tariffs for consumption in excess of reasonable use.

Consumer Concerns

On behalf of consumers, the Bank wants to see 24-hour supply. This is necessary, not only to give convenience to the consumer, but also to safeguard health and to ensure accurate measurement of consumption. The Bank strongly endorses provision of formal piped water supply service to the informal settlements of the urban poor, through bulk metered supplies, even when the residents do not have official tenure of the land. In general, wherever possible, public tap services should be phased out in favor of direct connections. The consumer should expect to get water from the tap which is potable. The price of a new connection should be affordable to all potential consumers. It is necessary for utilities to make provision for a consumer to make a small deposit on the new connection fee and allow the balance to be repaid with the tariff over two or three years. The consumer is also entitled to be given on a regular basis relevant information about the utility and activities which may affect them.

General

Although appropriate standards of performance for human, financial, and water resource management will vary from one utility to the other, the Suggested Evaluation Criteria given in Appendix 3 gives an indication of the performance standards the Bank would normally expect.

The Bank encourages water supply and sanitation development to go hand in hand, since increased water supplies means increased need for wastewater control, but also because health improvements will be greatly enhanced. It is now mandatory to conduct financial and economic appraisal of water supply and sanitation projects for Bank financing. (A Handbook for the Economic Evaluation of Water Supply Projects is now under preparation in the Bank.) In the appraisal of all projects for Bank financing, it is also mandatory to identify and quantify all subsidies. The Bank acts as a regional resource center for water supply and the Data Book is an example of this service.

Part II
Regional Profiles
(Figures and Tables)

Table 7: NAMES AND LOCATIONS OF UTILITIES

Country	City	Population[1]	Year[2]	Name of Utility
Bangladesh	Chittagong	1,000,000	1995	Chittagong Water Supply and Sewerage Authority
Bangladesh	Dhaka	9,000,000	1995	Dhaka Water Supply and Sewerage Authority
Bhutan	Thimphu	32,000	1996	Thimphu City Corporation (Water Supply Unit)
Cambodia	Phnom Penh	824,302	1996	Phnom Penh Water Supply Authority
China, People's Rep. of	Beijing	5,486,000	1995	Beijing Municipal Waterworks Company
China, People's Rep. of	Shanghai	8,197,000	1995	Shanghai Municipal Waterworks Company
China, People's Rep. of	Tianjin	4,580,000	1995	Tianjin Waterworks Group Company, Ltd.
Cook Islands	Rarotonga	11,100	1995	Water Supply Division
Fiji	Suva	280,000	1995	Fiji Public Works Department
Hong Kong, China	Hong Kong	6,270,000	1995	Water Supplies Department
India	Calcutta	4,400,000	1995	Calcutta Municipal Corporation (Water Supply Department)
India	Chennai	4,470,000	1995	Chennai Metropolitan Water Supply and Sewerage Board
India	Delhi	10,840,000	1996	Delhi Water Supply and Sewage Disposal Undertaking
India	Mumbai	10,350,000	1996	Brihanmumbai Municipal Corporation (Hydraulic Engineer's Department)
Indonesia	Bandung	2,250,000	1995	PDAM Kodya Dati II Bandung
Indonesia	Jakarta	9,116,000	1995	PDAM DKI Jakarta
Indonesia	Medan	1,963,702	1995	PDAM Tirtanadi Medan
Kazakstan	Almaty	1,250,000	1995	Industrial Enterprise Almaty Vodocanal
Korea, Rep. of	Seoul	10,595,943	1995	Seoul Metropolitan Government (Office of Waterworks)
Korea, Rep. of	Ulsan	990,626	1996	Ulsan City Water and Sewerage Board
Kyrgyzstan	Bishkek	605,000	1996	Industrial Enterprise Bishkek Vodocanal
Lao PDR	Vientiane	266,960	1995	Nam Papa Lao
Malaysia	Johor Bahru	1,004,000	1995	Syarikat Air Johor Sdn., Bhd.(Johor Water Company)
Malaysia	Kuala Lumpur	1,374,700	1996	Selangor Waterworks Department
Malaysia	Penang[3]	600,000	1995	Pihak Berkuasa Air Pulau Pinang (Penang Water Authority)
Maldives	Malé	78,000	1996	Malé Water and Sewerage Company, Ltd.
Mongolia	Ulaanbaatar	695,100	1996	Water Supply and Sewerage System Company (USAG)
Myanmar	Mandalay	670,000	1996	Mandalay City Development Committee (Water and Sanitation Department)
Myanmar	Yangon	3,263,114	1995	Yangon City Development Committee (Water and Sanitation Department)
Nepal	Kathmandu	935,000	1995	Nepal Water Supply Corporation
Pakistan	Faisalabad	1,800,000	1996	Faisalabad Development Authority (Water and Sanitation Agency)
Pakistan	Karachi	11,500,000	1996	Karachi Water and Sewerage Board
Pakistan	Lahore	3,880,000	1995	Lahore Development Authority (Water and Sanitation Agency)
Papua New Guinea	Lae	90,000	1995	The Waterboard (Lae District Office)
Philippines	Cebu	1,293,000	1995	Metropolitan Cebu Water District
Philippines	Davao	970,765	1995	Davao City Water District
Philippines	Manila[4]	10,610,000	1995	Metropolitan Waterworks and Sewerage System
Singapore	Singapore	3,000,000	1995	Public Utilities Board (Water Department)
Solomon Islands	Honiara	46,931	1995	Solomon Islands Water Authority
Sri Lanka	Colombo	2,800,000	1995	National Water Supply and Drainage Board
Taipei,China	Taipei	3,801,153	1995	Taipei Water Department
Thailand	Bangkok	7,300,000	1995	Metropolitan Waterworks Authority
Thailand	Chiangmai	195,600	1995	Provincial Waterworks Authority (Regional Office No.9)
Thailand	Chonburi	224,700	1995	Provincial Waterworks Authority (Regional Office No.1)
Tonga	Nuku'alofa	36,500	1995	Tonga Water Board
Uzbekistan	Tashkent	1,924,690	1996	Tashkent Vodocanal
Vanuatu	Port Vila	26,000	1996	Union Electrique du Vanuatu, Ltd.
Viet Nam, Soc. Rep. of	Hanoi	1,654,085	1995	Hanoi Water Business Company
Viet Nam, Soc. Rep. of	Ho Chi Minh City[5]	4,731,000	1995	Ho Chi Minh City Water Supply Company
Western Samoa	Apia	46,050	1995	Western Samoa Water Authority

[1] Population refers to the population of the area of responsibility of the utility in the city.

[2] Year refers to the year when population was determined or estimated.

[3] Penang refers to the entire Penang Island.

[4] Manila refers to the entire Metro Manila.

[5] The abbreviated "Ho Chi Minh" has been used throughout most of the Regional Profiles primarily for space/presentation purposes.

Table 8: SIZE OF UTILITY

City	Daily Production (m^3)	City	Number of Utility Connections	City	Number of Staff	City	Service Area (km^2)	City	People Served
Seoul	4,959,000	Hong Kong	2,099,820	Delhi	25,057	Delhi	1,397	Seoul	10,595,943
Shanghai	4,728,000	Seoul	1,873,186	Shanghai	11,060	Manila	1,274	Mumbai	10,350,000
Bangkok	3,849,863	Shanghai	1,827,717	Mumbai	9,041	Hong Kong	1,092	Delhi [1]	9,322,400
Manila	2,800,000	Taipei	1,289,180	Karachi	8,679	Johor Bahru	1,091	Shanghai [2]	8,197,000
Taipei	2,740,000	Bangkok	1,241,380	Manila	7,628	Bangkok	893	Karachi [1]	8,050,000
Delhi	2,610,000	Chiangmai	1,194,742	Colombo	7,555	Singapore	640	Manila [1]	7,108,700
Mumbai	2,601,506	Chonburi	1,194,742	Chiangmai	6,547	Seoul	606	Hong Kong	6,270,000
Hong Kong	2,518,000	Delhi	1,169,495	Chonburi	6,547	Beijing	550	Bangkok [2]	5,986,000
Tashkent	2,457,300	Karachi	1,032,374	Chennai	6,226	Shanghai	506	Beijing [1]	5,486,000
Beijing	1,851,640	Kuala Lumpur	932,860	Beijing	6,031	Karachi	500	Tianjin [2]	4,580,000
Karachi	1,648,820	Singapore	910,691	Hong Kong	5,830	Mumbai	438	Chennai [2]	4,335,900
Tianjin	1,510,000	Manila	779,380	Bangkok	5,736	Suva	395	Dhaka	3,780,000
Singapore	1,375,156	Johor Bahru	534,650	Calcutta	5,731	Tianjin	374	Taipei	3,763,141
Lahore	1,270,820	Lahore	371,693	Tianjin	5,428	Tashkent	363	Lahore	3,259,200
Calcutta	1,165,565	Jakarta	362,424	Seoul	4,332	Dhaka	360	Singapore	3,000,000
Jakarta	972,086	Calcutta	335,991	Dhaka	3,033	Penang	293	Calcutta [2]	2,904,000
Almaty	900,000	Colombo	323,259	Tashkent	2,560	Cebu	260	Jakarta [2]	2,461,320
Dhaka	781,540	Mumbai	271,530	Jakarta	2,133	Kuala Lumpur	243	Ho Chi Minh	2,460,120
Ho Chi Minh	730,000	Ulsan	268,177	Lahore	2,106	Yangon	238	Yangon [1]	1,957,868
Colombo	499,730	Penang	263,258	Kathmandu	2,078	Jakarta	212	Tashkent [1]	1,886,196
Kuala Lumpur	486,467	Ho Chi Minh	248,454	Faisalabad	2,003	Davao	200	Colombo	1,624,000
Bishkek	400,000	Chennai	240,523	Singapore	1,865	Taipei	190	Kuala Lumpur	1,374,700
Yangon	386,750	Beijing	222,108	Hanoi	1,645	Almaty	188	Hanoi	1,257,105
Johor Bahru	372,880	Medan	188,202	Ho Chi Minh	1,590	Calcutta	187	Almaty [1]	1,237,500
Hanoi	360,000	Dhaka	164,304	Almaty	1,565	Chennai	171	Medan	1,237,132
Chennai	334,830	Tashkent	143,310	Johor Bahru	1,544	Bishkek	167	Faisalabad [1]	1,080,000
Penang	304,084	Kathmandu	138,962	Taipei	1,465	Medan	166	Johor Bahru	1,004,000
Ulsan	290,000	Bandung	132,087	Kuala Lumpur	1,322	Lahore	165	Bandung	945,000
Medan	264,400	Hanoi	123,710	Yangon	1,168	Ho Chi Minh	153	Ulsan	832,126
Bandung	191,767	Tianjin	108,866	Ulaanbaatar	1,060	Ulaanbaatar	126	Kathmandu [1]	757,350
Ulaanbaatar	160,000	Almaty	102,778	Penang	1,058	Ulsan	110	Ulaanbaatar [1]	695,100
Faisalabad	160,000	Suva	100,876	Bandung	1,022	Colombo	110	Phnom Penh	684,171
Chittagong	144,762	Davao	96,994	Medan	923	Bandung	100	Chittagong	600,000
Davao	128,204	Yangon	96,950	Suva	900	Chiangmai	92	Penang	594,000
Cebu	107,983	Faisalabad	80,034	Chittagong	760	Chittagong	84	Bishkek [1]	592,900
Kathmandu	107,000	Bishkek	63,079	Vientiane	609	Phnom Penh	78	Mandalay [1]	536,000
Phnom Penh	103,096	Cebu	57,369	Davao	604	Chonburi	75	Davao	504,798
Suva	95,000	Mandalay	49,708	Cebu	532	Faisalabad	70	Cebu	297,390
Mandalay	91,000	Vientiane	37,914	Phnom Penh	463	Rarotonga	67	Suva	274,400
Chonburi	81,500	Phnom Penh	34,377	Bishkek	435	Mandalay	67	Chonburi [1]	199,983
Vientiane	70,000	Chittagong	28,101	Mandalay	315	Vientiane	59	Vientiane	144,158
Chiangmai	46,500	Lae	18,326	Lae	269	Kathmandu	50	Chiangmai	127,140
Lae	33,800	Apia	15,762	Apia	249	Lae	50	Malé [1]	78,000
Apia	31,000	Malé	9,600	Ulsan	204	Honiara	38	Lae [2]	56,700
Honiara	27,130	Nuku'alofa	8,453	Nuku'alofa	135	Nuku'alofa	30	Honiara	46,931
Rarotonga	10,000	Honiara	6,163	Malé	73	Apia	29	Apia	46,050
Port Vila	9,400	Rarotonga	4,265	Honiara	66	Port Vila	21	Nuku'alofa	36,500
Thimphu	7,000	Port Vila	3,974	Thimphu	46	Thimphu	8	Thimphu	29,760
Nuku'alofa	5,600	Ulaanbaatar	1,830	Port Vila	20	Hanoi	7	Port Vila [1]	25,480
Malé	2,400	Thimphu	1,806	Rarotonga	15	Malé	2	Rarotonga [1]	11,100

Notes:

[1] Computed from given percentage of service coverage and total population.

[2] Based on population served by HC, PT and bulk supply connections to residential areas.

Figure 1: TYPE OF WATER UTILITY

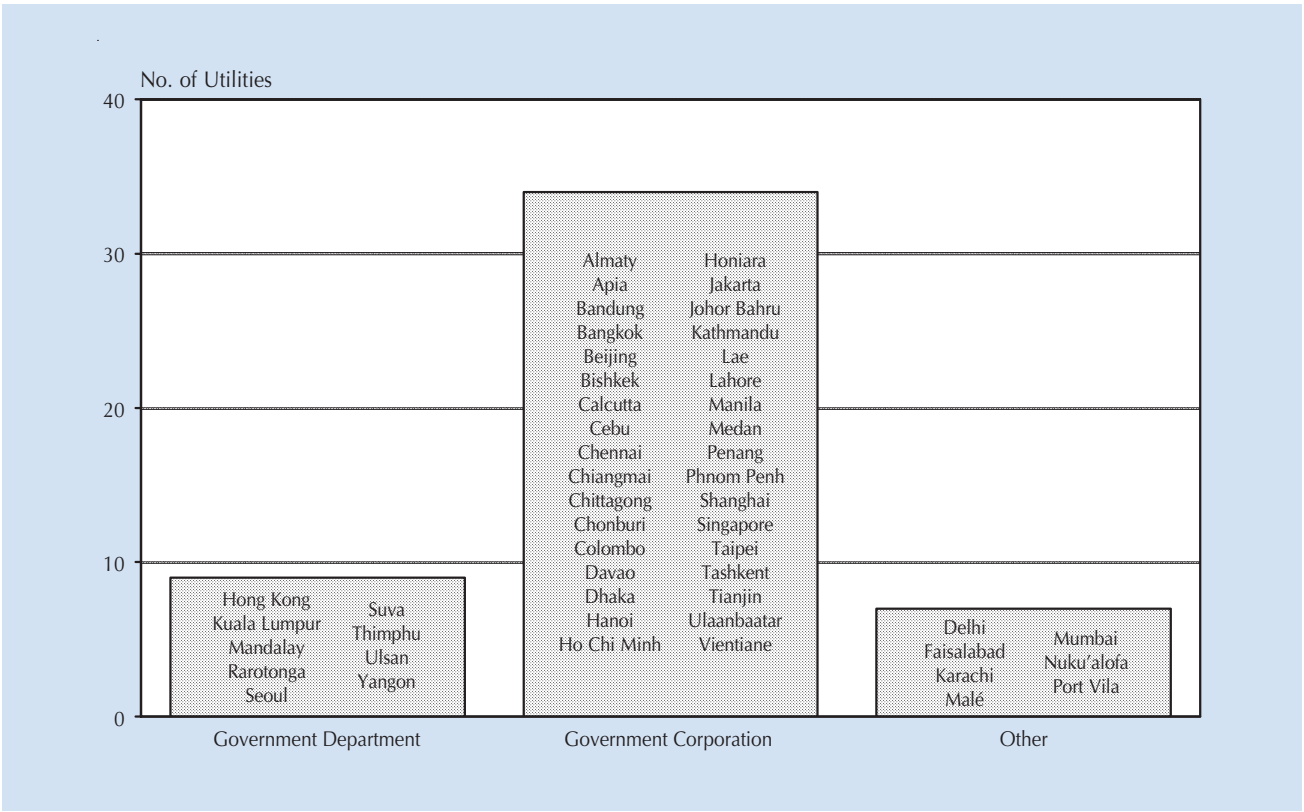


Figure 2: OPERATIONS SUBSIDY FOR UTILITY

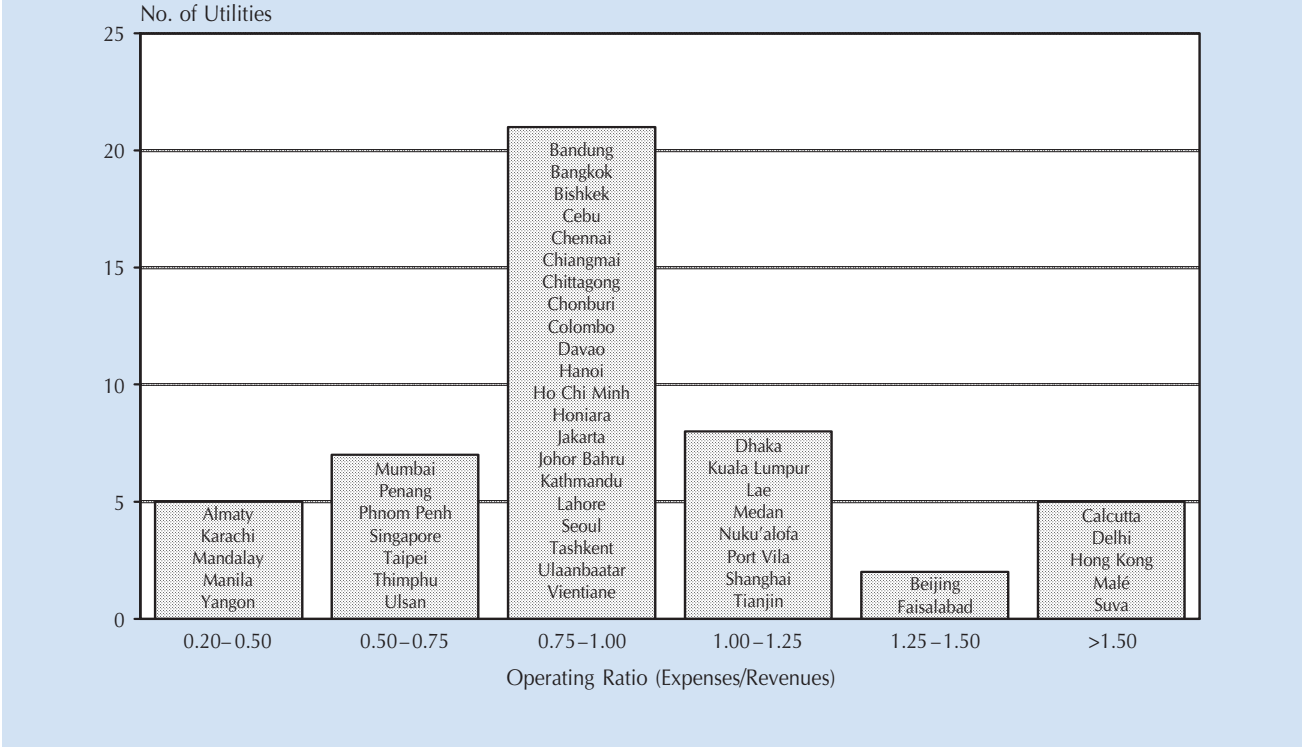
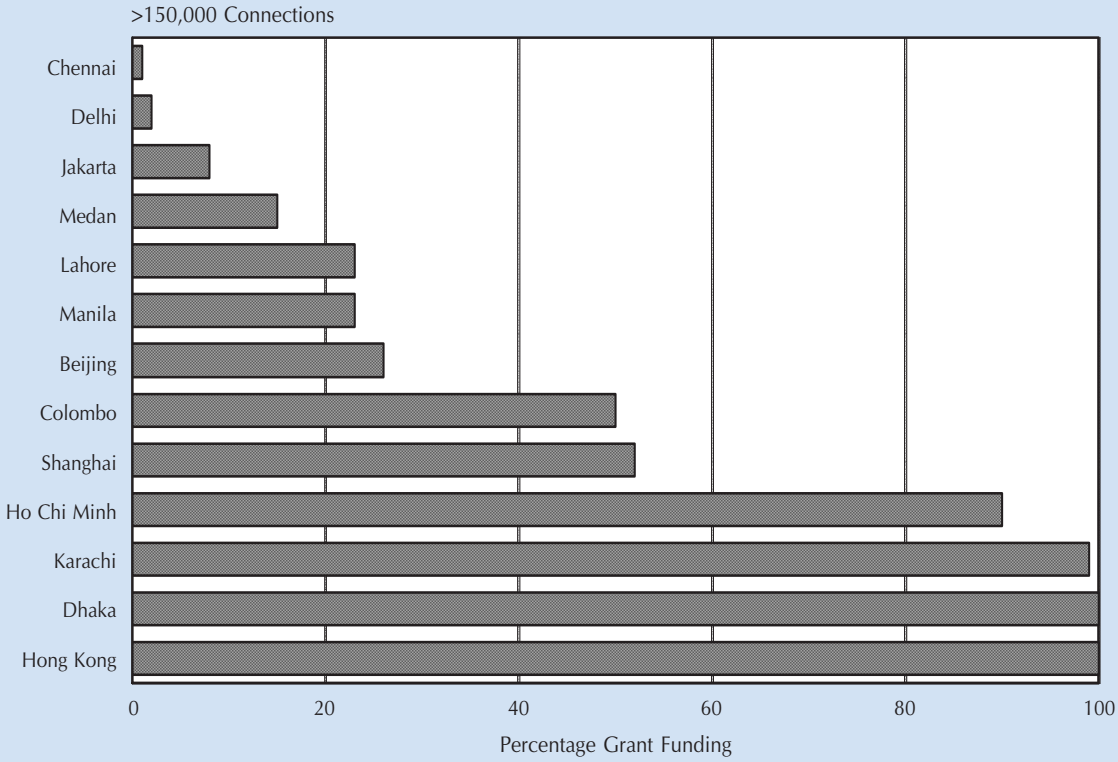


Figure 3: GRANT ELEMENT OF CAPITAL INVESTMENT



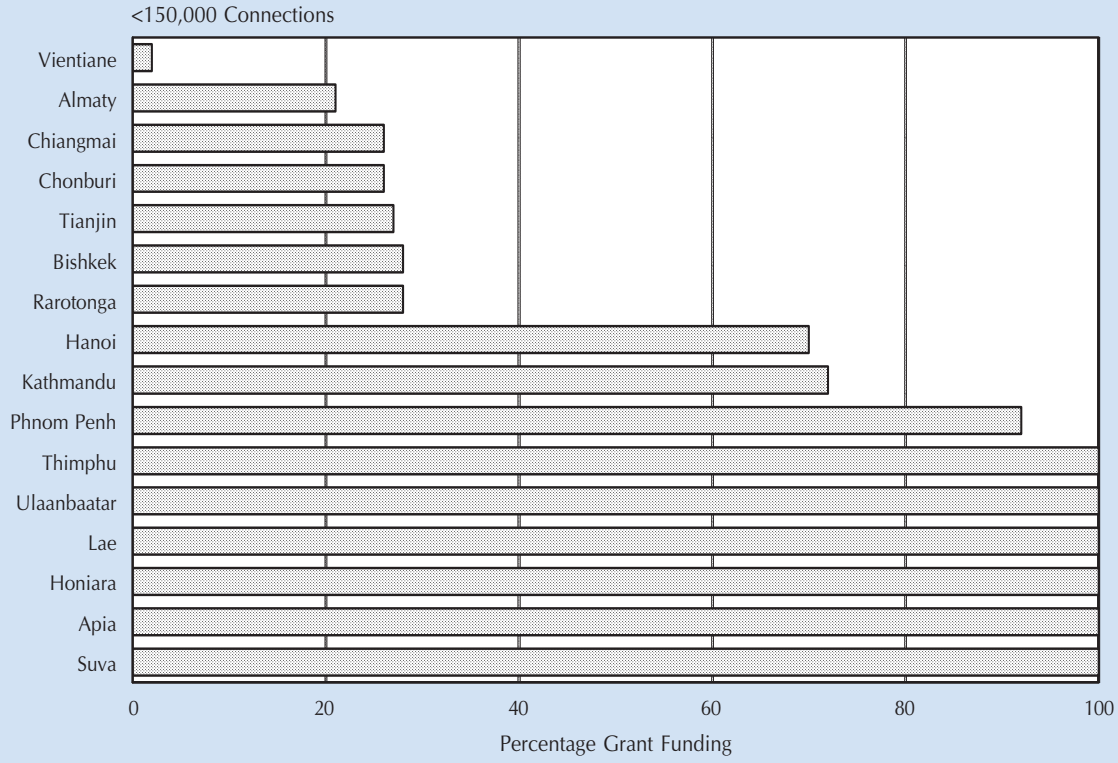


Figure 4: CAPITAL EXPENDITURE PER CONNECTION

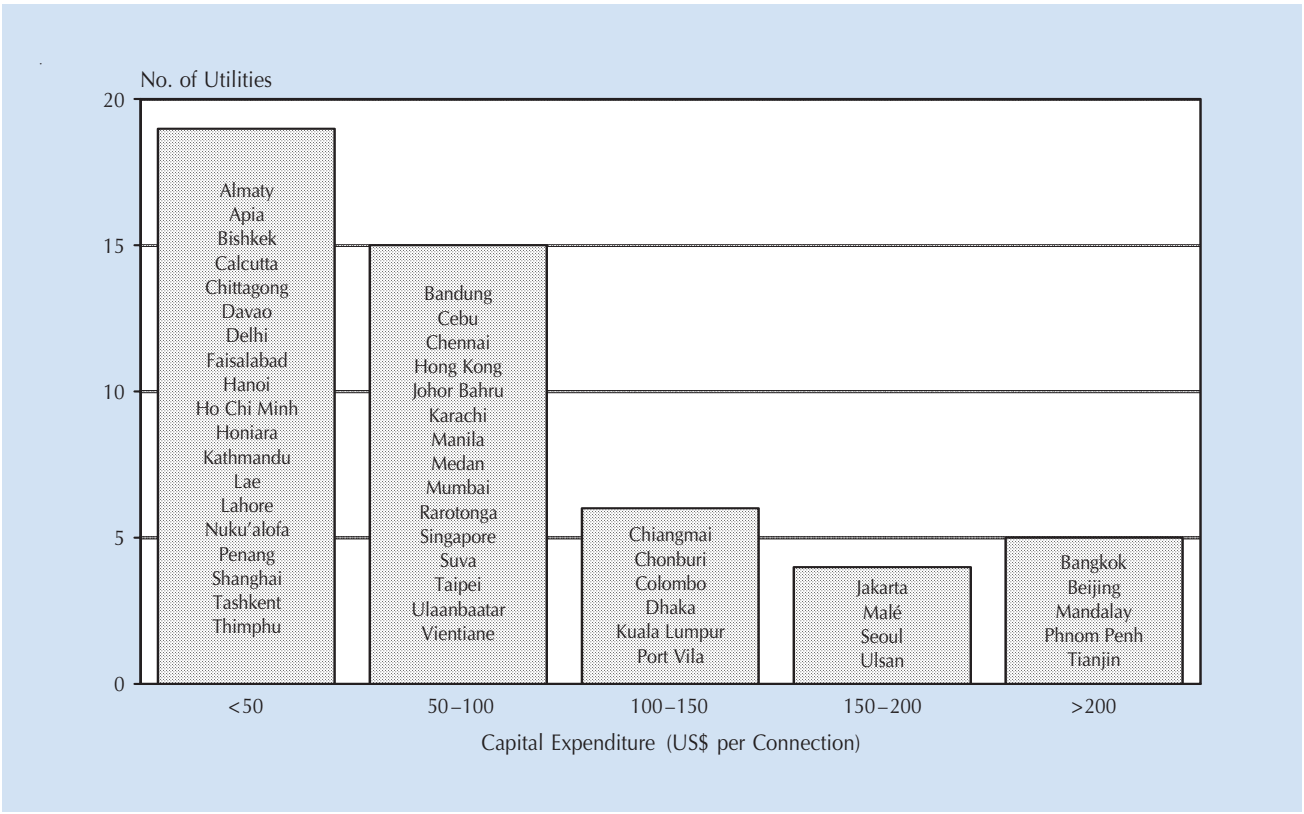
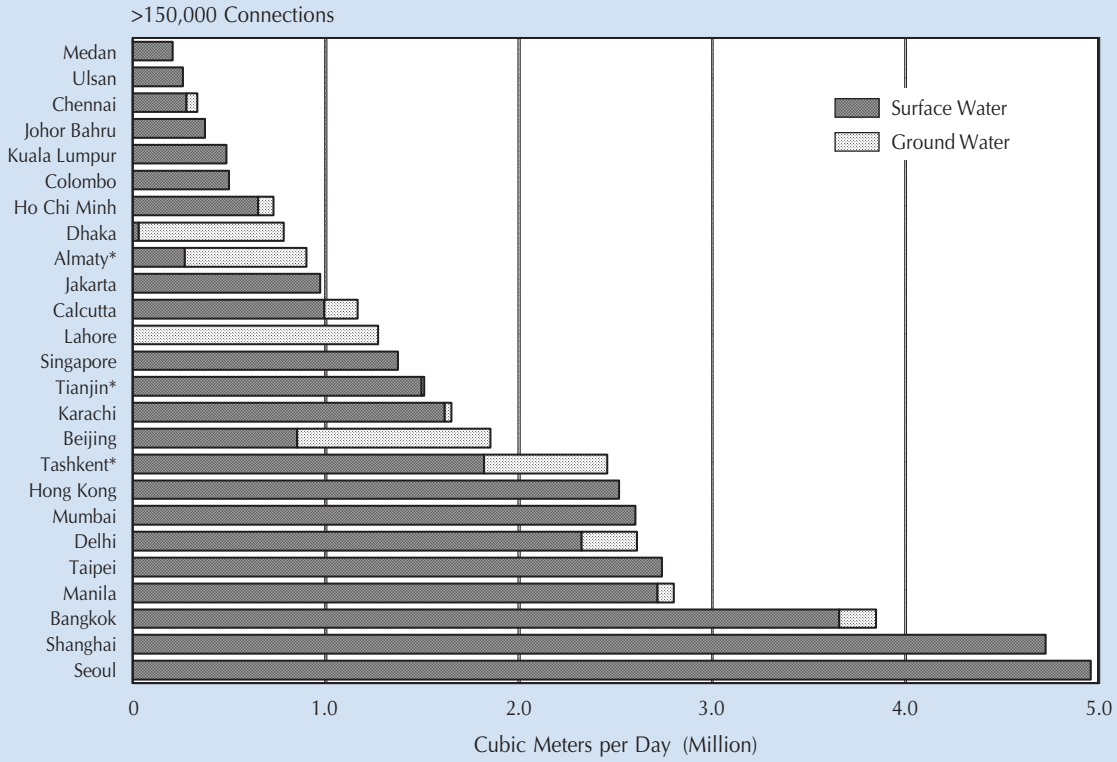
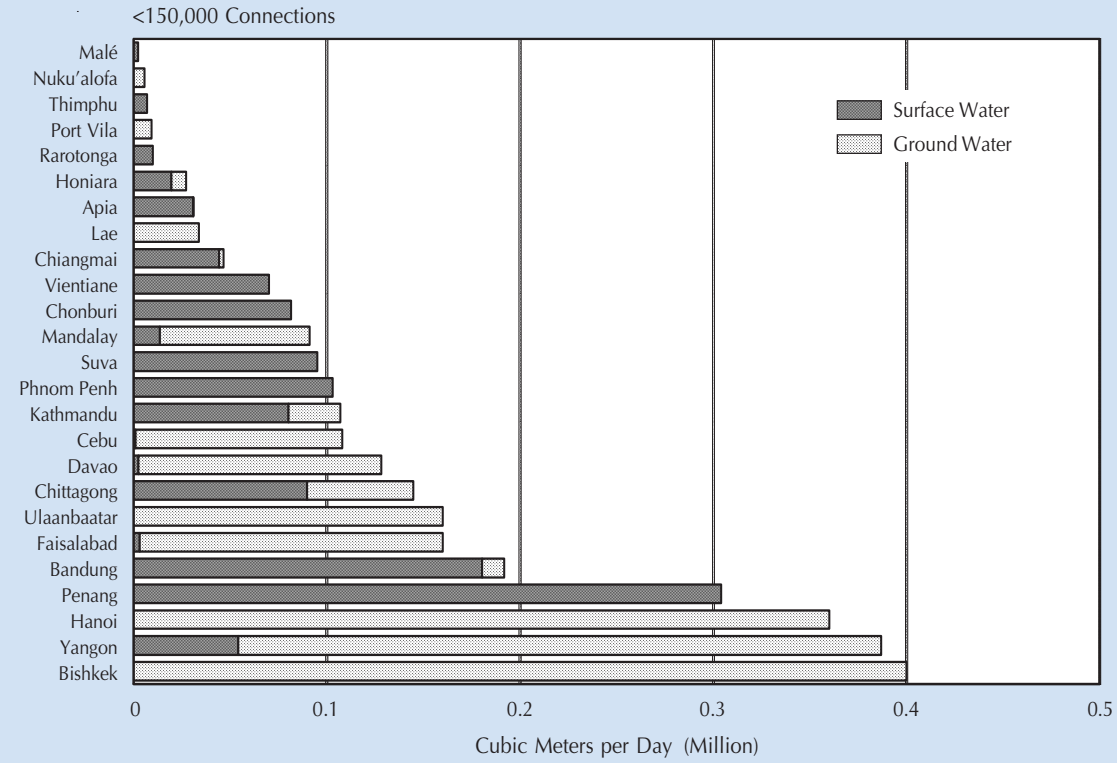


Figure 5: PRODUCTION VOLUME





* Belongs to <150,000 Connections.

Figure 6: STORAGE CAPACITY

Figure 7: MAIN WATER TREATMENT PROCESS

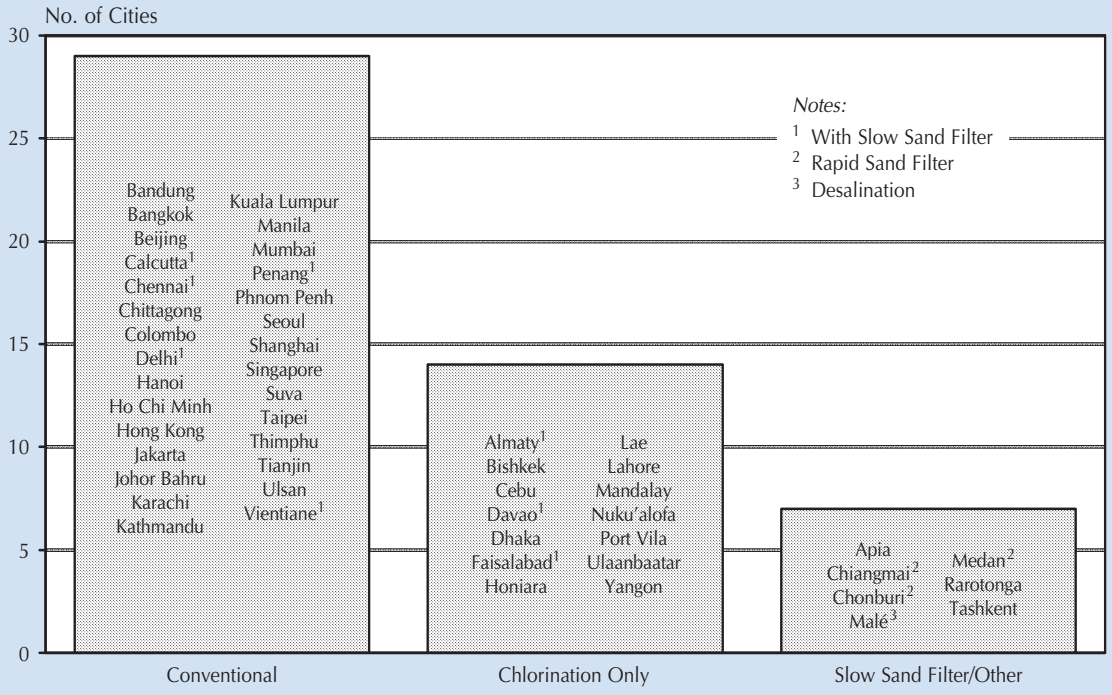


Figure 8: CHLORINATION METHODS

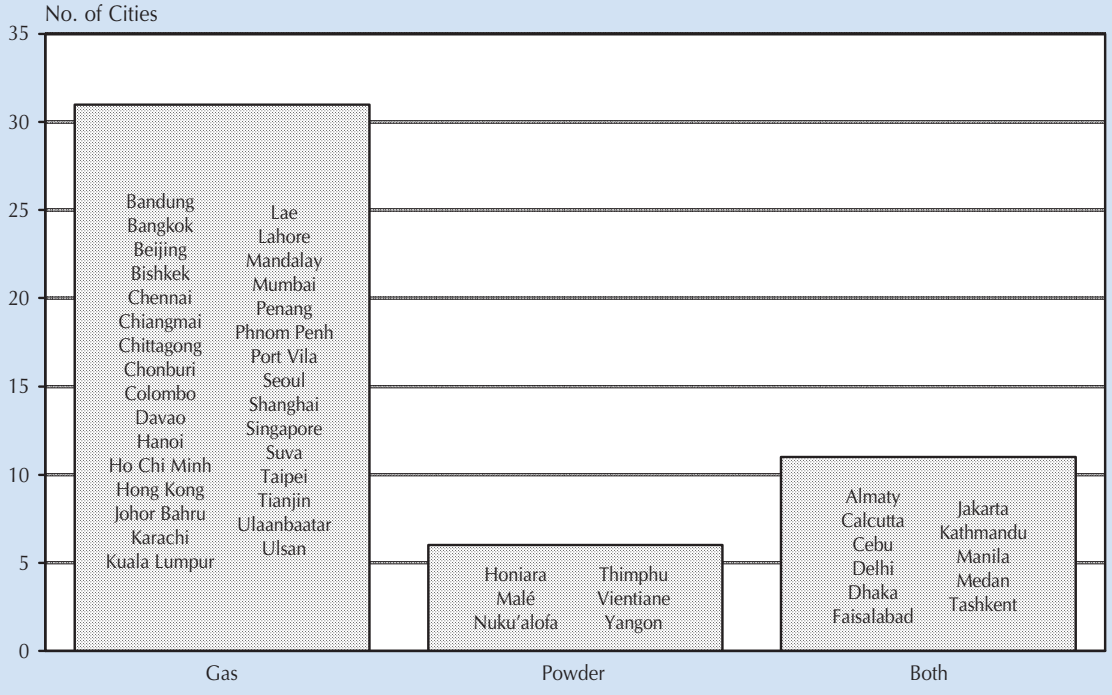


Figure 9: PRODUCTION METERING

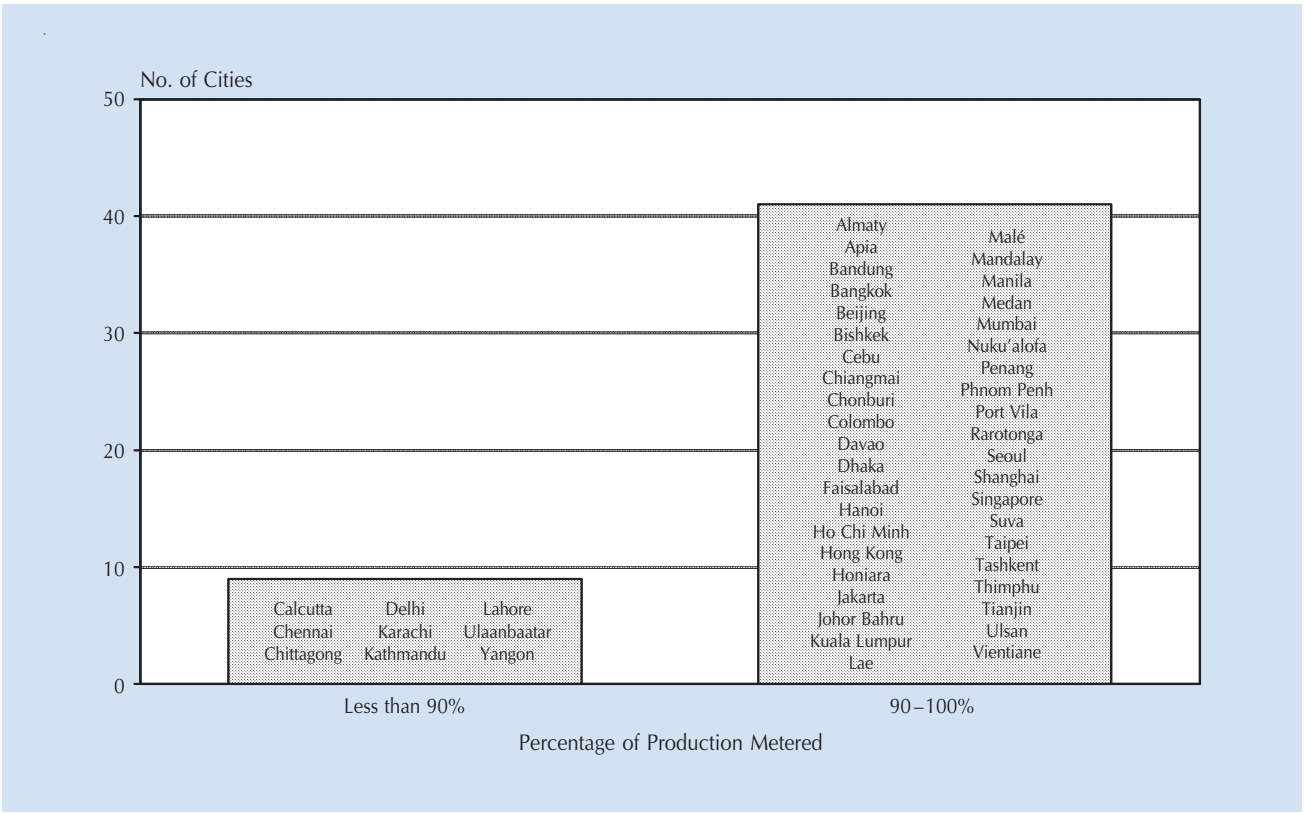
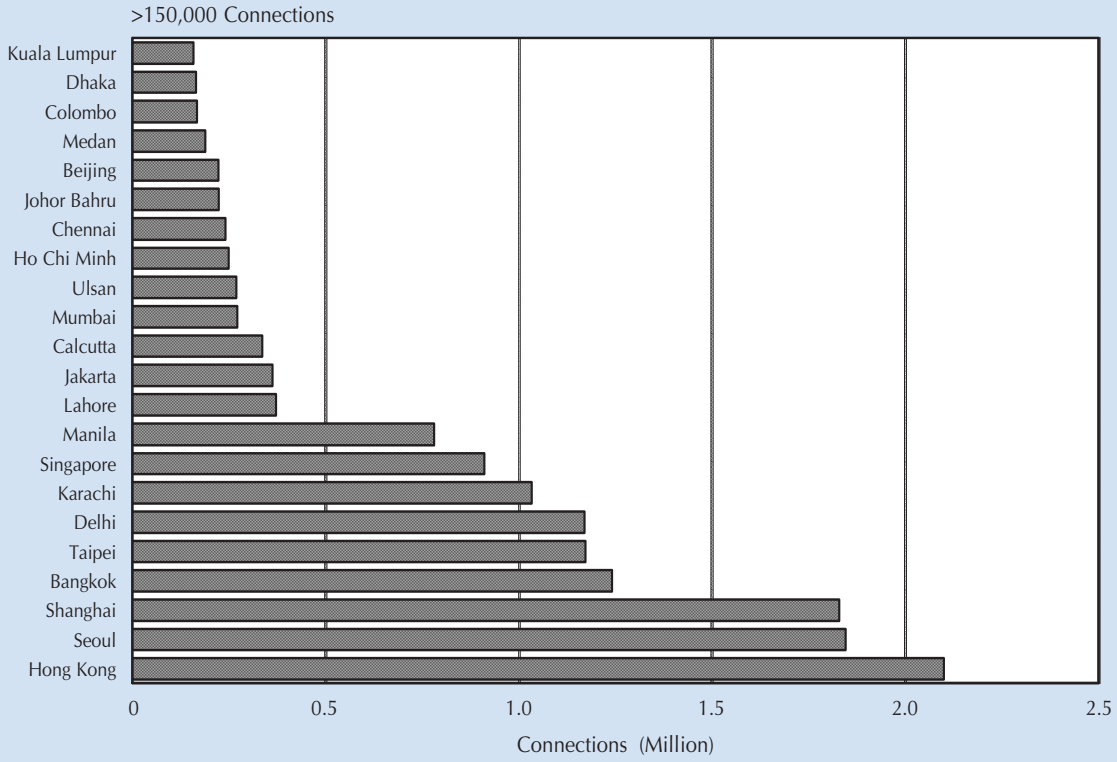


Figure 10: CITY CONNECTIONS



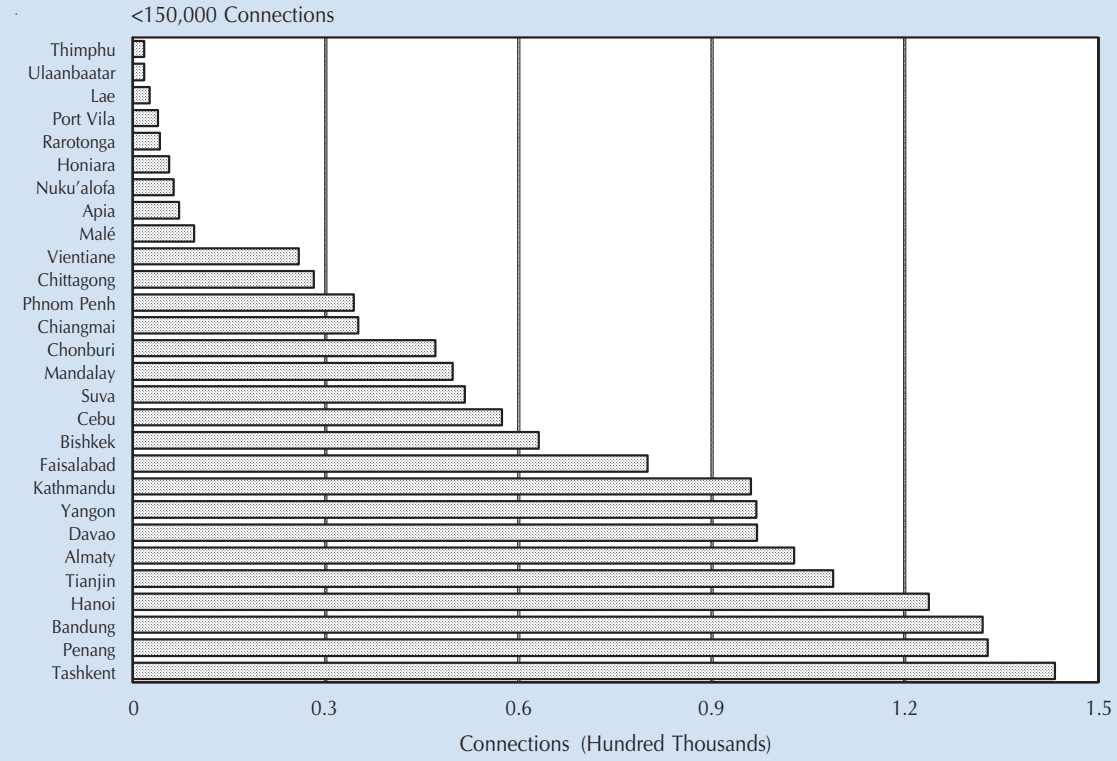
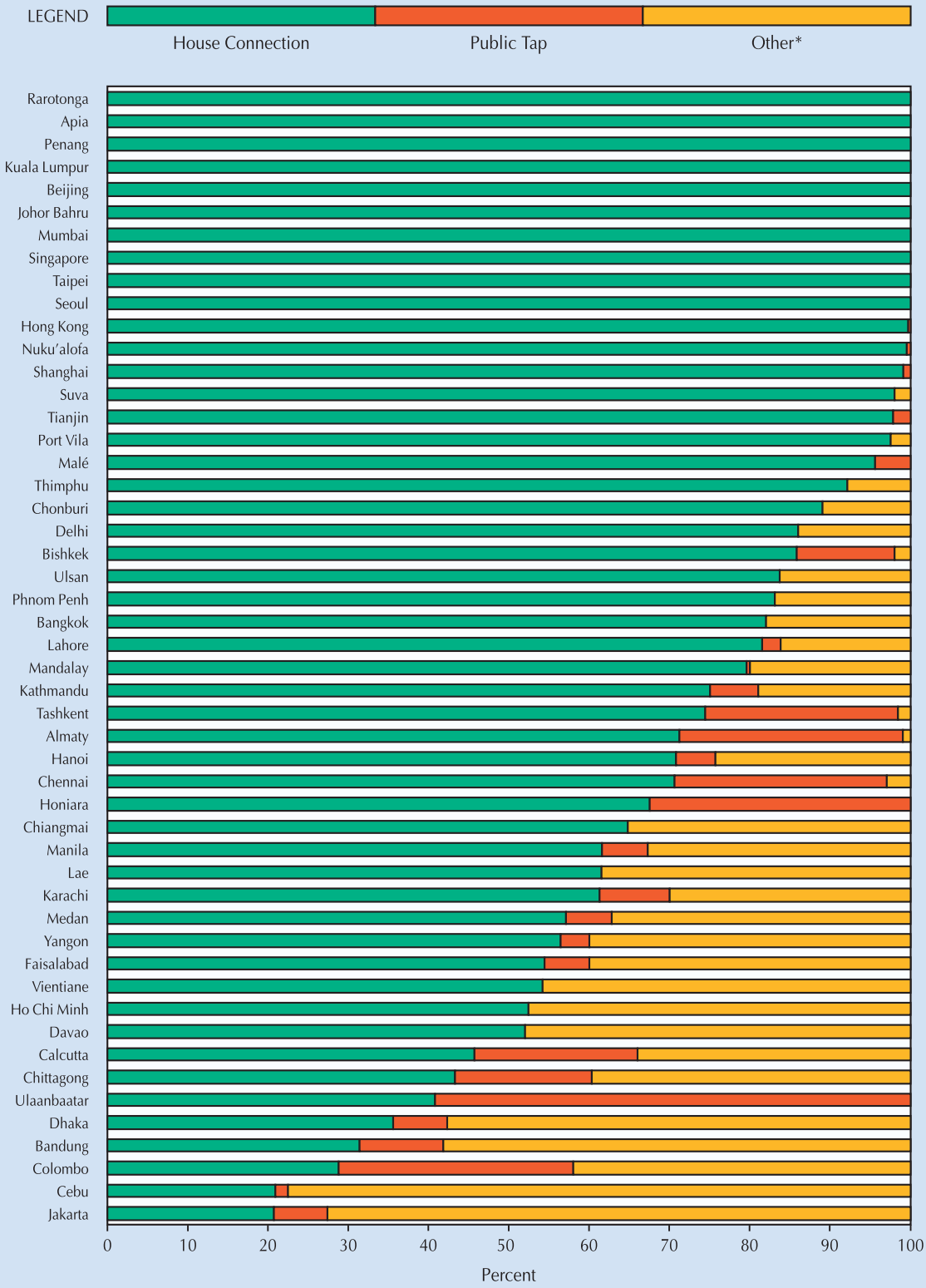
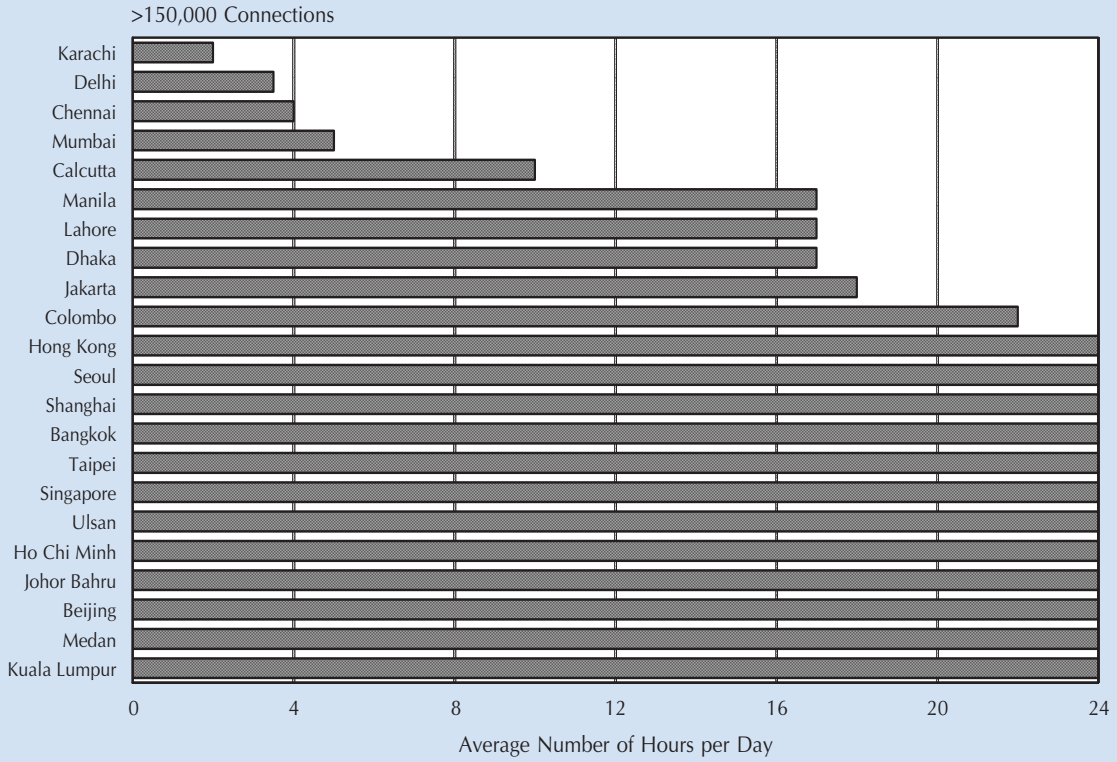


Figure 11: DOMESTIC WATER SUPPLY SERVICES



* Other sources include wells, springs, rivers, canals, rainwater, vendors and neighbors.

Figure 12: WATER AVAILABILITY



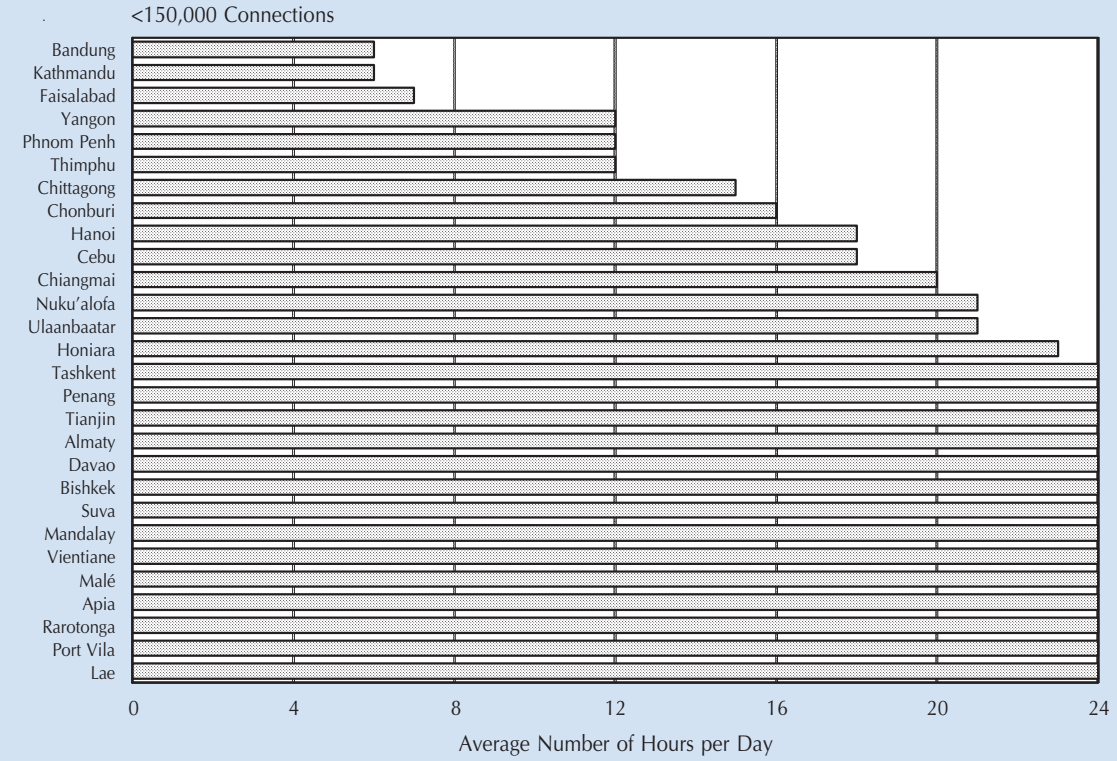
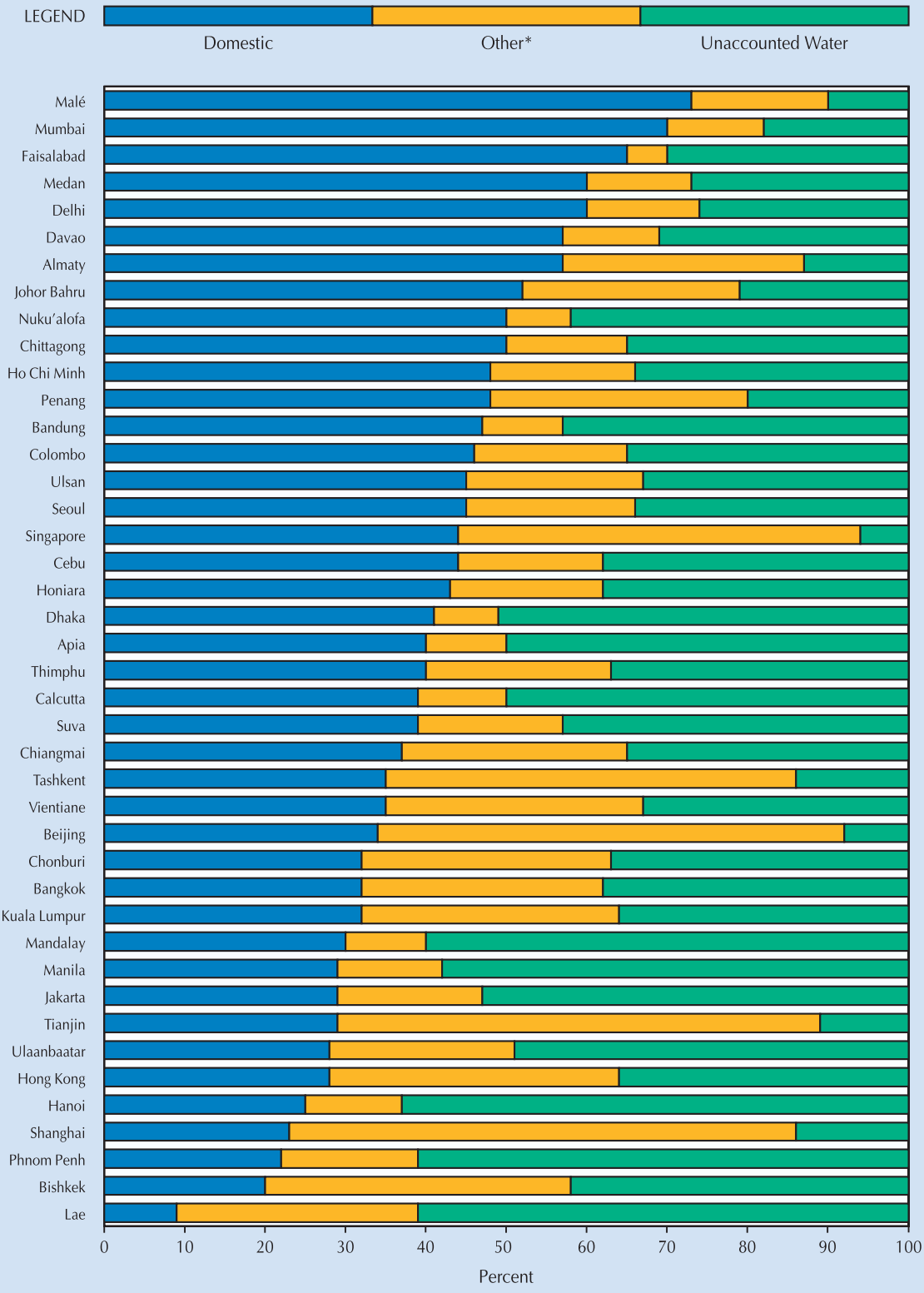
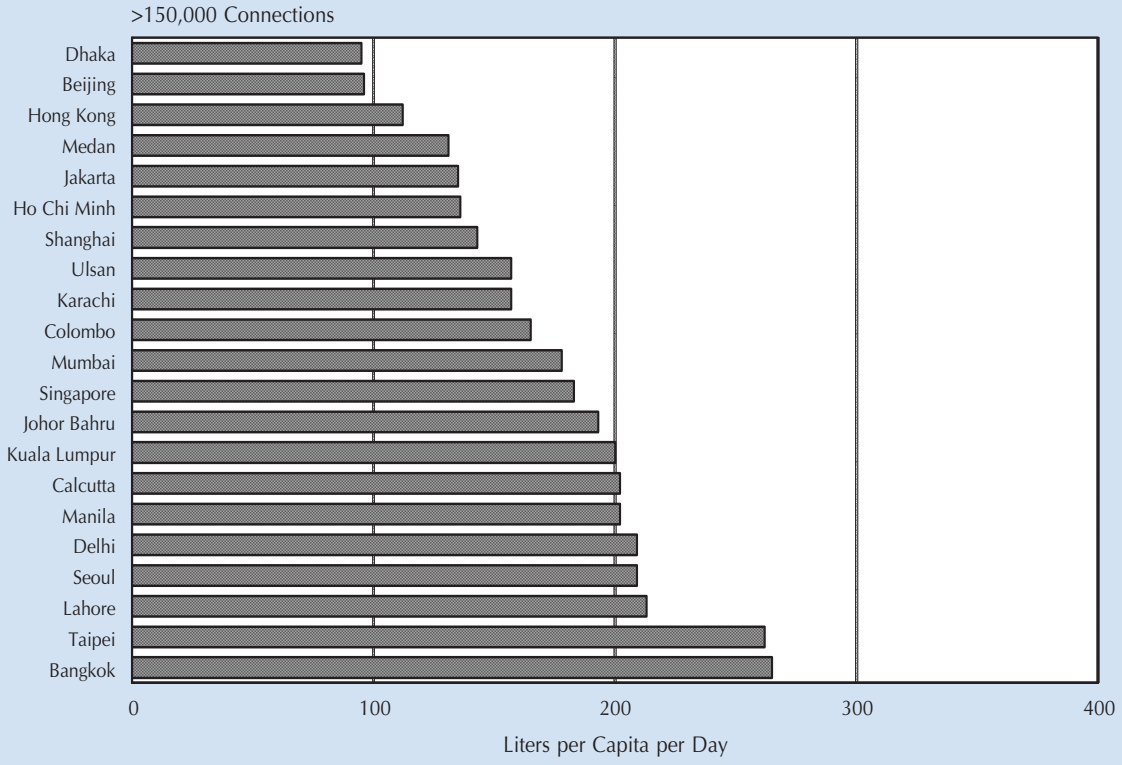


Figure 13: WATER USE



* Other use includes industrial, commercial and institutional.

Figure 14: PER CAPITA CONSUMPTION



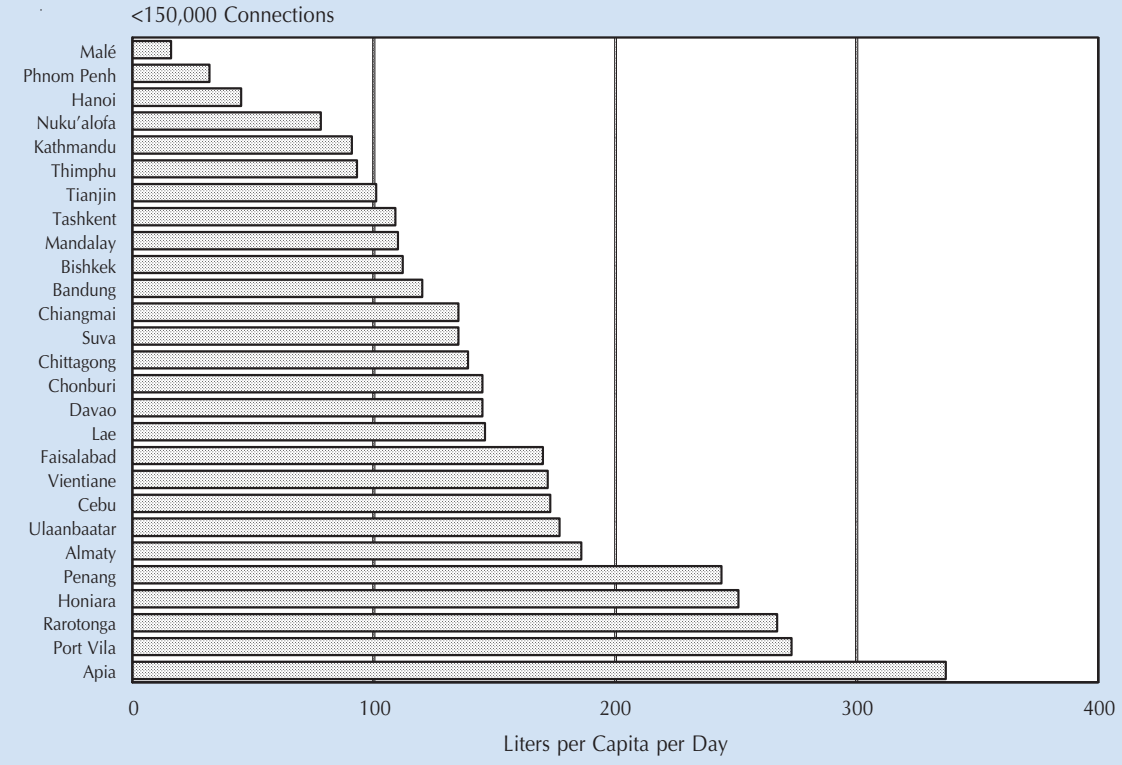


Figure 15: DRINKING WATER QUALITY

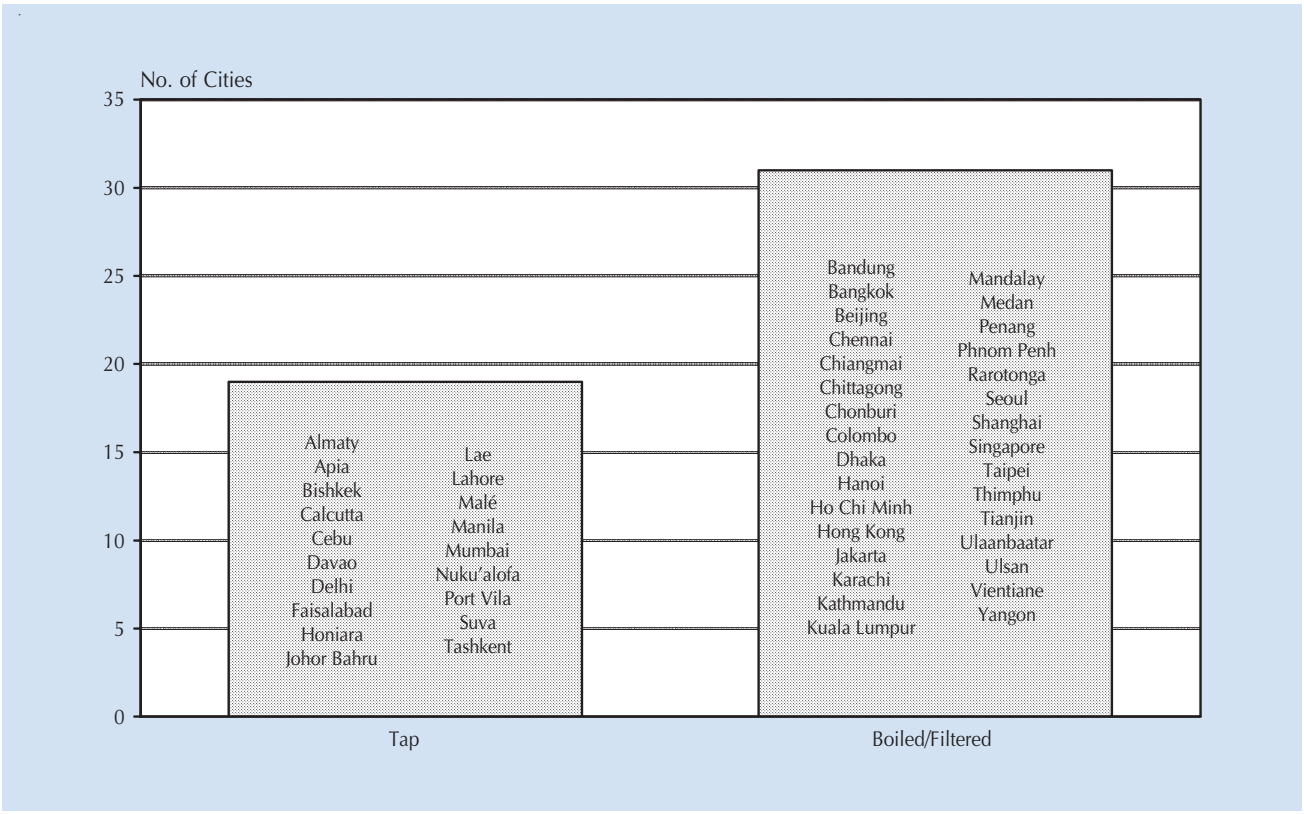


Figure 16: BOTTLED WATER USAGE

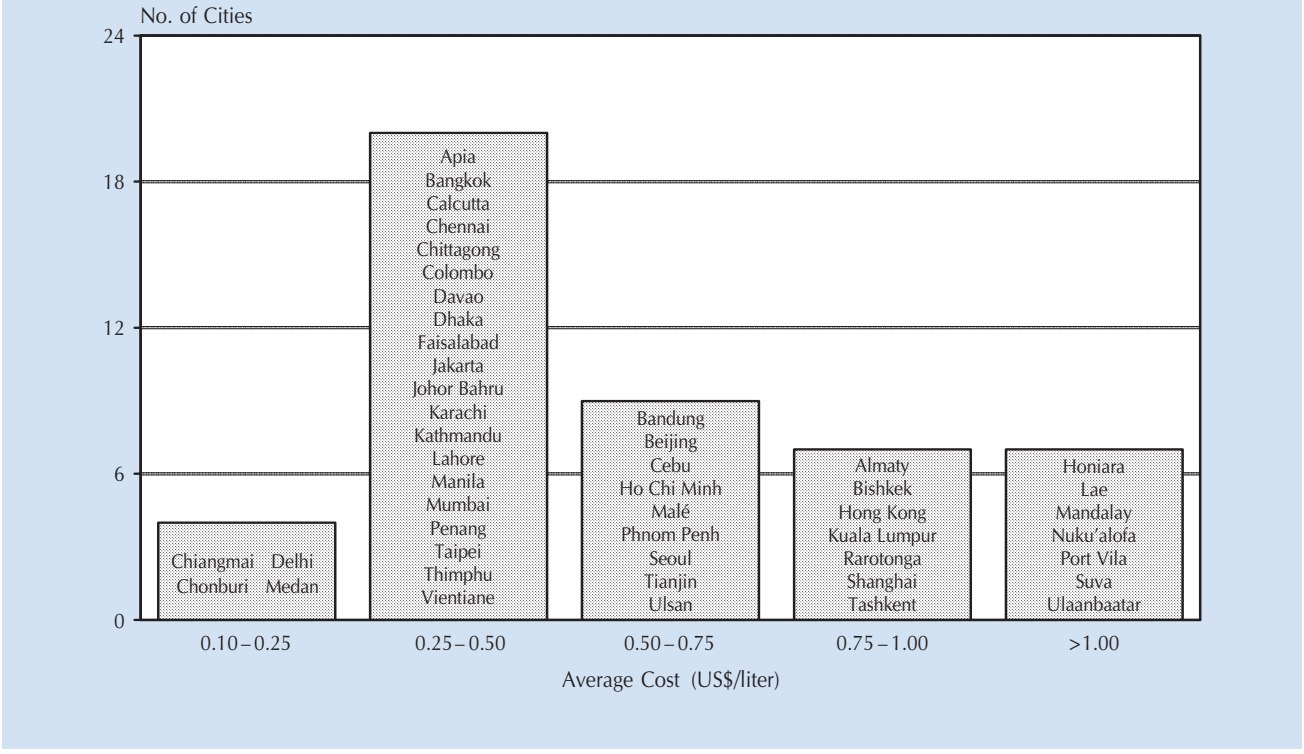
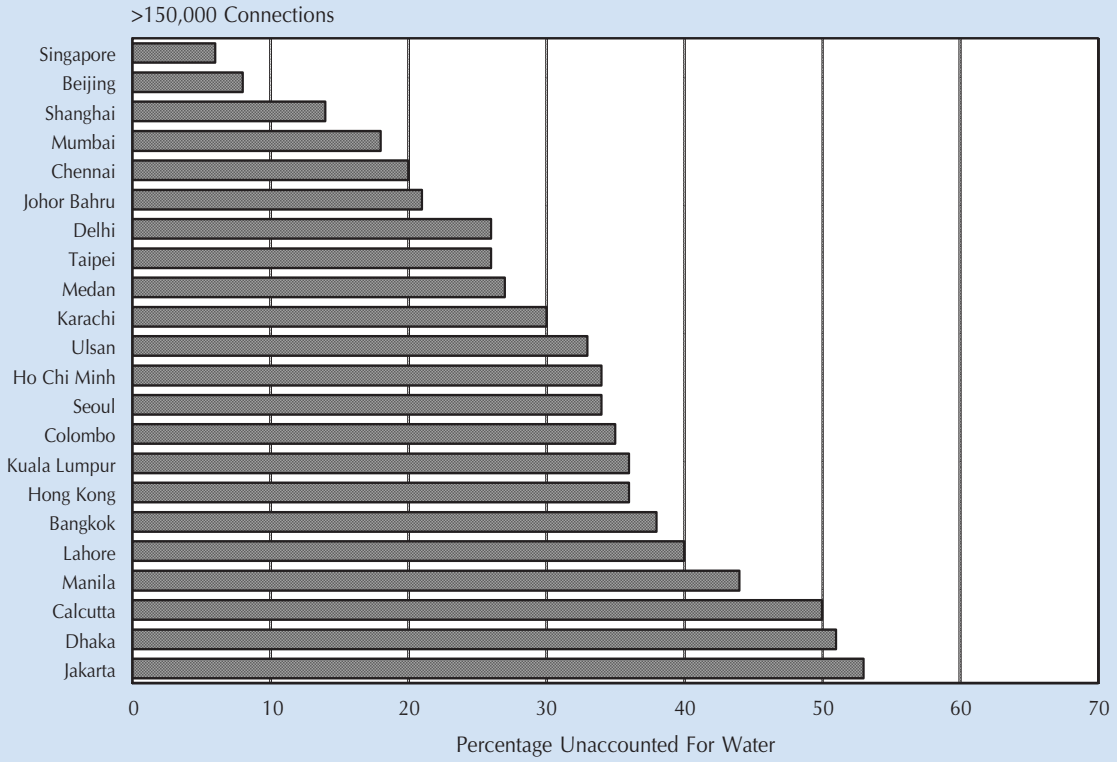


Figure 17: UNACCOUNTED FOR WATER



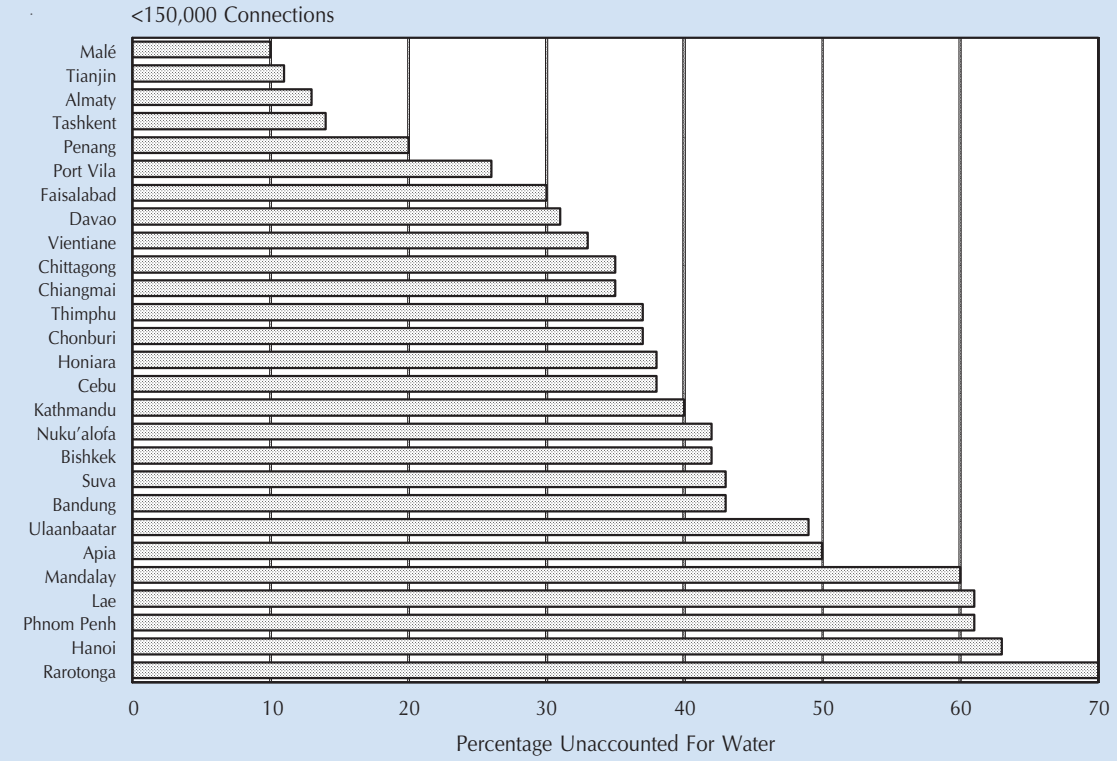
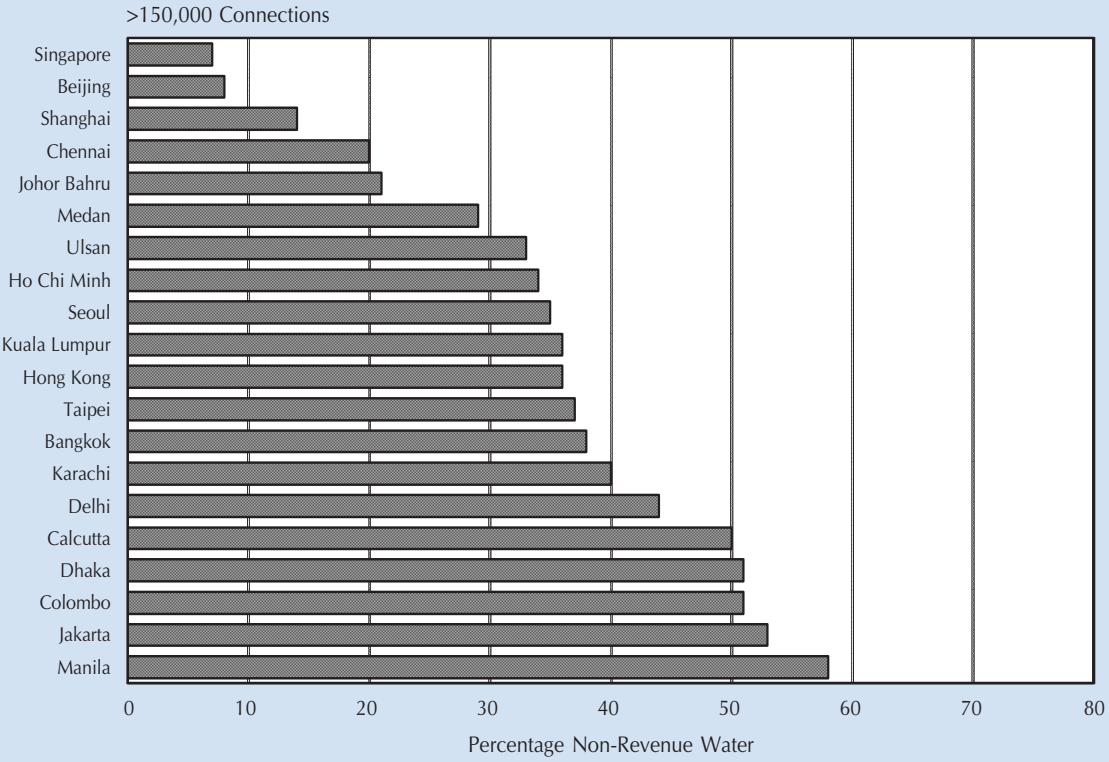


Figure 18: NON-REVENUE WATER



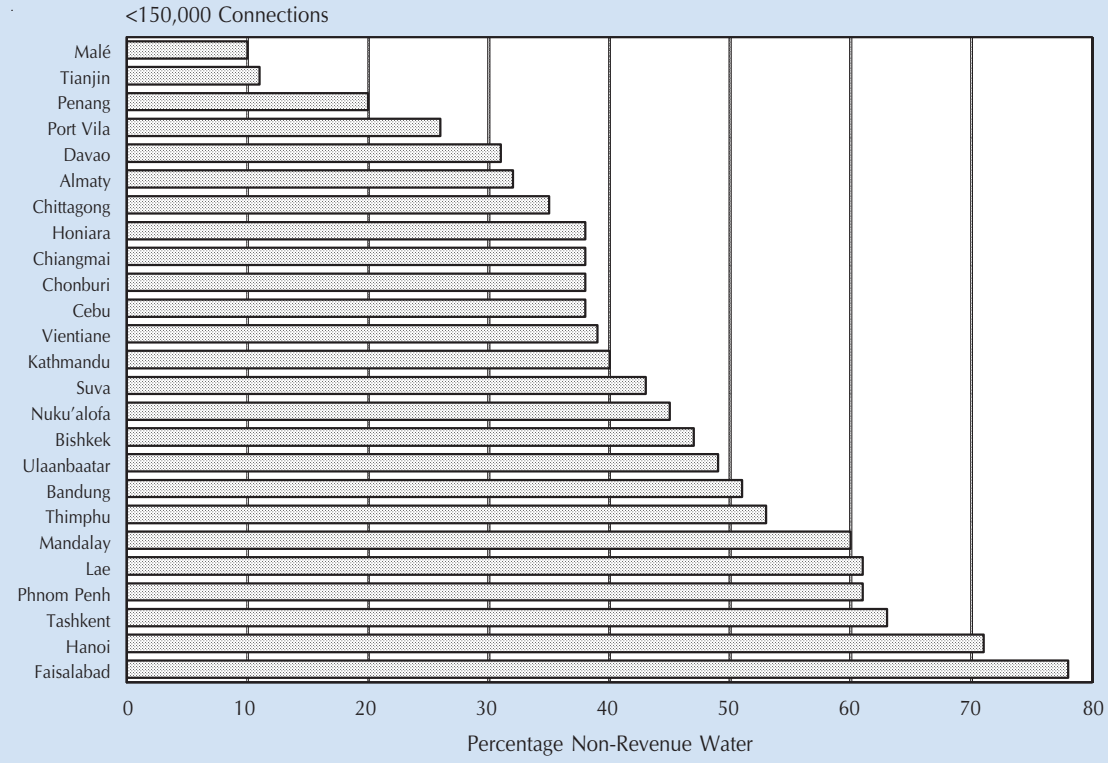
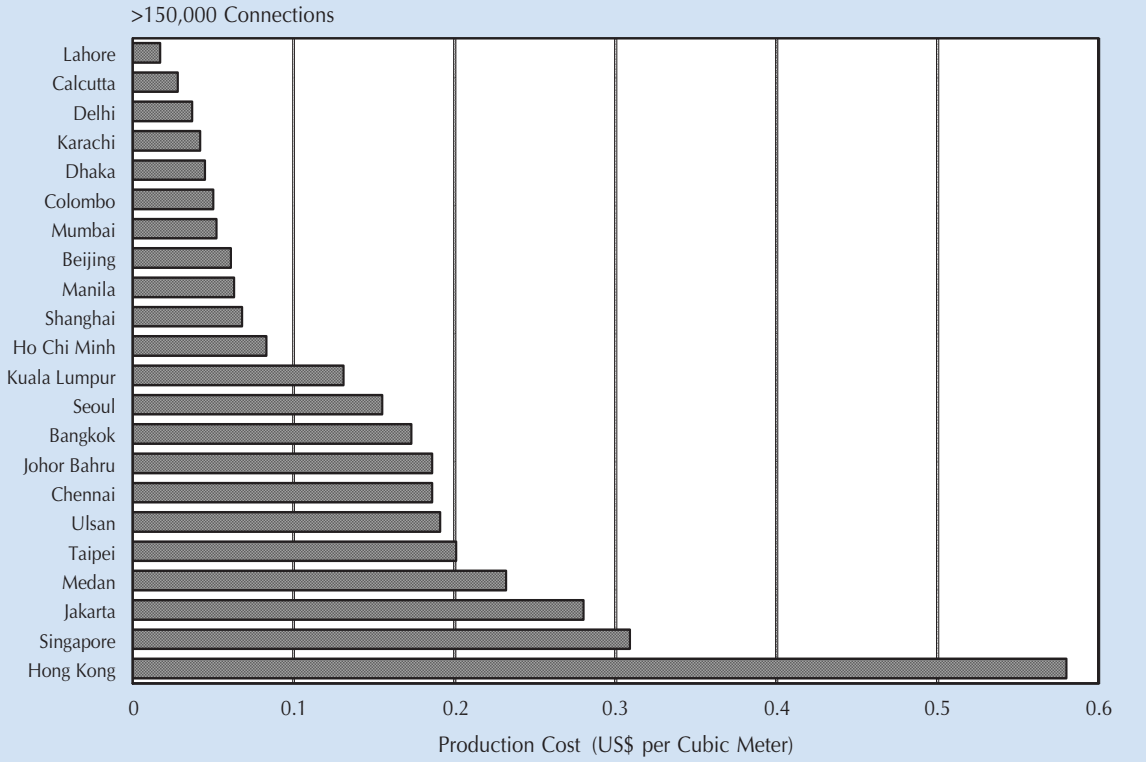


Figure 19: UNIT PRODUCTION COST



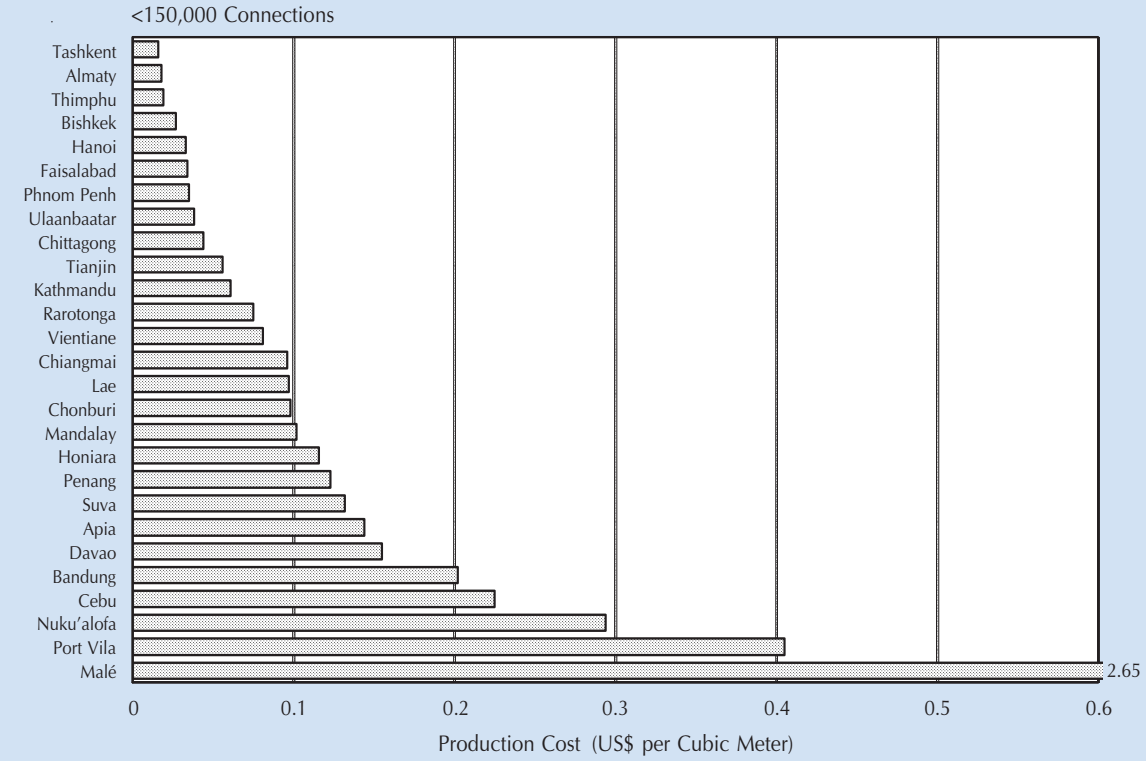


Figure 20: AVERAGE TARIFF

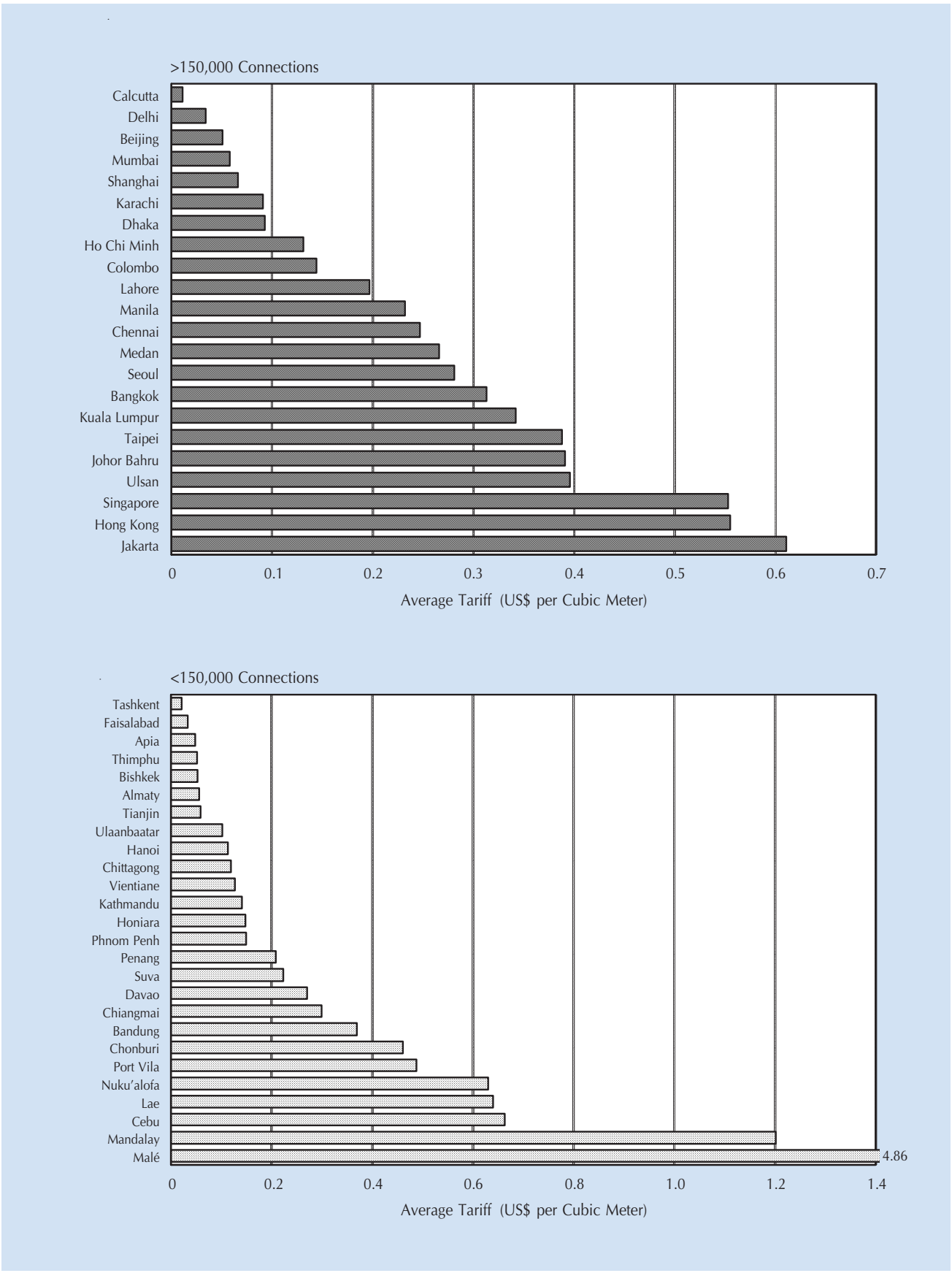


Table 9: OPERATING RATIOS OF CITY WATER SUPPLIES

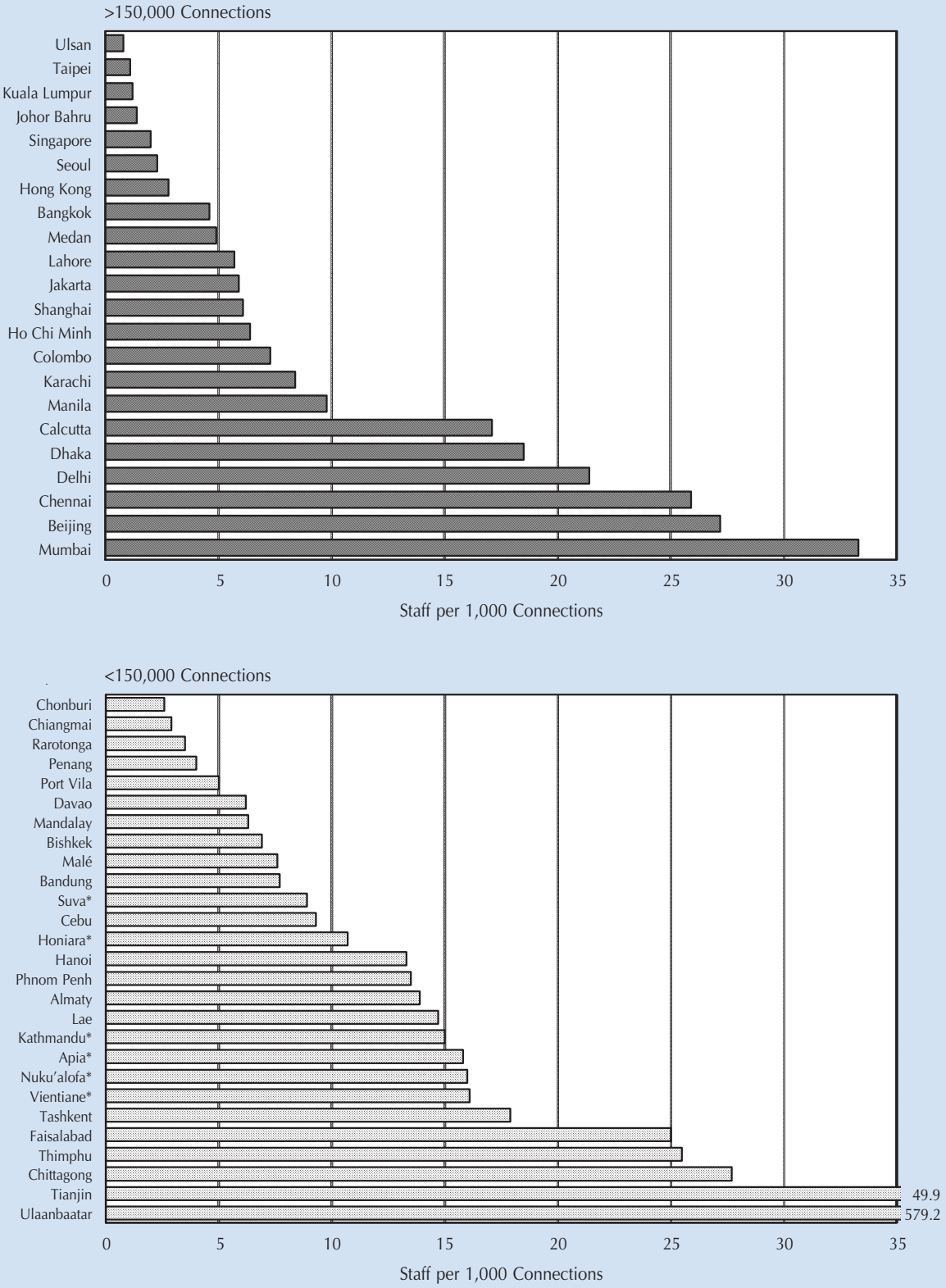
City	Annual O&M Costs (US$)	Annual Water Billings (US$)	Operating Ratio[1]	Ascending Order City	Ascending Order Operating Ratio[1]
Chittagong	2,314,777	4,117,107	0.56	Mandalay	0.22
Dhaka	12,956,701	12,870,103	1.01	Yangon	0.27
Thimphu	49,728	83,475	0.60	Chonburi	0.34
Phnom Penh	1,332,784	2,201,441	0.61	Karachi[2]	0.35
Beijing	41,136,454	31,580,084	1.30	Almaty	0.37
Shanghai	117,284,895	98,497,835	1.19	Lae	0.39
Tianjin	30,692,463	29,142,051	1.05	Chiangmai	0.49
Rarotonga	275,181	(No tariff)	NA	Colombo	0.53
Suva	4,585,853	4,430,744	1.04	Cebu	0.55
Hong Kong	532,749,006	327,798,962	1.63	Chittagong	0.56
Calcutta	11,961,873	2,278,882	5.25	Thimphu	0.60
Chennai	22,690,790	24,146,136	0.94	Singapore	0.60
Delhi	34,993,711	23,649,476	1.48	Kuala Lumpur	0.60
Mumbai	49,170,650	45,615,038	1.08	Malé	0.60
Bandung	14,115,135	14,764,222	0.96	Phnom Penh	0.61
Jakarta	99,342,529	100,933,240	0.98	Johor Bahru	0.61
Medan	22,426,898	18,611,940	1.20	Manila	0.65
Almaty	6,031,775	16,211,921	0.37	Taipei	0.69
Seoul	280,500,342	334,935,666	0.84	Lahore	0.71
Ulsan	20,186,230	28,242,664	0.71	Ulsan	0.71
Bishkek	3,946,055	4,447,303	0.89	Kathmandu	0.72
Vientiane	2,064,213	2,177,967	0.95	Ulaanbaatar	0.74
Johor Bahru	25,351,323	41,842,268	0.61	Penang	0.74
Kuala Lumpur	23,339,454	38,899,411	0.60	Hanoi	0.79
Penang	13,626,461	18,449,479	0.74	Nuku'alofa	0.80
Malé	1,027,613	1,698,895	0.60	Davao	0.83
Ulaanbaatar	2,222,060	3,020,304	0.74	Seoul	0.84
Mandalay	3,402,423	15,711,111	0.22	Tashkent	0.85
Yangon	9,466,718	34,857,457	0.27	Bishkek	0.89
Kathmandu	2,387,374	3,316,388	0.72	Bangkok	0.89
Faisalabad	1,967,424	1,392,401	1.41	Chennai	0.94
Karachi[2]	25,394,604	72,805,350	0.35	Vientiane	0.95
Lahore	7,931,671	11,106,111	0.71	Bandung	0.96
Lae	1,195,869	3,032,951	0.39	Ho Chi Minh	0.96
Cebu	8,880,818	16,230,799	0.55	Jakarta	0.98
Davao	7,241,259	8,709,003	0.83	Dhaka	1.01
Manila	64,351,880	99,699,226	0.65	Suva	1.04
Singapore	155,331,654	259,305,905	0.60	Tianjin	1.05
Honiara	1,148,062	910,534	1.26	Mumbai	1.08
Colombo	9,047,945	17,095,719	0.53	Port Vila	1.12
Taipei	146,989,156	211,660,508	0.69	Shanghai	1.19
Bangkok	243,019,661	272,267,748	0.89	Medan	1.20
Chiangmai	1,631,643	3,316,430	0.49	Honiara	1.26
Chonburi	2,910,661	8,580,133	0.34	Beijing	1.30
Nuku'alofa	601,243	748,501	0.80	Faisalabad	1.41
Tashkent	14,330,620	16,897,096	0.85	Delhi	1.48
Port Vila	1,388,179	1,236,531	1.12	Hong Kong	1.63
Hanoi	4,400,367	5,588,787	0.79	Calcutta	5.25
Ho Chi Minh	21,318,096	22,257,735	0.96	Rarotonga	NA
Apia	(No data)	270,439	NA	Apia	NA

Notes:

[1] Operating Ratio = O&M Cost/Billings

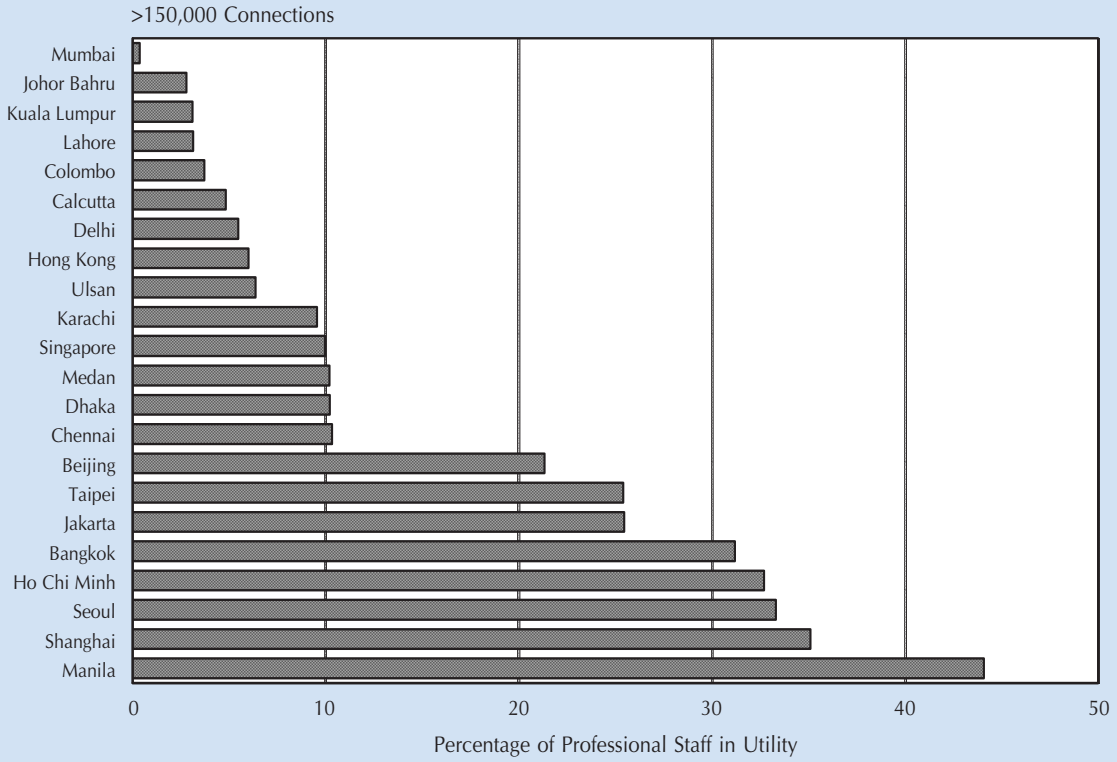
[2] Billings include past arrears amounting to US$39,937,903; ratio without billing arrears is 0.77.

Figure 21: STAFF PER 1,000 CONNECTIONS (CITIES)



* Ratio is for the entire utility.

Figure 22: PROFESSIONAL STAFF



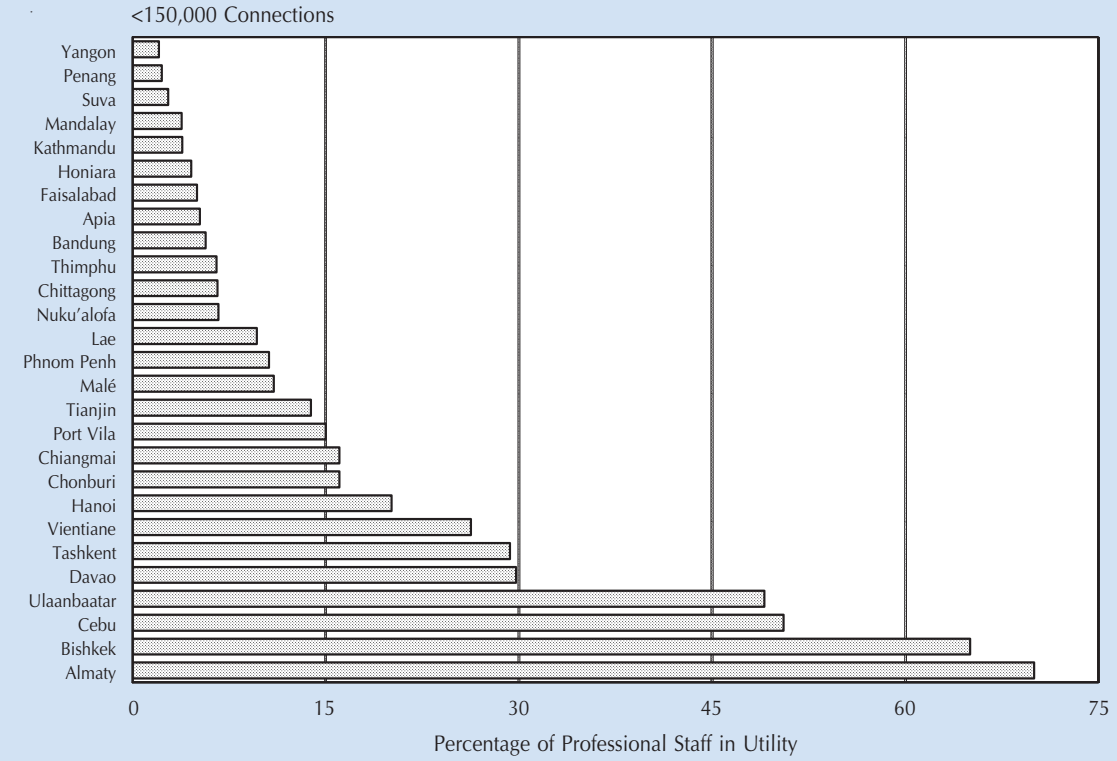


Figure 23: TYPE OF ANNUAL REPORT

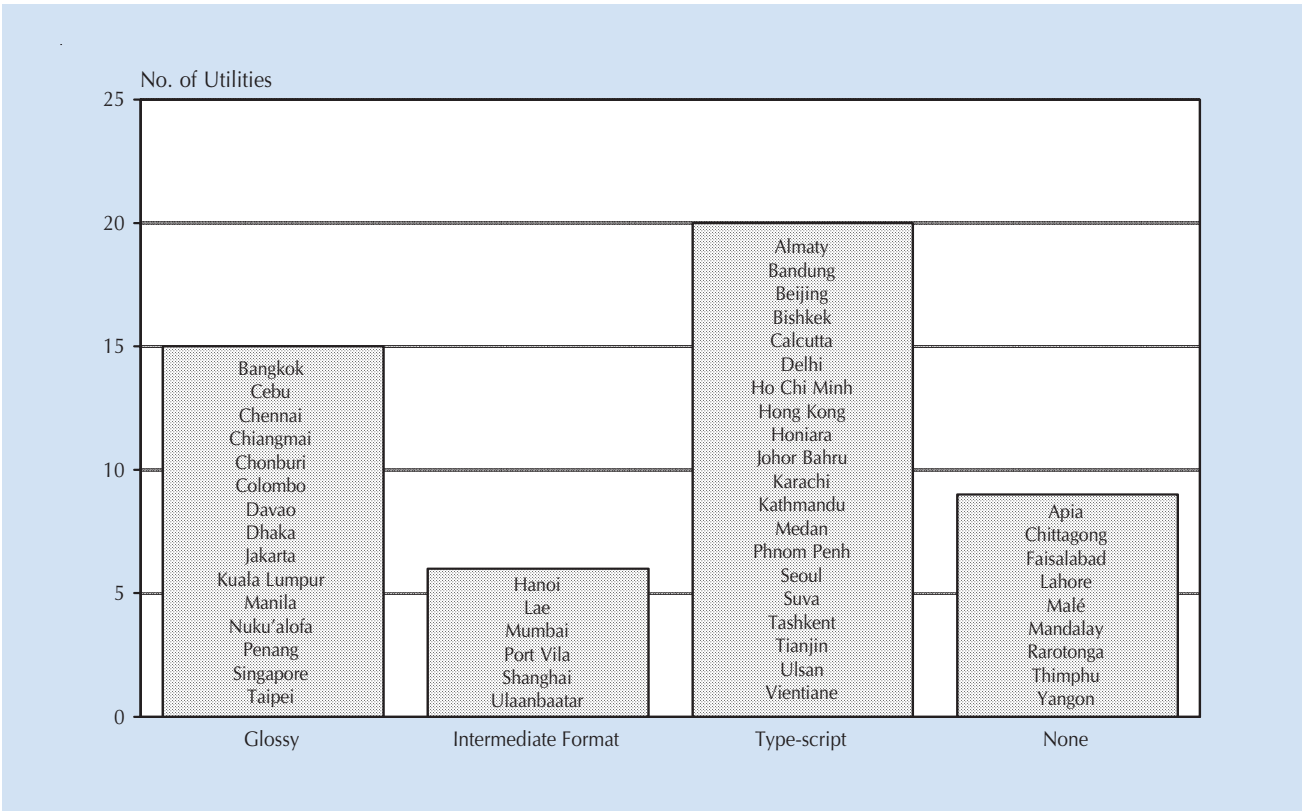


Figure 24: AVERAGE SALARIES OF THE TOP FIVE MANAGEMENT POSITIONS

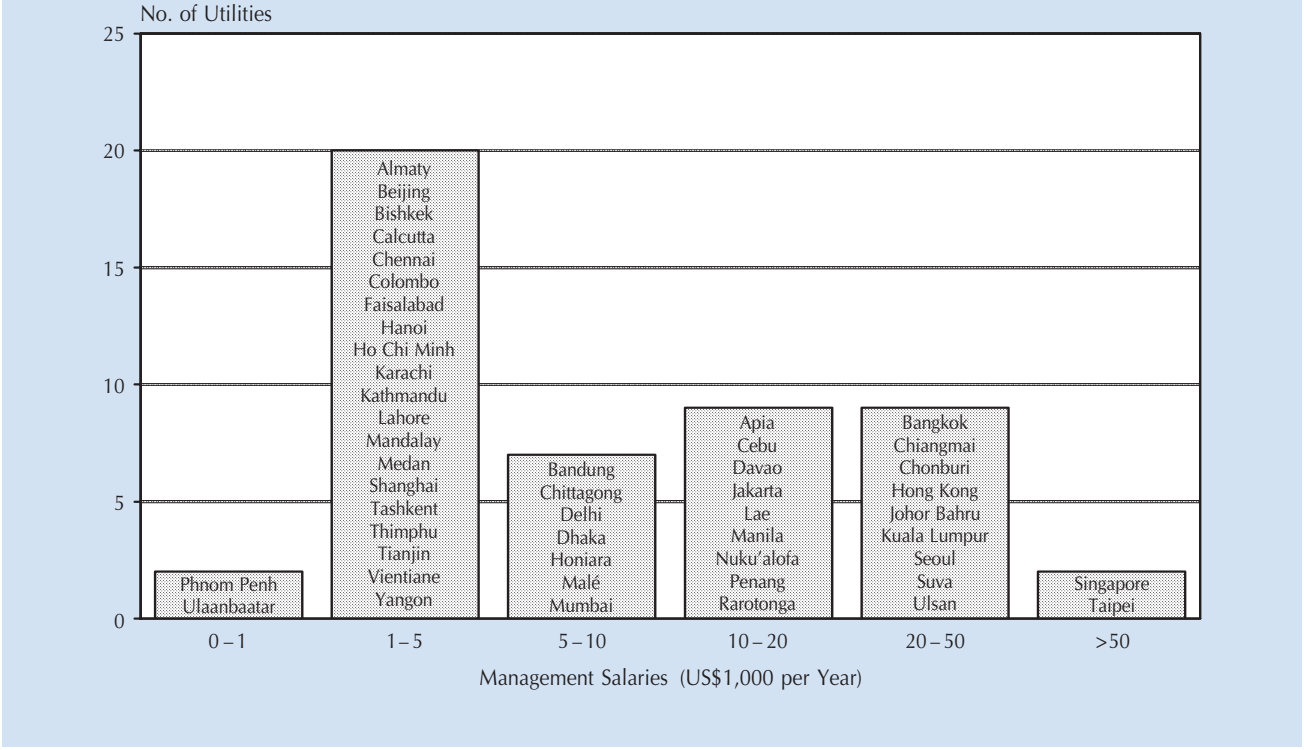


Table 10: PRIORITY NEEDS OF UTILITY

City	As seen by Management	Consumers' Opinion
Chittagong	Improvement of management. Amendment of labor law.	Reliability with 24-hour supply. Water quantity and increased pressure.
Dhaka	Institutional reform. Improvement of financial management.	More tubewells. Privatize the water utility.
Thimphu	Inadequate skilled and dedicated personnel. Lack of equipment (e.g., leak detection instrument).	Reliability and 24-hour supply. Improved operations and service.
Phnom Penh	Reducing unaccounted for water. Extension of service capacity.	Higher water pressure. More house connections.
Beijing	Decrease operations cost. Improve service to consumers.	Improve water quality. Increase water quantity and pressure.
Shanghai	ISO 9002 Quality Assurance System classification. Improve customer relations and service.	Improve water quality. Increase water quantity and pressure.
Tianjin	Reduce operating cost. Improve bill collection and raise rate of return.	Replace old water pipes and expansion. Improve water quality.
Rarotonga	Improve water resources management in the island. Development of water supply master plan for Rarotonga.	Improve water quality. Better water storage facilities.
Suva	Corporatisation of the utility. Improved efficiency.	Prompt repairs. Improved service.
Hong Kong	To improve operational efficiency. To enhance quality of service to customers.	Improve water quality. Reduce water rates.
Calcutta	Introduce computerized pipe network distribution management system. Computerize monitoring system for treatment plant, operation of valves and electrical panel board.	Improve water quality. Increase water pressure.
Chennai	To strengthen and develop the utility into a service-oriented commercial organization. To achieve supply of 105 lpcd of water and to ensure effective sewage collection and disposal and reuse of wastewater.	Improve water quality. Ensure regular or 24-hour supply.
Delhi	Additional sources of raw water and check leakage. Revision of tariff.	Increase water supply and longer supply hours. Increase water pressure.
Mumbai	Reduction in unaccounted for water. Equitable distribution of available supply.	Increase water pressure. Increase supply hours/24-hours supply.
Bandung	Reduction in unaccounted for water to 25% by year 2000. Increase production to cover 80% of population by year 2000.	Increase water quantity and pressure. Improve service.

Table 10: PRIORITY NEEDS OF UTILITY *(continued)*

City	As seen by Management	Consumers' Opinion
Jakarta	Decrease unaccounted for water. Increase total production capacity.	Improved and stable supply of water. Proper maintenance and timely billing.
Medan	To reduce non-revenue water. To develop personnel capability.	More water and increase pressure. Improve service.
Almaty	Address non-payment of bills by some users. Lower expenses for power and electricity.	Improve water quality. Increase water pressure.
Seoul	Reduction of leakage. Protection of water sources.	Improve water quality. Replace pipes and repair leaks.
Ulsan	Price of water should at least cover production cost. Water quality improvement.	Improve water quality. Leak repair and replace old distribution lines.
Bishkek	Improve bill collection efficiency. Water quality improvement.	Increase water supply and pressure. More hot water supply and water for irrigation.
Vientiane	Investment funds for nationwide expansion and skills upgrading for technicians/staff. Modern production equipment for utilities.	Tariff policy (i.e., lower price) Improve piped water distribution system.
Johor Bahru	Tariff review. Improving core competency.	Increase water pressure. Reduce breakdown and improve pipe system.
Kuala Lumpur	Shortage of manpower. Using latest technology in water supply operation and maintenance.	Water quality. No interruption of supply.
Penang	Corporatisation/privatisation. Human resources development.	Improve water quality. Minimize interruptions of supply.
Malé	Implementation of agreed water policy with government. Sewerage system upgrade and maintenance.	Improve quality and taste of water. Lower price of water.
Ulaanbaatar	Water metering. Replacement of equipment.	Expand water distribution system with more water trucks, tankers and kiosks. Improved hygiene and lengthen distribution hours in kiosks.
Mandalay	Financial improvements. Technological improvements.	None.
Yangon	Implement metering for entire water supply system. Reduce unaccounted for water.	Expand water supply lines. More piped water connections.
Kathmandu	Leakage and wastage control. Management improvement.	Sufficient and regular water supply. Improve water quality.

Table 10: PRIORITY NEEDS OF UTILITY *(continued)*

City	As seen by Management	Consumers' Opinion
Faisalabad	Water source development. Optimal O&M and reduction of UFW.	Improve water supply. Reliable supply of water.
Karachi	Additional water to meet demand. Distribution system strengthening.	Improve water quality. Increase water supply and pressure.
Lahore	Introduce preventive maintenance of tubewells. Make the distribution system more efficient.	Increase pressure. Improve billing.
Lae	Reduce non-revenue water. Increase sales.	Improve water quality, supply and pressure. Improve maintenance.
Cebu	Capital funding for large source development. Autonomy from government bureaucracy.	Improved operation and maintenance. Reliability and 24-hour supply.
Davao	Rehabilitation of water system. Financing for expansion.	Improved operation and maintenance. More water and increased pressure.
Manila	Rehabilitation of water system. Financing for expansion.	Improved operation and maintenance. More water and increased pressure.
Singapore	Secure adequate supply to meet long-term needs. Demand management to keep consumption growth low.	Improve cleanliness and reduce chlorine. Reduce or lower rates.
Honiara	Institutional strengthening. Infrastructure development.	Reliable water supply and new water source. Improve water quality.
Colombo	Unaccounted for water reduction. Autonomy in management functions.	More water and increased pressure. Quick repairs.
Taipei	Sufficient water supply. Stable and reliable water quality.	Leak prevention and repair. Better water quality.
Bangkok	Reduction of unaccounted for water. Service area expansion.	Improve water quality. Improve water pressure.
Chiangmai	Funds for improvement and expansion of waterworks system. Human resources management.	Higher water pressure. Improve water quality.
Chonburi	Funds for improvement and expansion of waterworks systems. Human resources management.	Higher water pressure. Improve water quality.
Nuku'alofa	Safe and reliable water supply. Efficient work performance.	Reduce chemical/improve water quality. Increase water supply and pressure.
Tashkent	Improve cash flow through better revenue collection. Supply of replacement parts, and funds for power, fuel, chemical and transport.	Increase water pressure. Improve water quality.

Table 10: PRIORITY NEEDS OF UTILITY *(continued)*

City	As seen by Management	Consumers' Opinion
Port Vila	Quality of service. Economic viability.	Improve water quality. Reduce water rates.
Hanoi	Reduce unaccounte1d for water to 50% by the year 2000. Institution building and development for the water sector.	Increase water pressure. Improve service.
Ho Chi Minh	Improve the physical facilities. Improve the workers' expertise and skill to meet technical requirements.	Need for stronger water pressure. Expand to villages with more connections.
Apia	Customer service satisfaction. Cost recovery.	Improve quality of water. Reliability, more water and higher pressure.

Figure 25: PRIVATE SECTOR PARTICIPATION

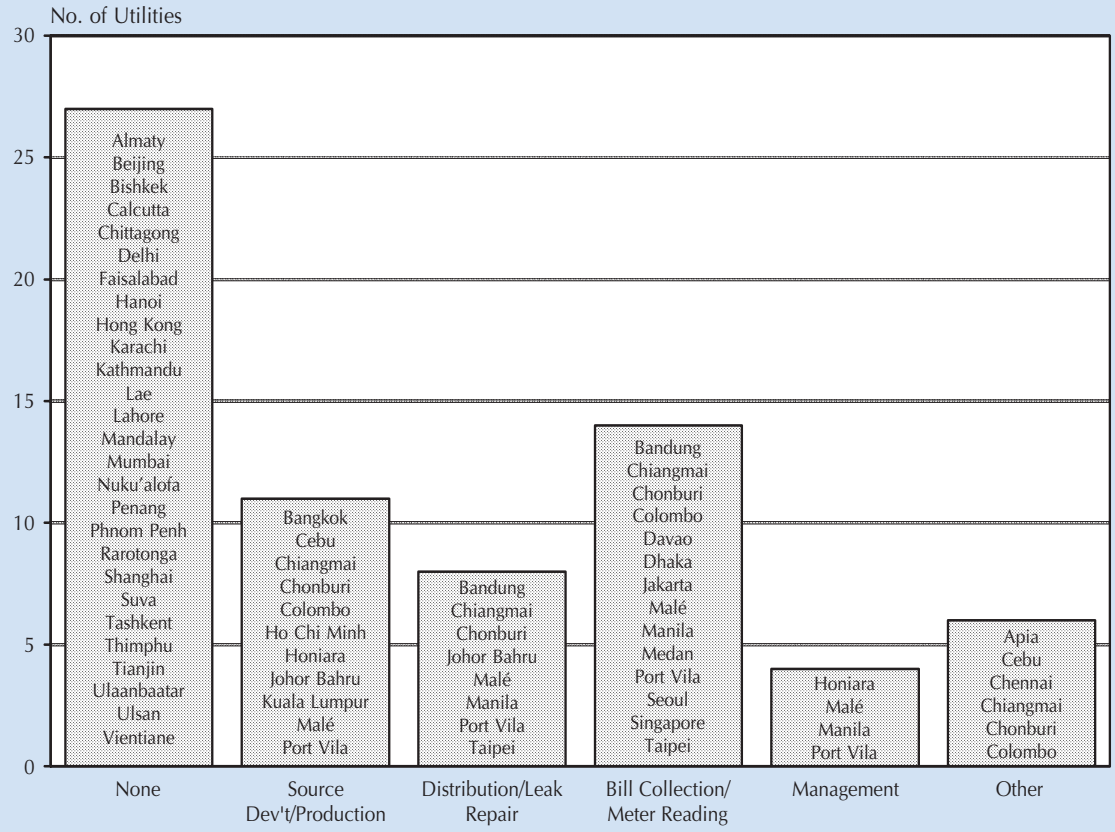


Figure 26: METHODS OF PAYMENT FOR WATER THROUGH HOUSE CONNECTIONS

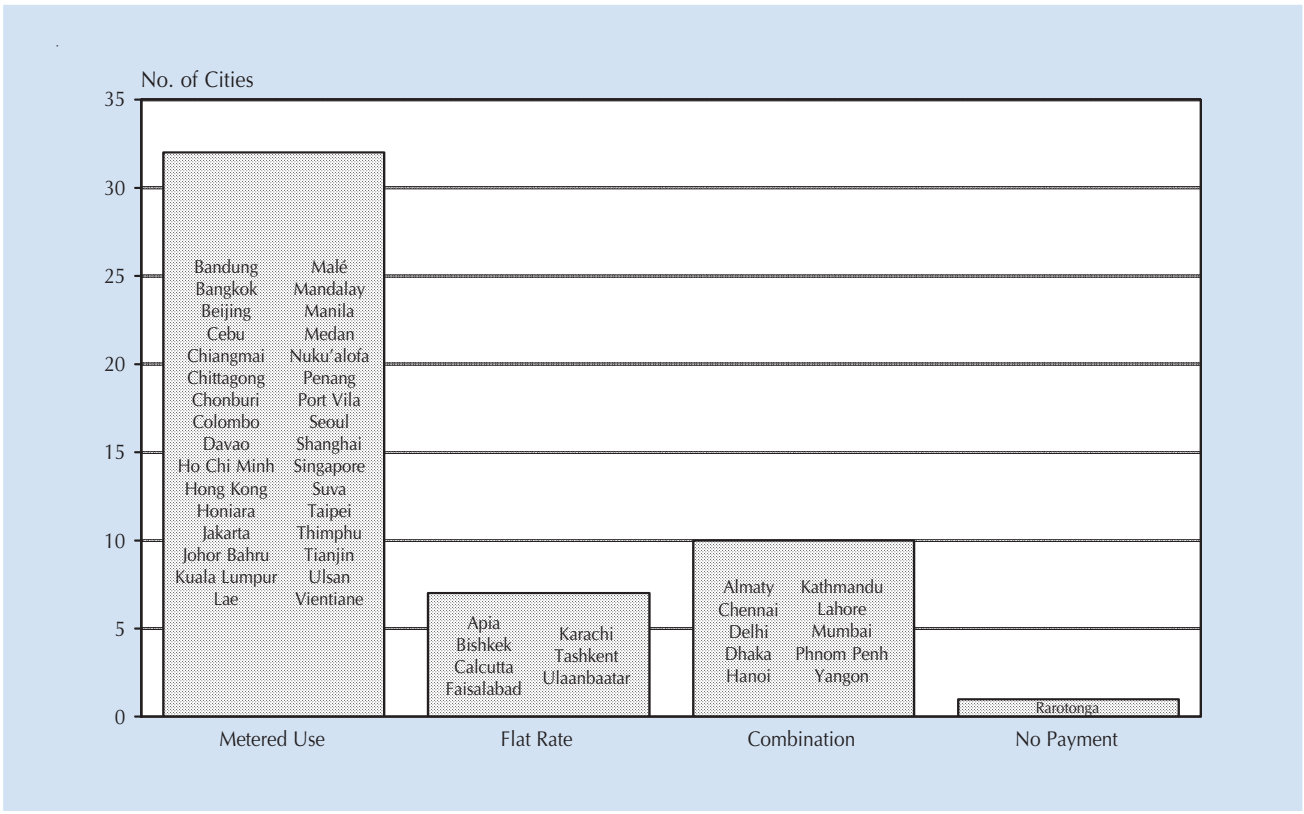


Figure 27: METHODS OF PAYMENT FOR WATER THROUGH PUBLIC TAPS AND STAND PIPES

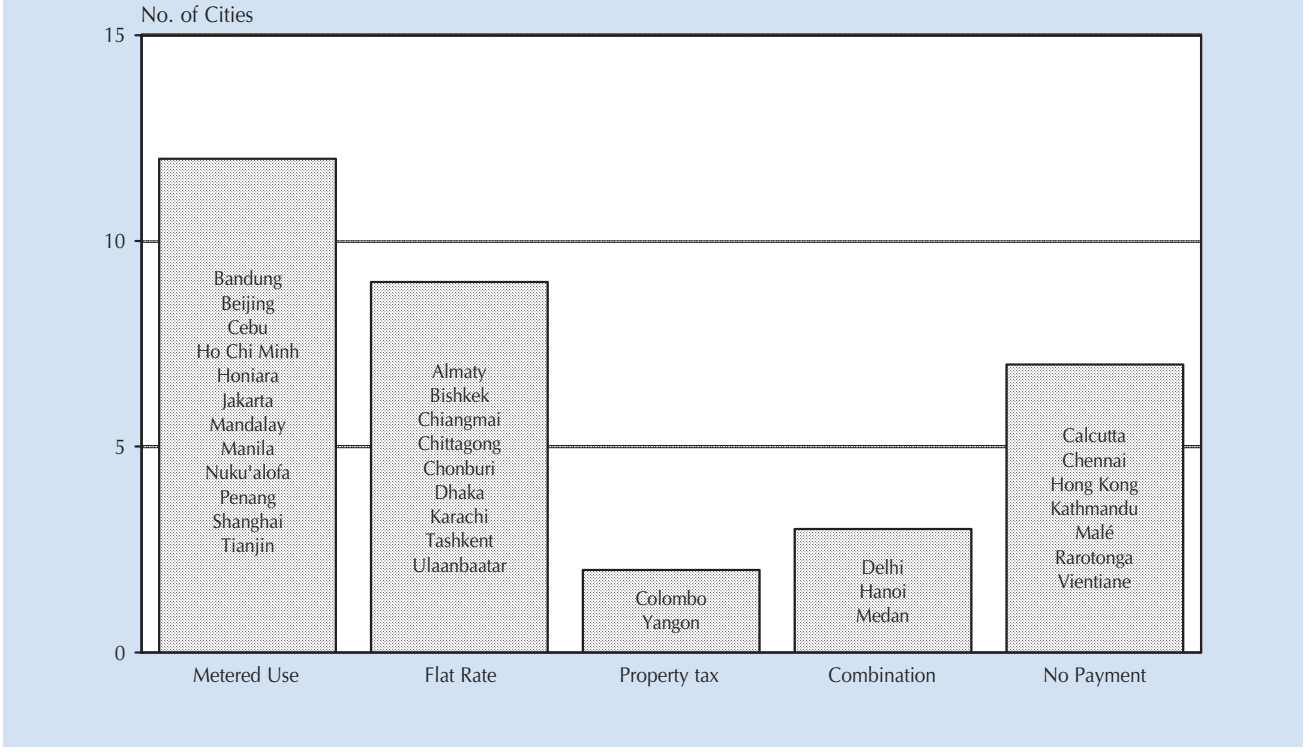


Figure 28: METHODS OF PAYMENT FOR WATER THROUGH INDUSTRIAL & COMMERCIAL CONNECTIONS

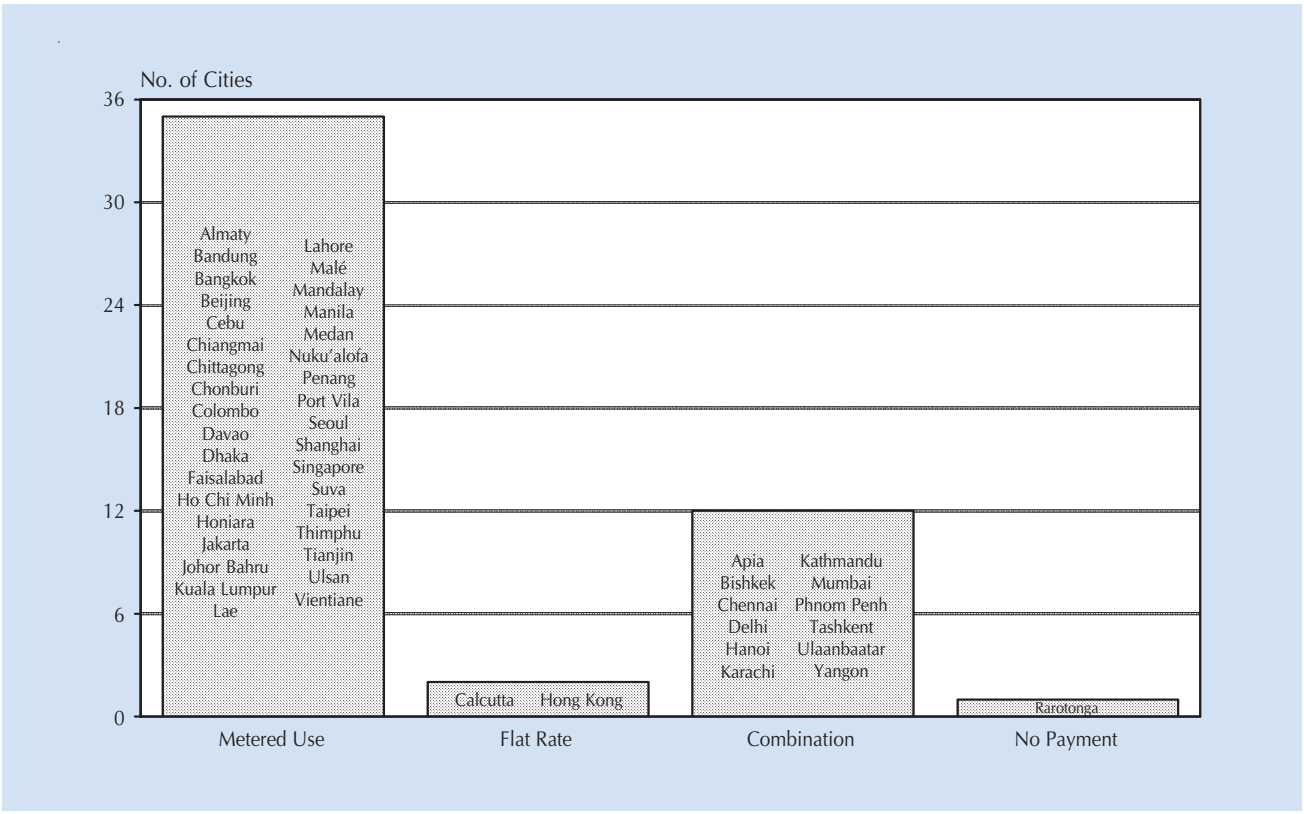


Figure 29: CONSUMER METERING

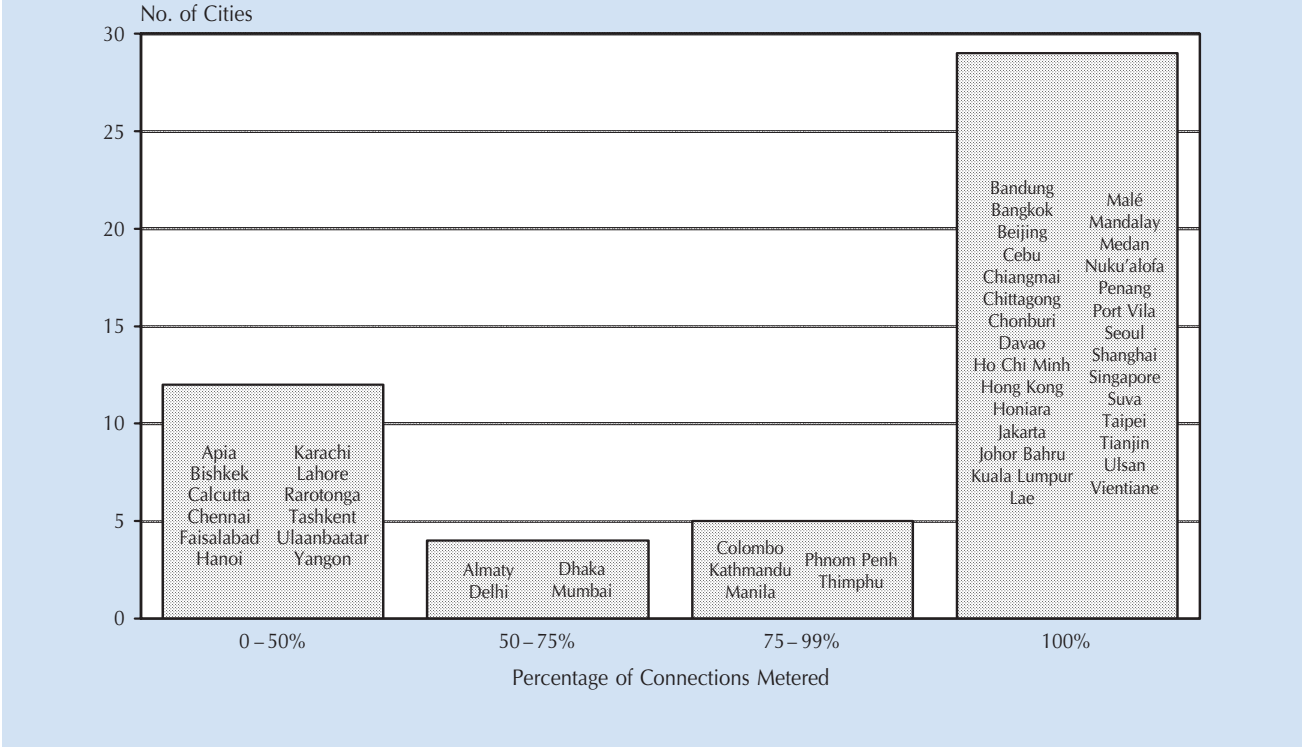


Figure 30: METHODS OF PAYMENT COLLECTION

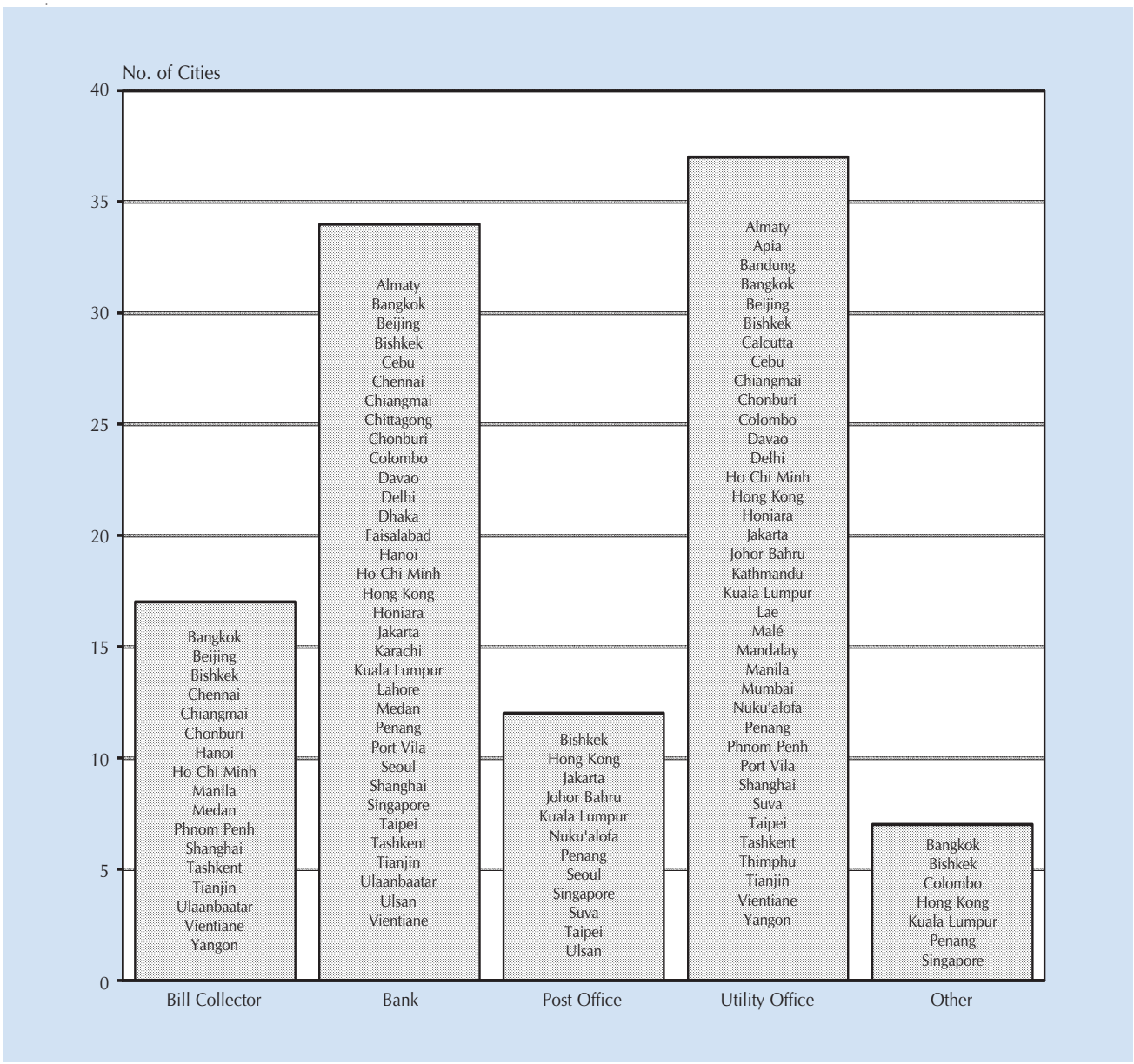


Figure 31a: DOMESTIC TARIFF STRUCTURES

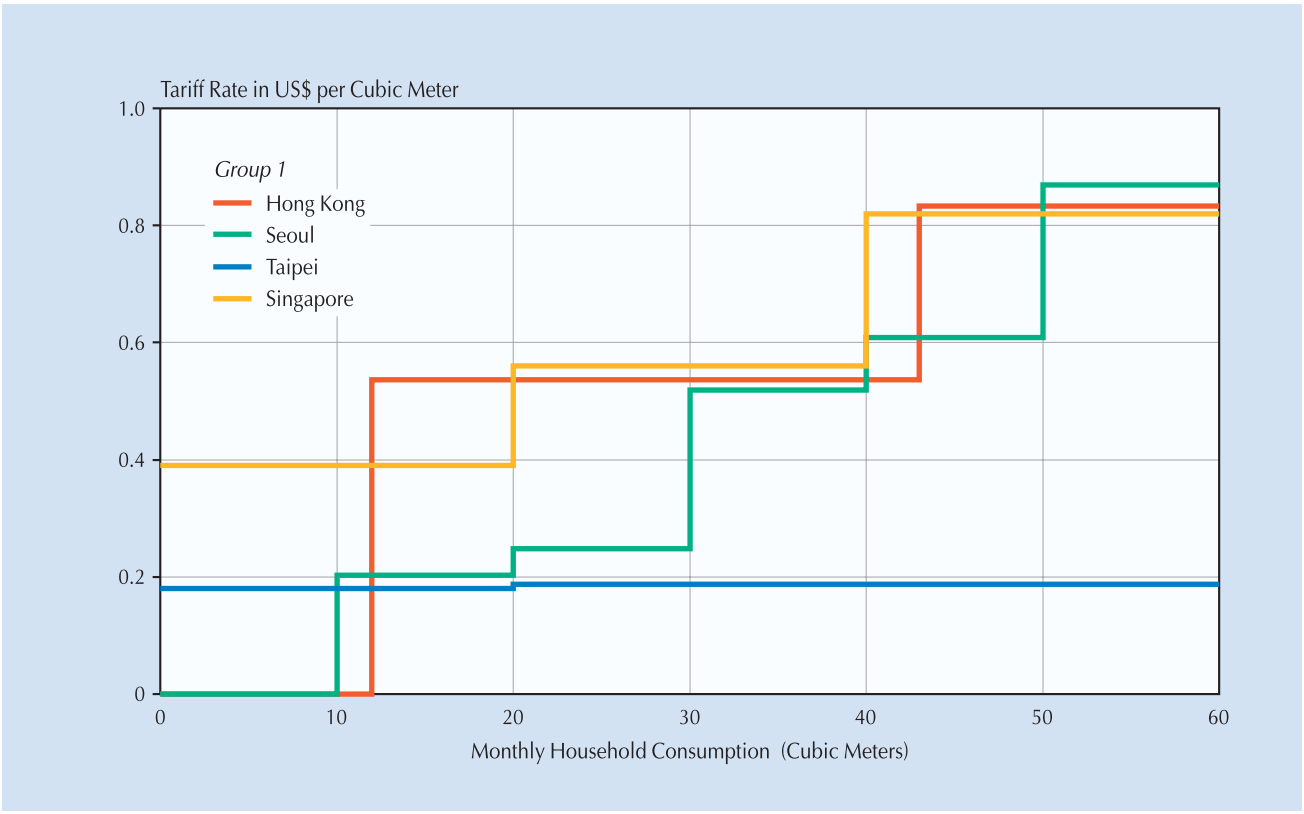


Figure 31b: DOMESTIC TARIFF STRUCTURES

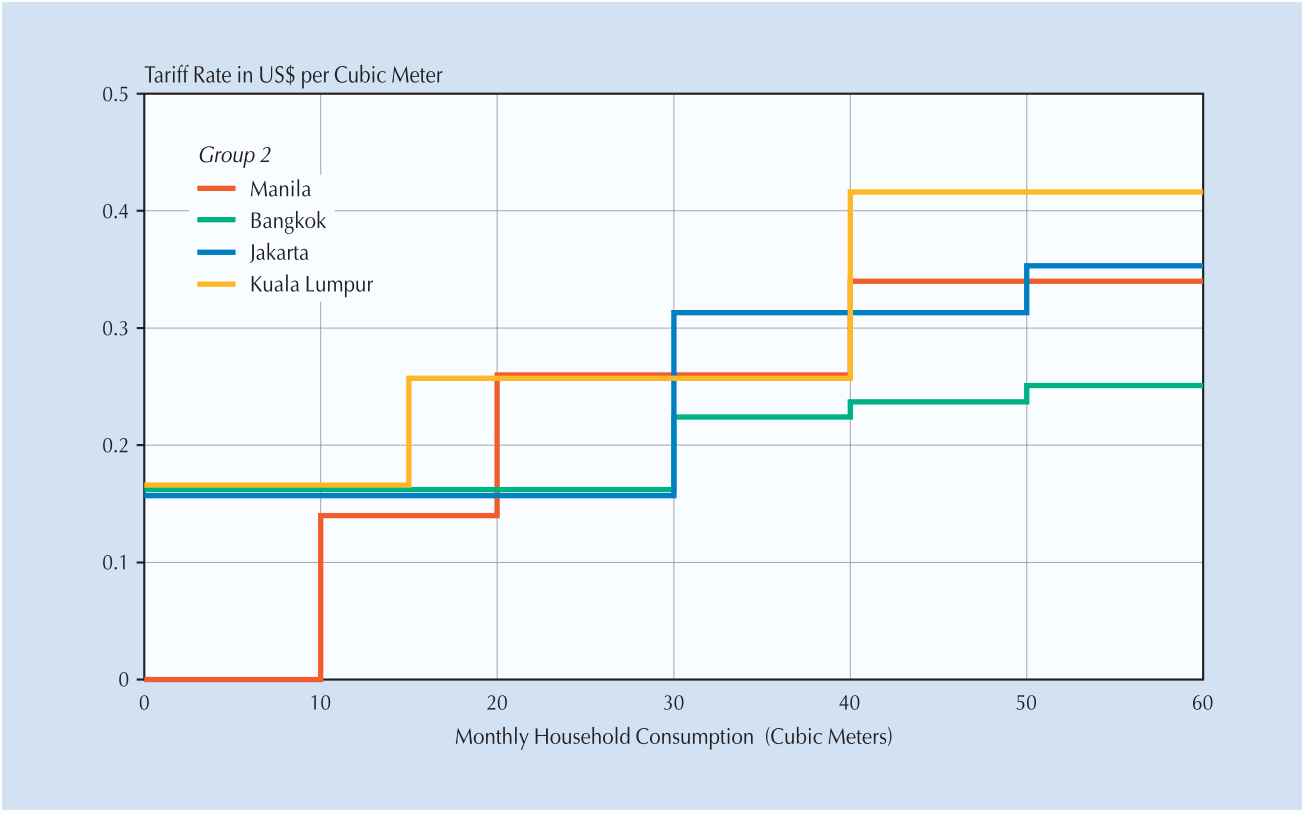


Figure 31c: DOMESTIC TARIFF STRUCTURES

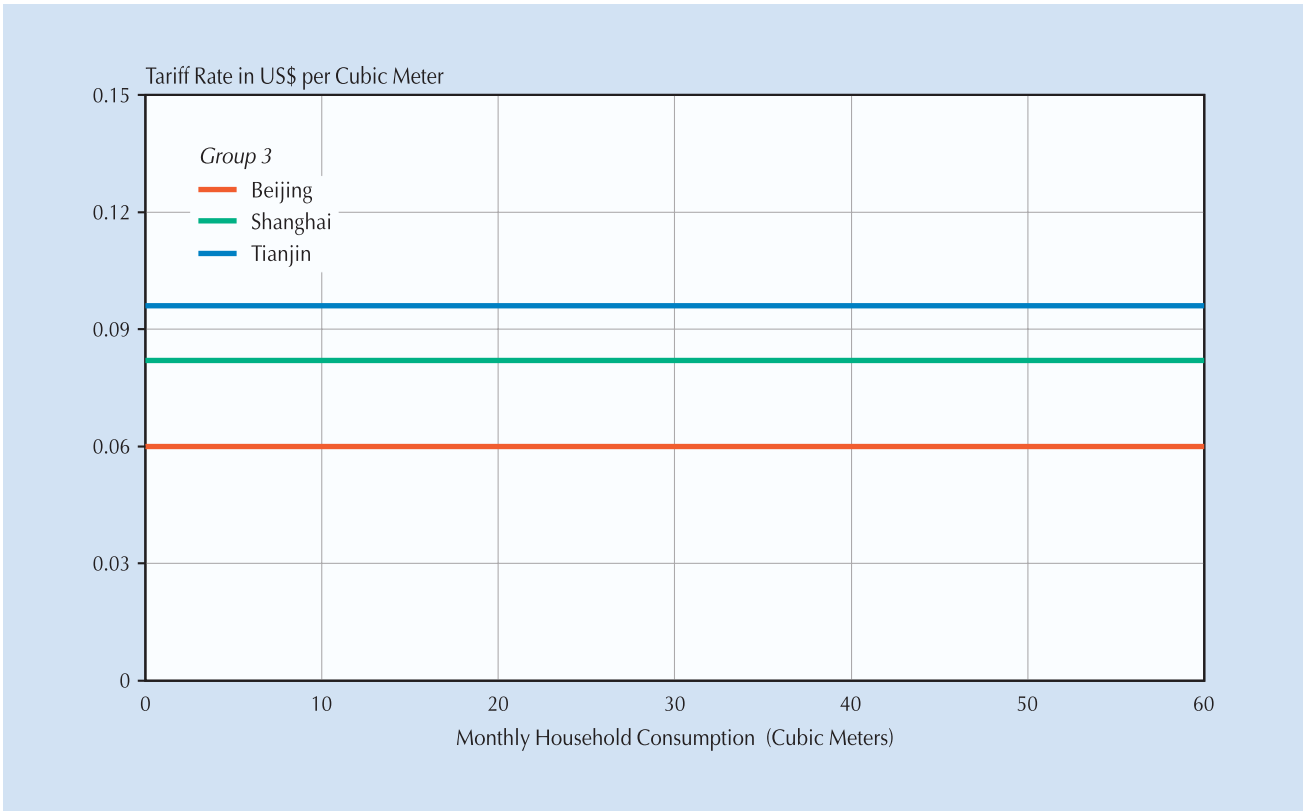


Figure 31d: DOMESTIC TARIFF STRUCTURES

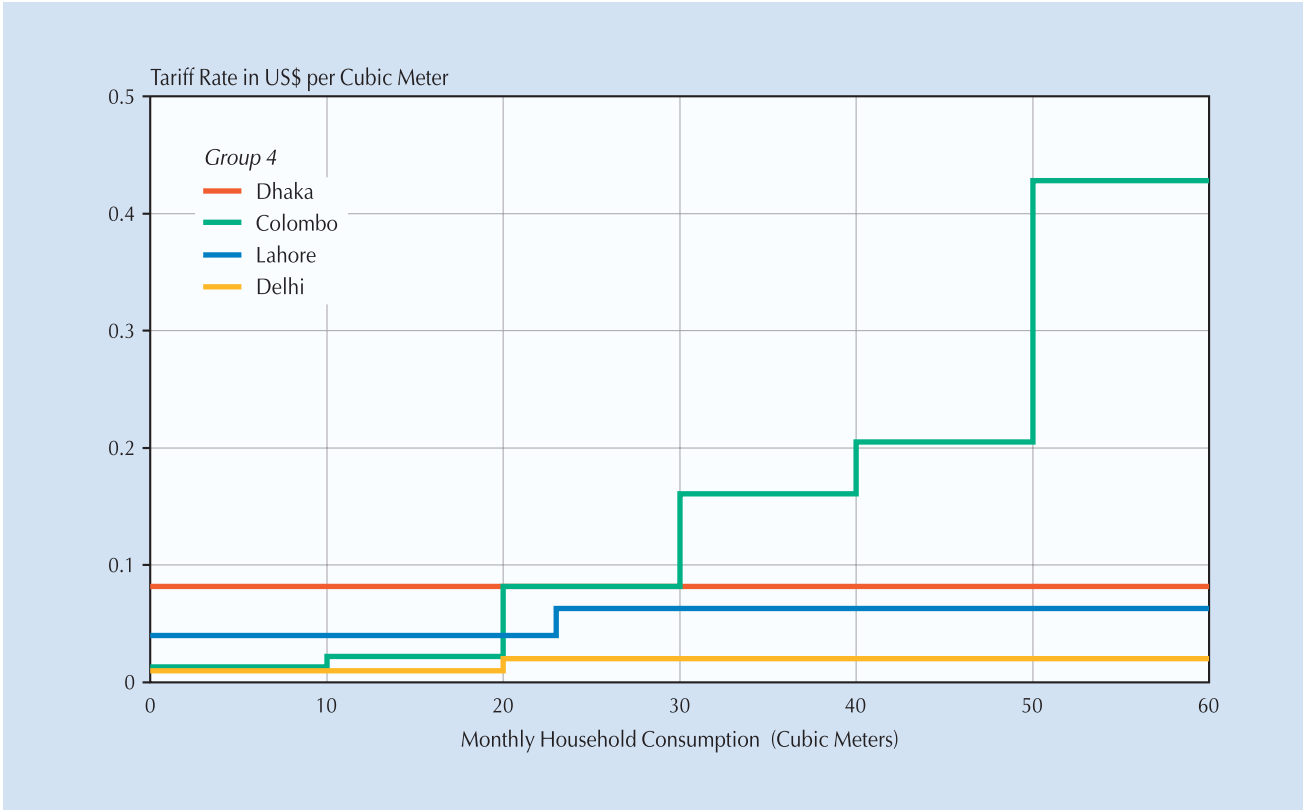


Figure 31e: DOMESTIC TARIFF STRUCTURES

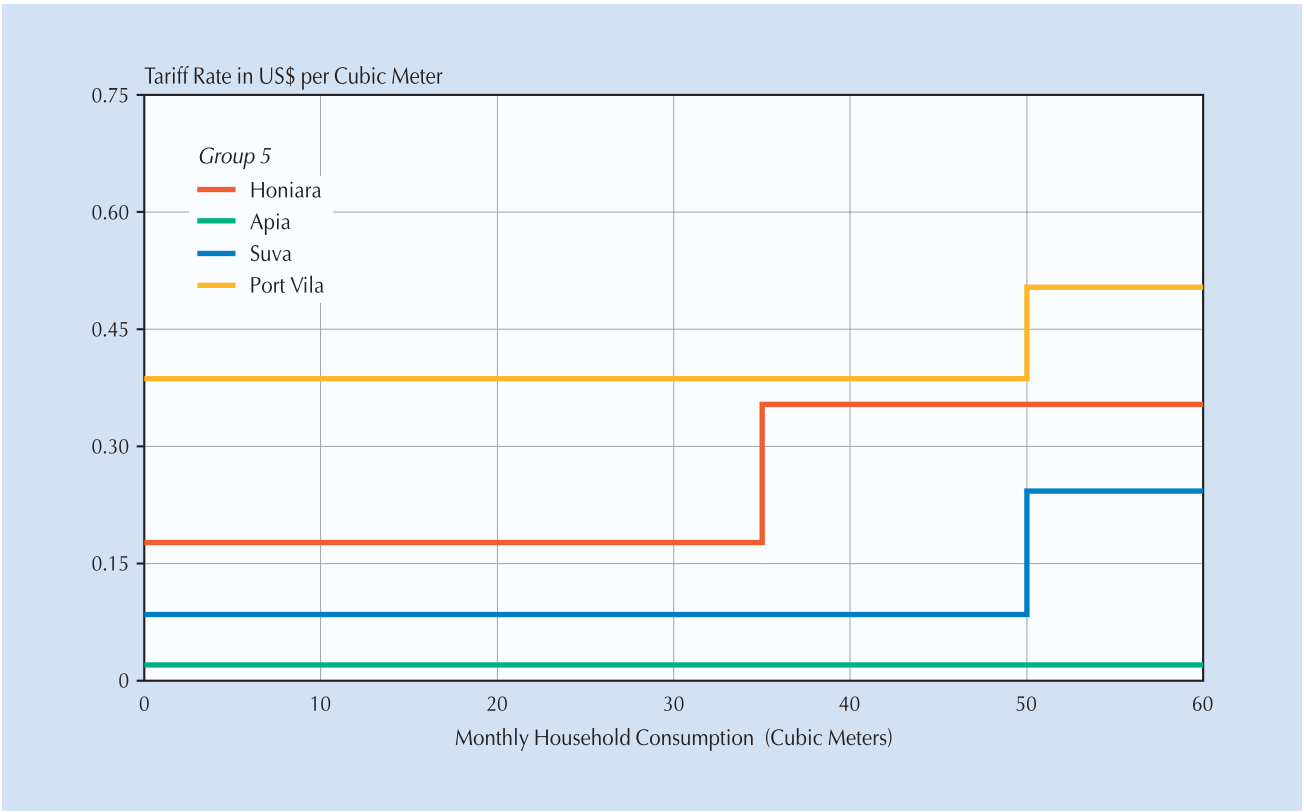


Figure 31f: DOMESTIC TARIFF STRUCTURES

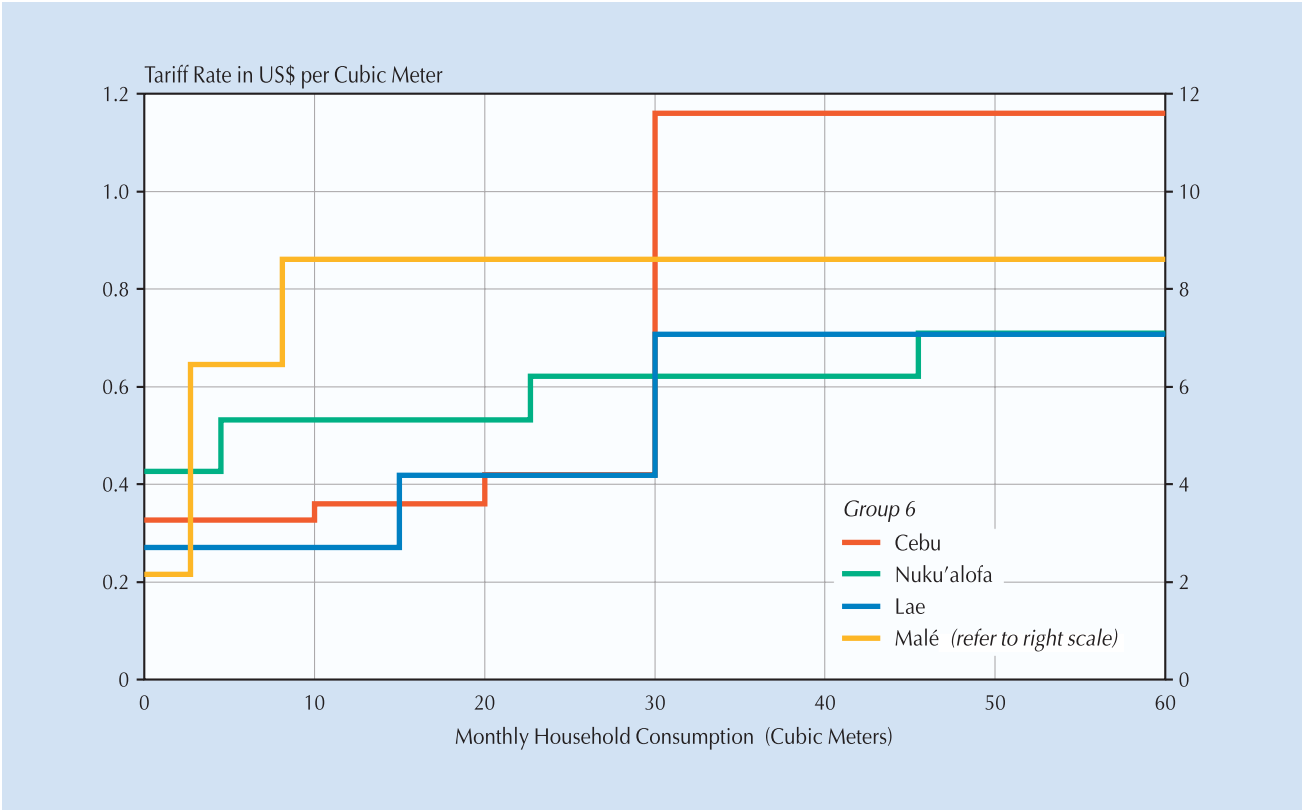


Figure 31g: DOMESTIC TARIFF STRUCTURES

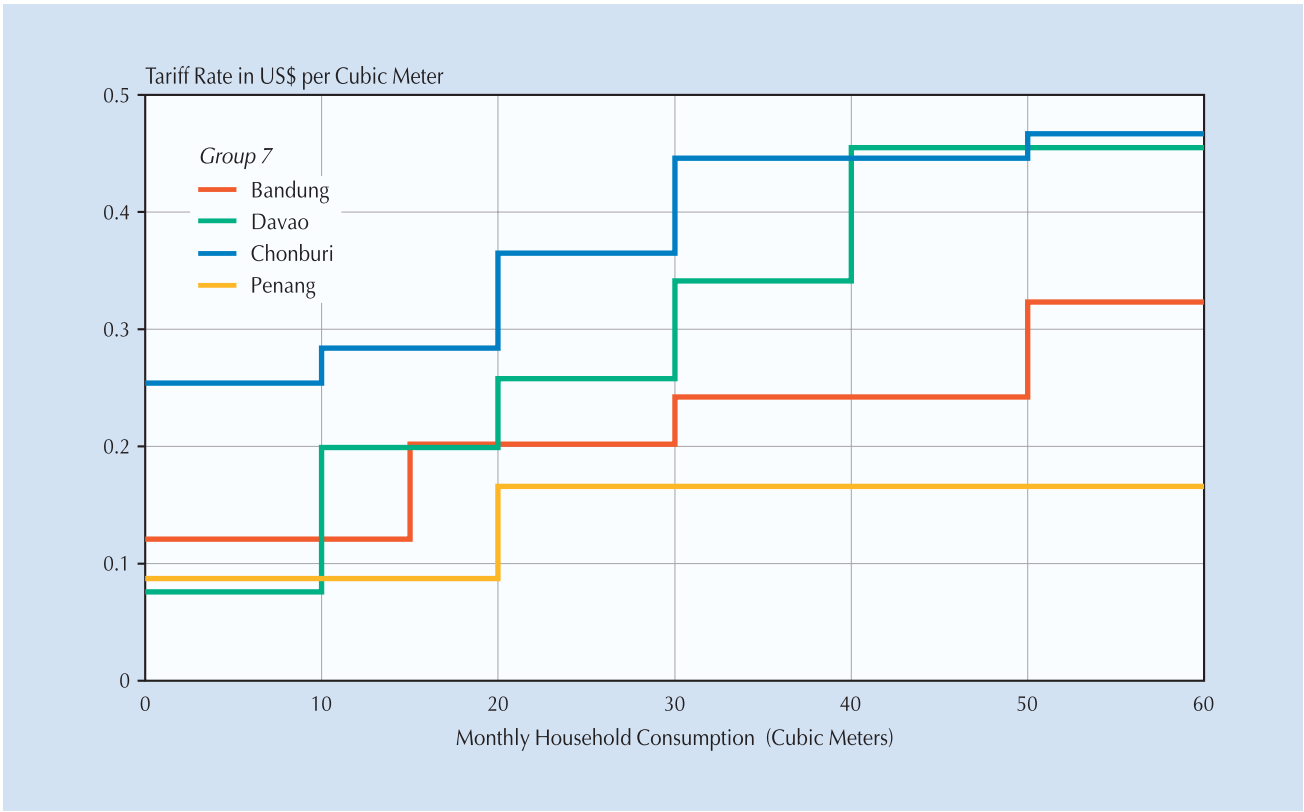


Figure 31h: DOMESTIC TARIFF STRUCTURES

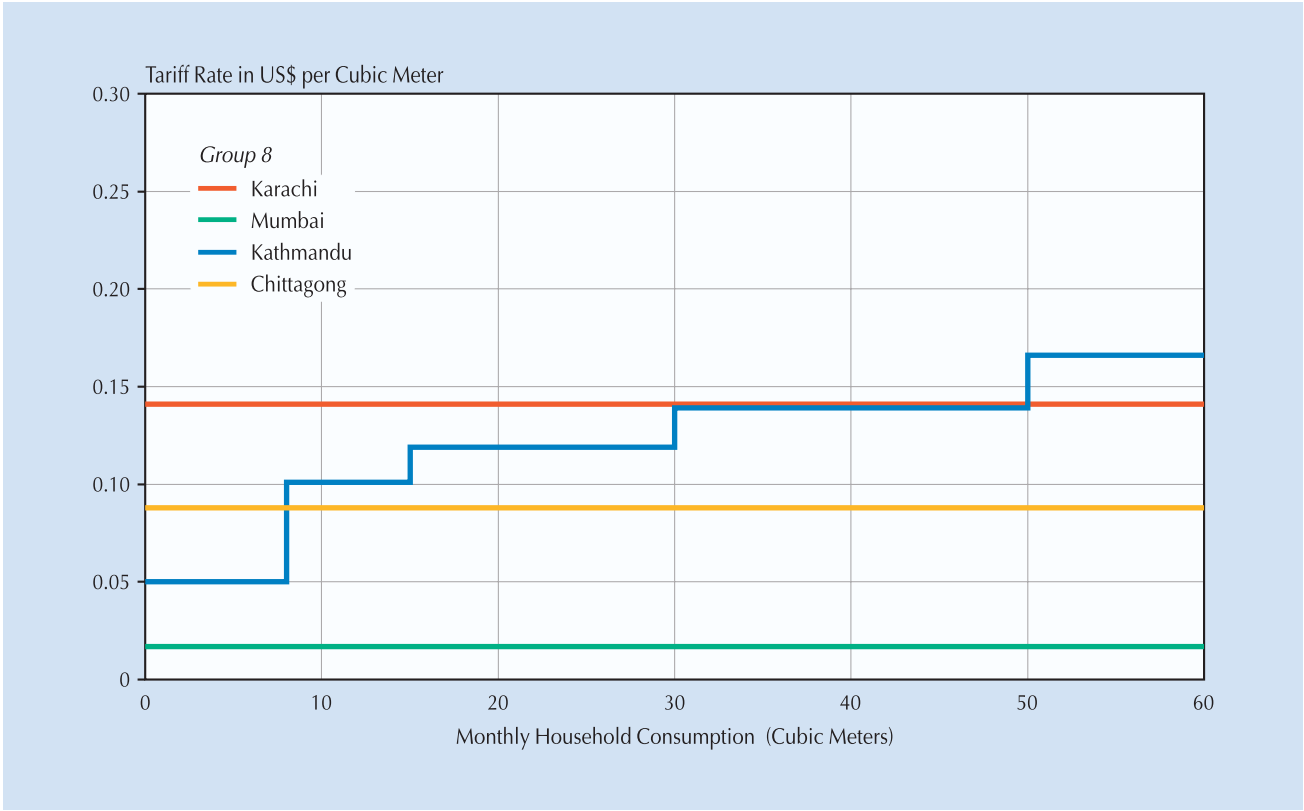


Figure 31i: DOMESTIC TARIFF STRUCTURES

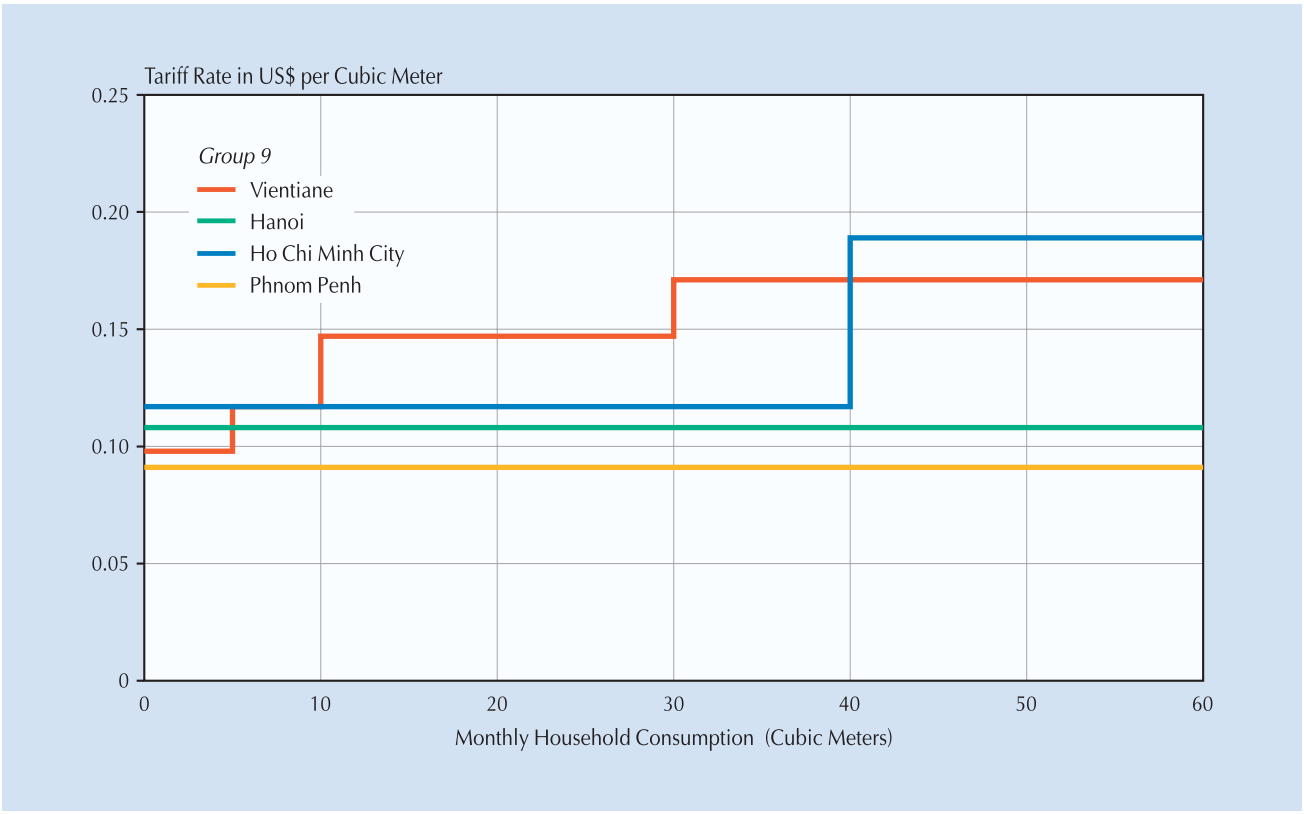


Figure 31j: DOMESTIC TARIFF STRUCTURES

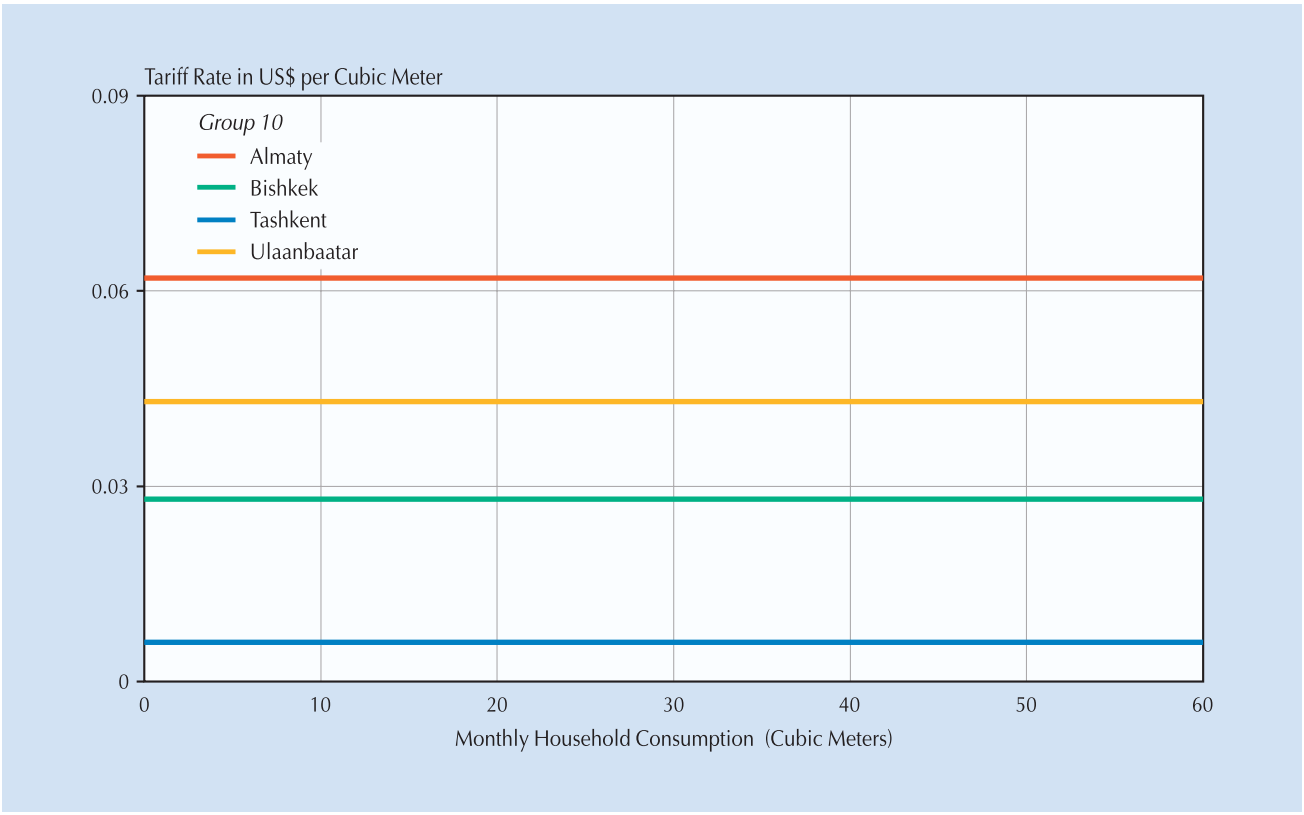


Figure 31k: DOMESTIC TARIFF STRUCTURES

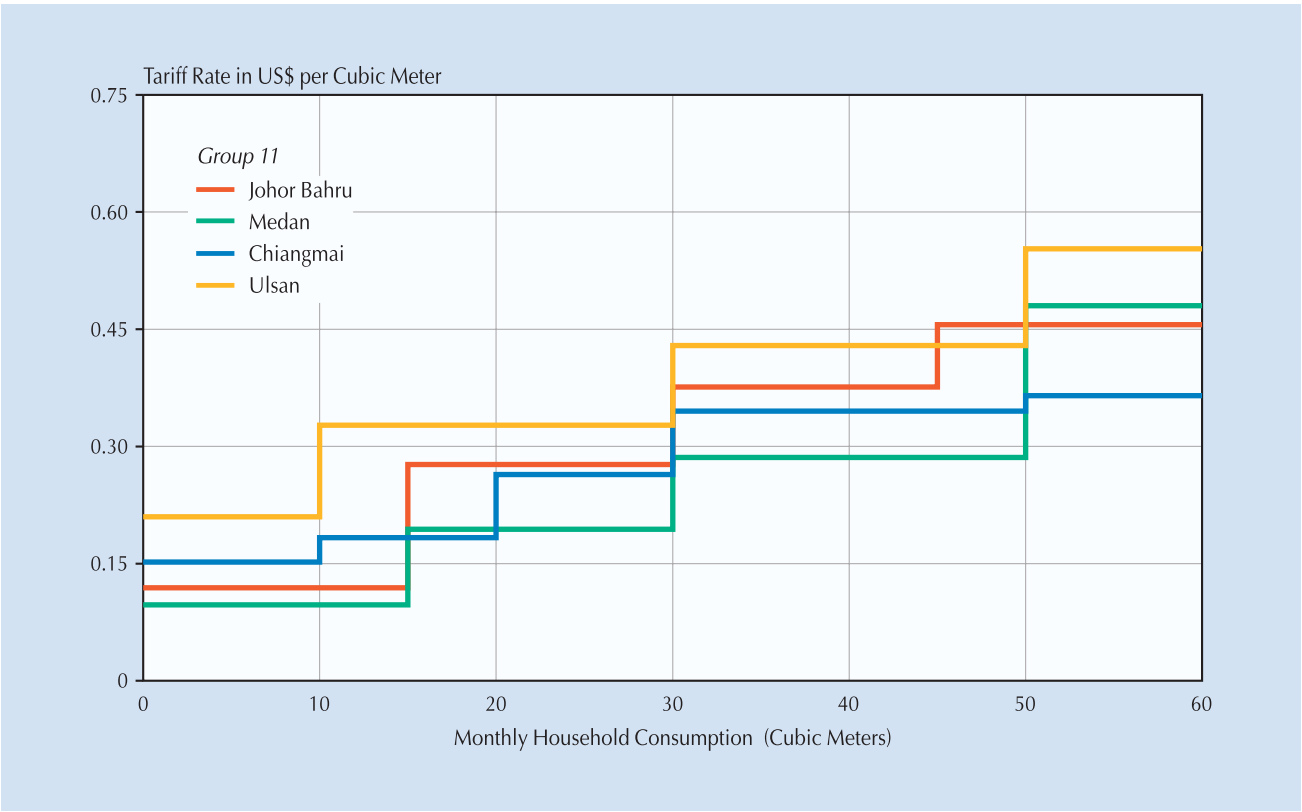


Figure 31l: DOMESTIC TARIFF STRUCTURES

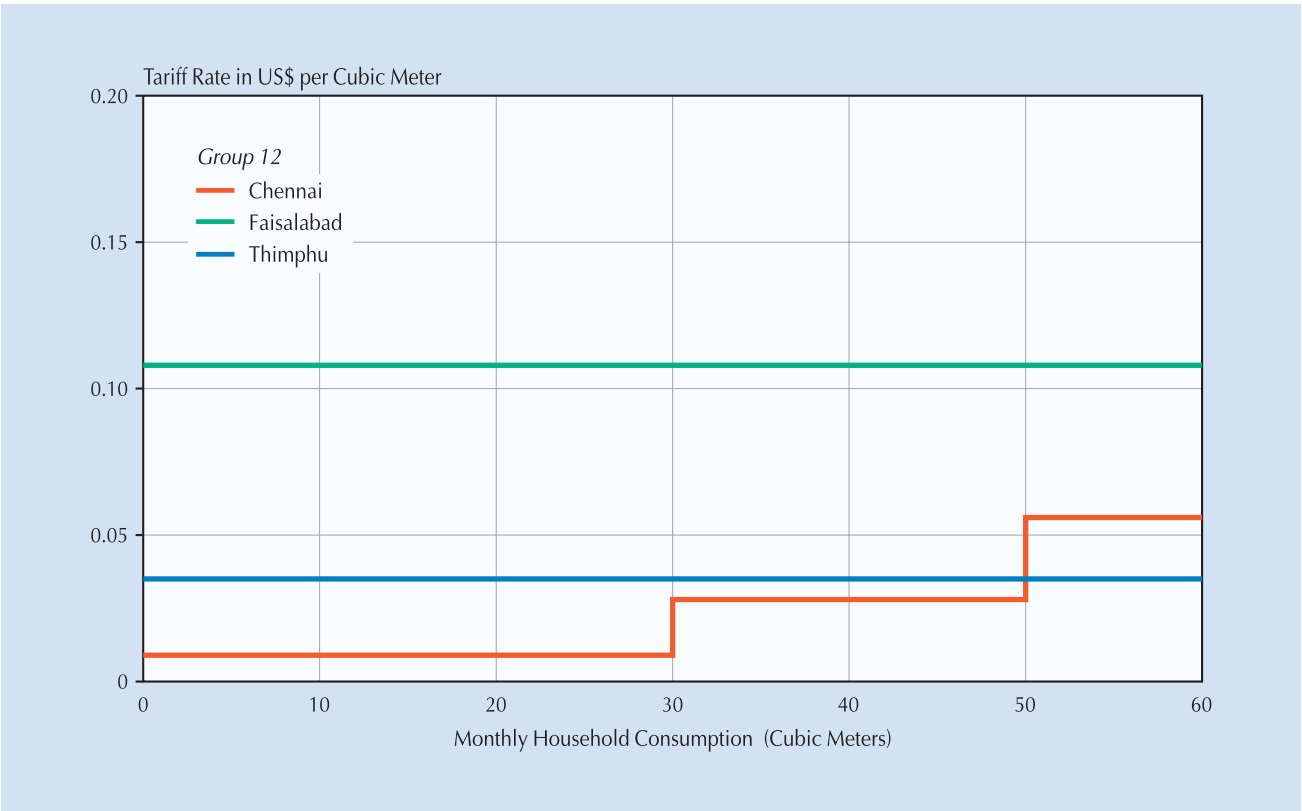


Figure 32: RATIO INDUSTRIAL/DOMESTIC TARIFF FOR 30 CUBIC METERS PER MONTH

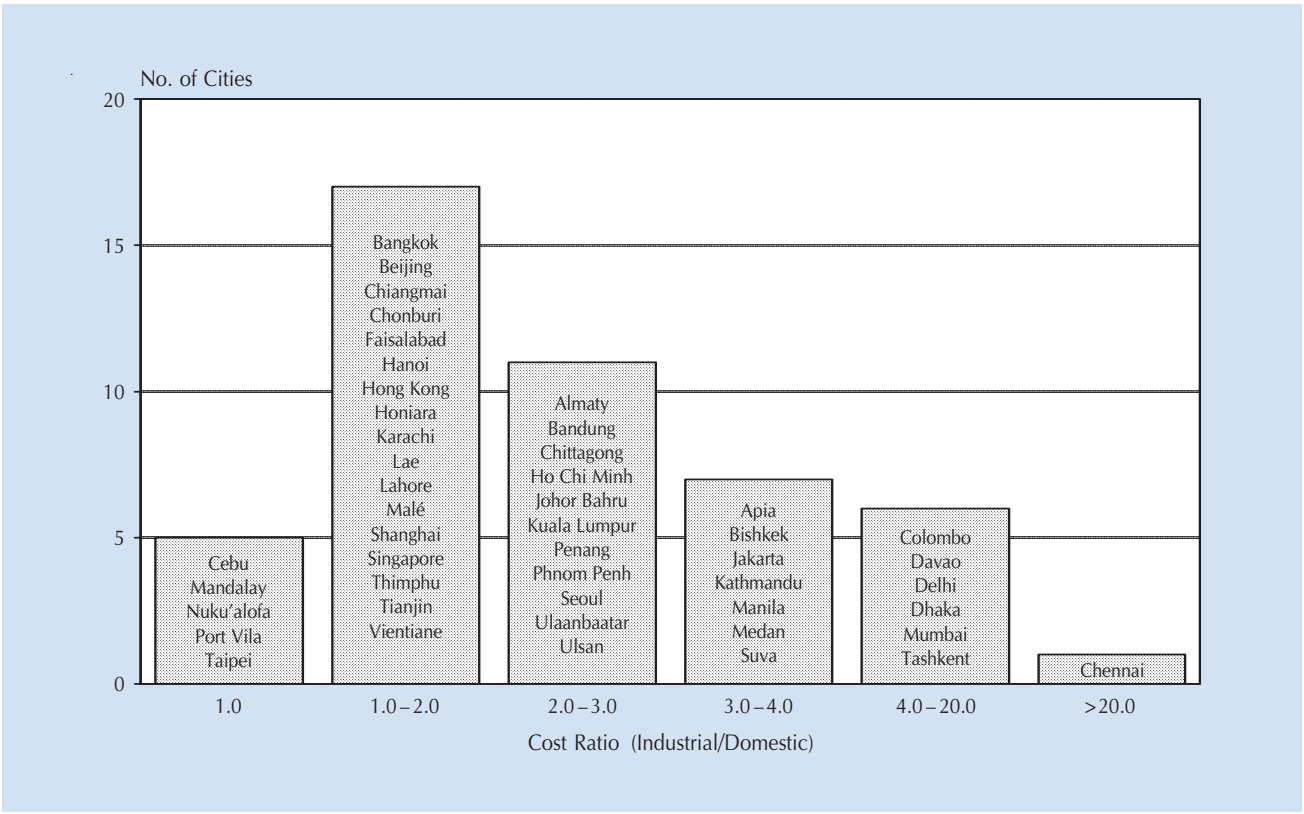
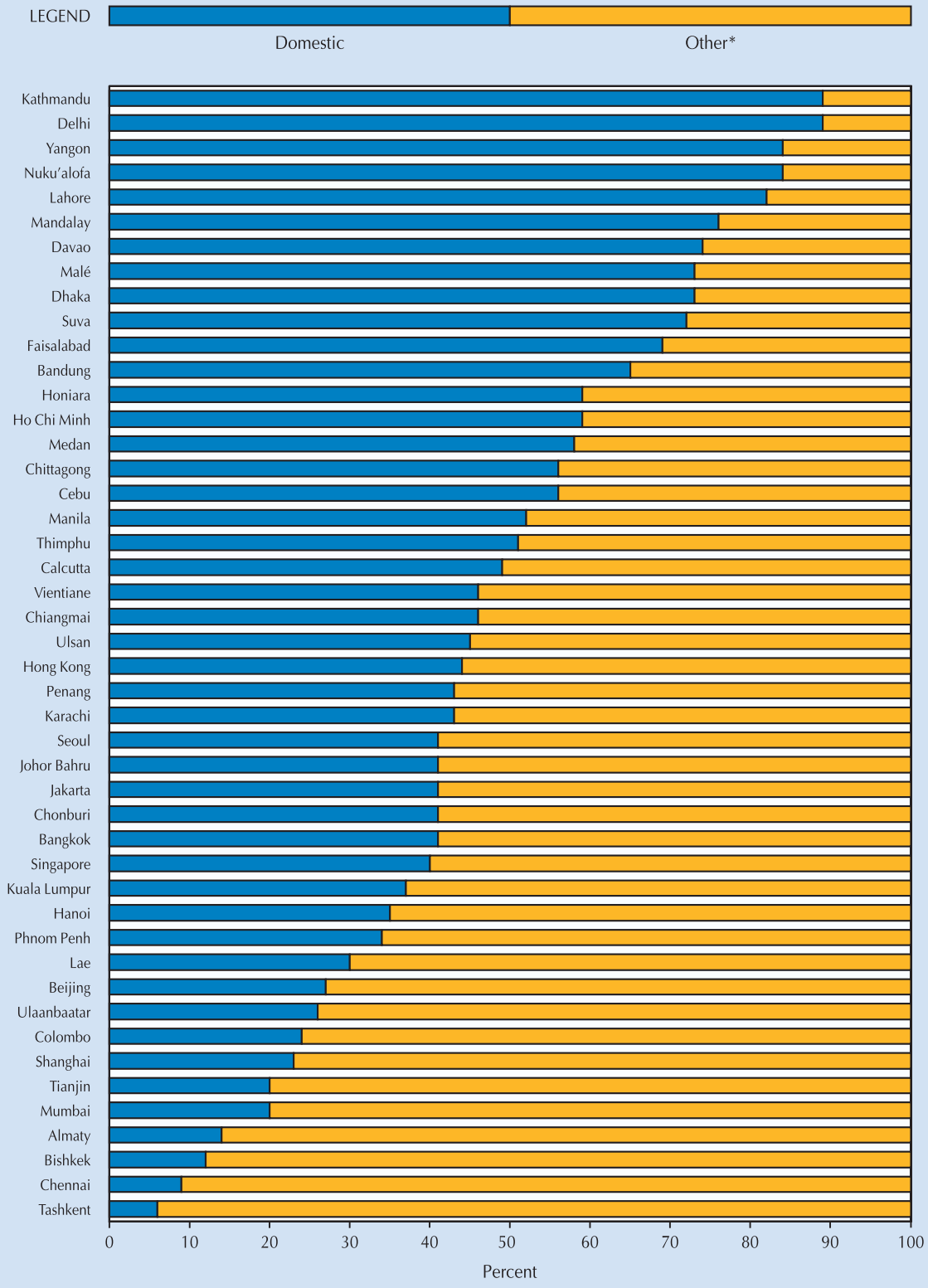


Figure 33: WATER REVENUE COMPONENTS



* Other use includes industrial, commercial and institutional.

Table 11: COST OF WATER FOR DOMESTIC USE (HOUSE CONNECTIONS)

(10, 20, 30 & 50 m^3/month)

City	Cost of 10 m^3 (US$)	City	Cost of 20 m^3 (US$)	City	Cost of 30 m^3 (US$)	City	Cost of 50 m^3 (US$)
Malé	57.00	Malé	143.03	Malé	229.06	Malé	401.12
Mandalay	8.09	Mandalay	16.18	Hong Kong[1]	25.05	Hong Kong[1]	48.41
Port Vila[2]	5.47	Hong Kong[1]	13.37	Mandalay	24.27	Mandalay	40.45
Nuku'alofa	4.84	Nuku'alofa	10.16	Nuku'alofa	16.13	Cebu	34.27
Singapore	3.90	Port Vila[2]	9.73	Port Vila[2]	14.77	Nuku'alofa	29.13
Hong Kong[1]	3.76	Singapore	7.80	Singapore	13.40	Singapore	27.20
Cebu	3.27	Cebu	6.87	Cebu	11.07	Lae	23.33
Lae[3]	2.92	Chonburi	5.38	Lae	9.19	Port Vila[2]	20.07
Chonburi	2.54	Ulsan	5.37	Chonburi	9.03	Chonburi	17.95
Ulsan	2.10	Lae	5.01	Ulsan	8.64	Ulsan	17.22
Davao	1.90	Davao	3.89	Davao	6.47	Seoul	17.14
Taipei	1.80	Kuala Lumpur	3.78	Kuala Lumpur	6.35	Davao	14.43
Honiara	1.77	Taipei	3.60	Chiangmai	5.99	Johor Bahru	13.86
Kuala Lumpur	1.66	Honiara	3.54	Johor Bahru	5.94	Kuala Lumpur	13.08
Bangkok	1.62	Seoul	3.38	Seoul	5.86	Chiangmai	12.89
Jakarta	1.57	Chiangmai	3.35	Taipei	5.47	Honiara	11.51
Chiangmai	1.52	Bangkok	3.24	Honiara	5.31	Manila	11.12
Karachi	1.41	Johor Bahru	3.17	Manila	5.12	Jakarta	10.97
Seoul	1.35	Jakarta	3.14	Bangkok	4.86	Medan	10.09
Bandung	1.21	Bandung	2.83	Bandung	4.85	Bandung	9.69
Johor Bahru[3]	1.19	Karachi	2.82	Jakarta	4.71	Bangkok	9.47
Ho Chi Minh	1.17	Vientiane	2.55	Medan	4.37	Taipei	9.21
Manila	1.12	Manila	2.52	Karachi	4.23	Vientiane	7.44
Vientiane	1.08	Medan	2.42	Vientiane	4.02	Karachi	7.05
Faisalabad	1.08	Ho Chi Minh	2.34	Ho Chi Minh	3.51	Penang	6.72
Hanoi	1.08	Faisalabad	2.16	Penang	3.40	Ho Chi Minh	6.57
Penang[3]	0.99	Hanoi	2.16	Faisalabad	3.24	Kathmandu	5.67
Medan	0.97	Shanghai	1.92	Hanoi	3.24	Faisalabad	5.40
Shanghai	0.96	Phnom Penh	1.82	Kathmandu	2.89	Hanoi	5.40
Lahore[3]	0.92	Chittagong	1.76	Shanghai	2.88	Colombo	4.93
Phnom Penh	0.91	Penang	1.74	Phnom Penh	2.73	Shanghai	4.80
Chittagong	0.88	Kathmandu	1.70	Chittagong	2.64	Phnom Penh	4.55
Suva	0.85	Suva	1.70	Suva	2.55	Chittagong	4.40
Dhaka	0.82	Dhaka	1.64	Dhaka	2.46	Suva	4.25
Tianjin	0.82	Tianjin	1.64	Tianjin	2.46	Dhaka	4.10
Almaty	0.62	Almaty	1.24	Almaty	1.86	Tianjin	4.10
Beijing	0.60	Beijing	1.20	Beijing	1.80	Almaty	3.10
Kathmandu	0.60	Lahore[3]	0.92	Lahore	1.36	Beijing	3.00
Ulaanbaatar	0.43	Ulaanbaatar	0.86	Ulaanbaatar	1.29	Lahore	2.62
Thimphu	0.35	Thimphu	0.70	Colombo	1.27	Ulaanbaatar	2.15
Chennai[4]	0.28	Bishkek	0.56	Thimphu	1.05	Thimphu	1.75
Mumbai[5]	0.28	Colombo	0.45	Bishkek	0.84	Bishkek	1.40
Bishkek	0.28	Apia[6]	0.40	Apia[6]	0.60	Apia[6]	1.00
Colombo	0.23	Mumbai	0.34	Mumbai	0.51	Mumbai	0.85
Apia[6]	0.20	Chennai[4]	0.28	Delhi	0.40	Delhi	0.80
Delhi	0.10	Delhi	0.20	Chennai[4]	0.28	Chennai	0.56
Tashkent	0.06	Tashkent	0.12	Tashkent	0.18	Tashkent	0.30
Rarotonga[7]	NA	Rarotonga[7]	NA	Rarotonga[7]	NA	Rarotonga[7]	NA
Calcutta[8]	NA	Calcutta[8]	NA	Calcutta[8]	NA	Calcutta[8]	NA
Yangon	NA	Yangon	NA	Yangon	NA	Yangon	NA

Notes:

[1] Cost of equivalent monthly volume based on 4-month billing practiced in Hong Kong.

[2] Cost of equivalent monthly volume based on quarterly billing practiced in Port Vila.

[3] Subject to minimum charge.

[4] Covered under minimum charge up to 30 m^3.

[5] Subject to quarterly minimum charge.

[6] Subject to annual minimum charge of US$19.05 equivalent to US$1.59/month.

[7] No tariffs are levied.

[8] Rates are based on property tax.

Figure 34: COST OF DOMESTIC WATER AT 200 CUBIC METERS PER YEAR

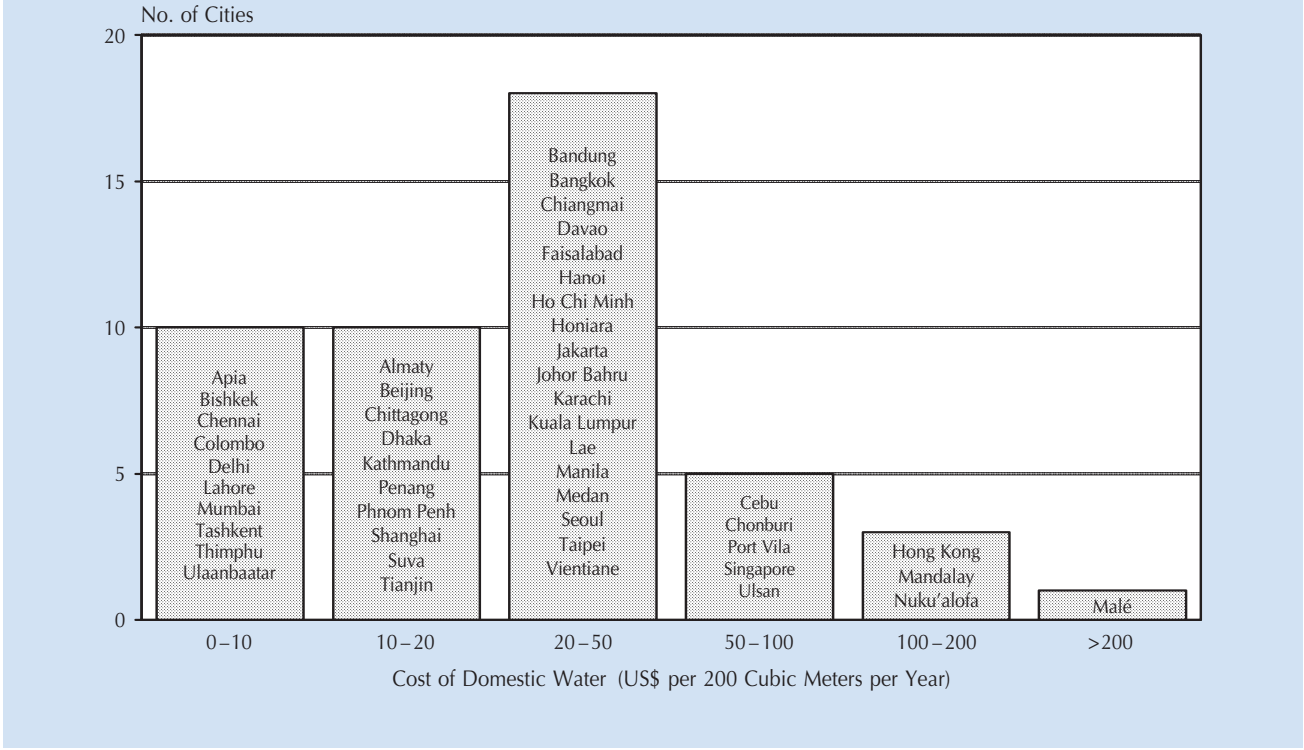


Figure 35: AFFORDABILITY OF DOMESTIC WATER

(As Percent of Average Household Income Based on Per Capita GNP)

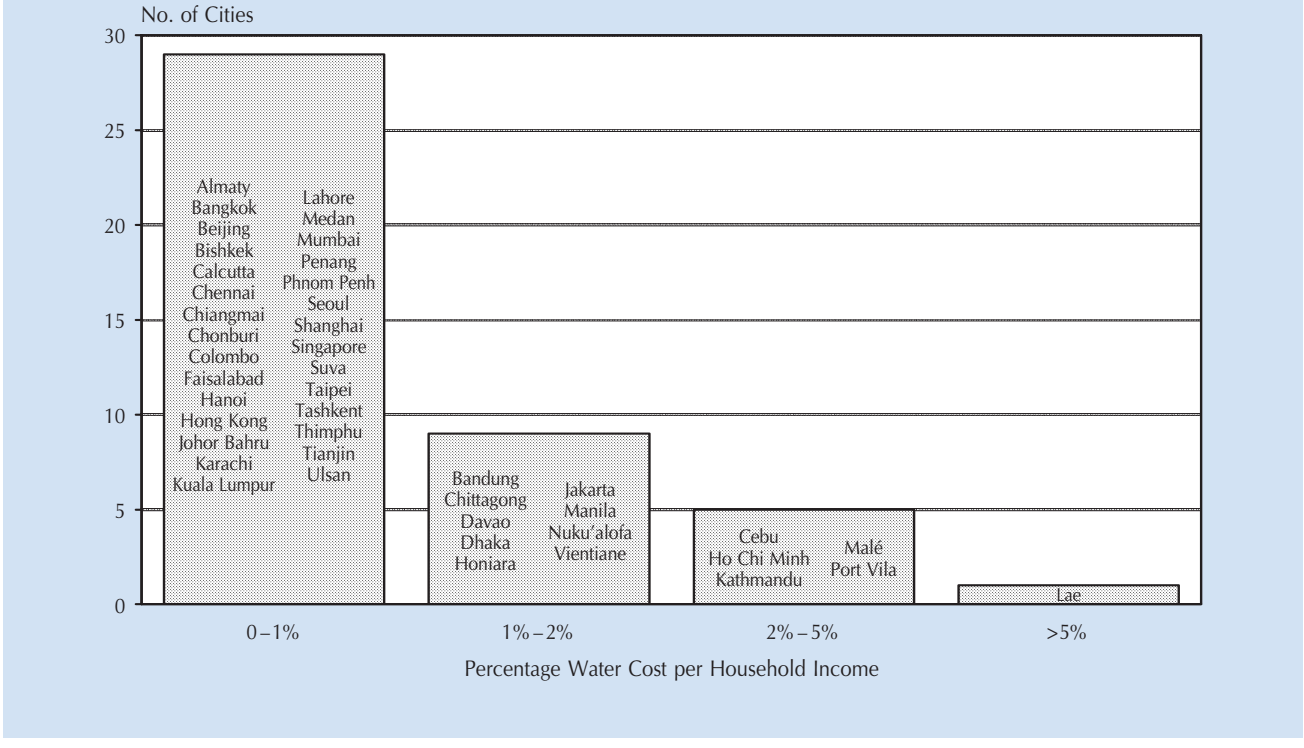


Table 12: CONNECTION FEE FOR HOUSE CONNECTION

City	Price of New Connection (US$)
Seoul	1,977.11
Taipei	1,079.14
Yangon	906.06
Ulsan	902.93
Mandalay	485.39
Tianjin	361.85
Singapore	350.00
Bangkok	283.98
Tashkent	164.45
Phnom Penh	164.41
Port Vila	151.50
Hong Kong	147.16
Rarotonga	135.66
Bishkek	115.39
Beijing	100.11
Honiara	95.34
Manila	94.79
Colombo	92.47
Vientiane	87.71
Chiangmai	83.16
Chonburi	83.16
Medan	80.68
Cebu	79.59
Bandung	77.65
Hanoi	76.48
Lae	72.10
Thimphu	69.84
Chittagong	68.73
Almaty	66.23
Penang	59.42
Johor Bahru	49.51
Kathmandu	49.10
Ho Chi Minh	44.99
Davao	41.69
Chennai	40.53
Calcutta[1]	40.25
Faisalabad	33.52
Dhaka	29.05
Nuku'alofa	28.21
Apia	27.78
Delhi	14.68
Suva	11.03
Jakarta[2]	10.08
Mumbai	7.69
Lahore	7.38
Kuala Lumpur	3.96
Karachi[3]	2.46

Notes:

[1] One year advance on water bill is also collected.

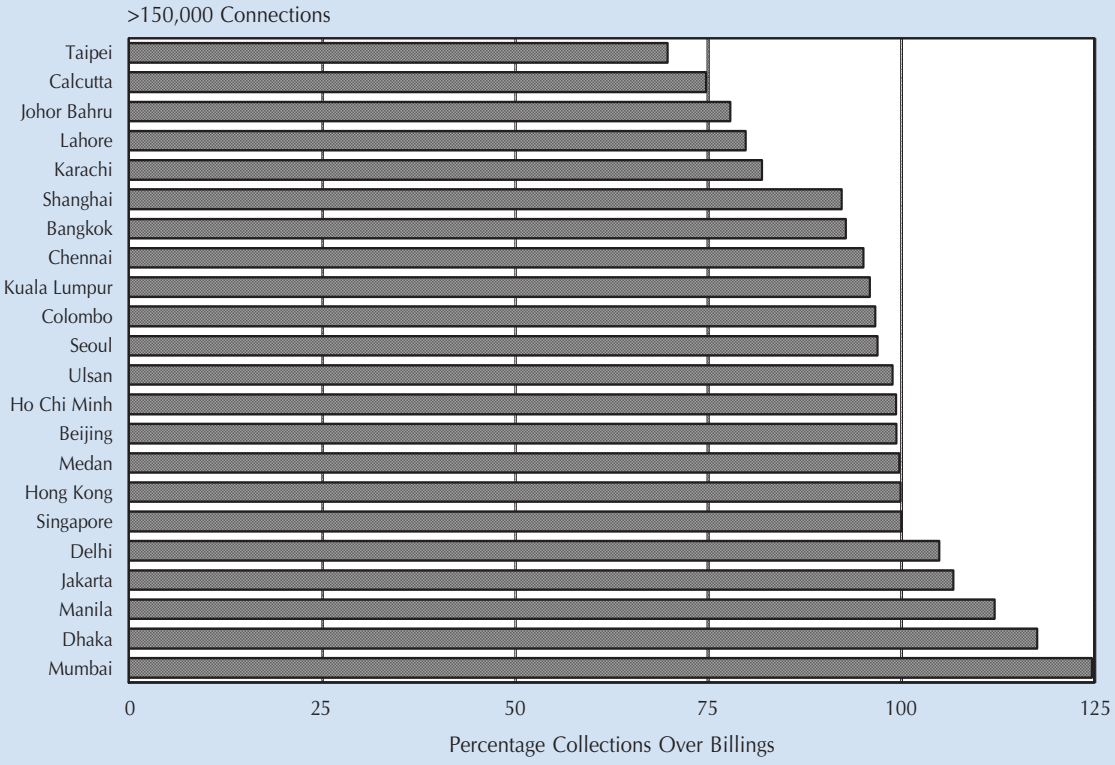
[2] Amount is customer's guarantee; a monthly meter maintenance cost is also collected.

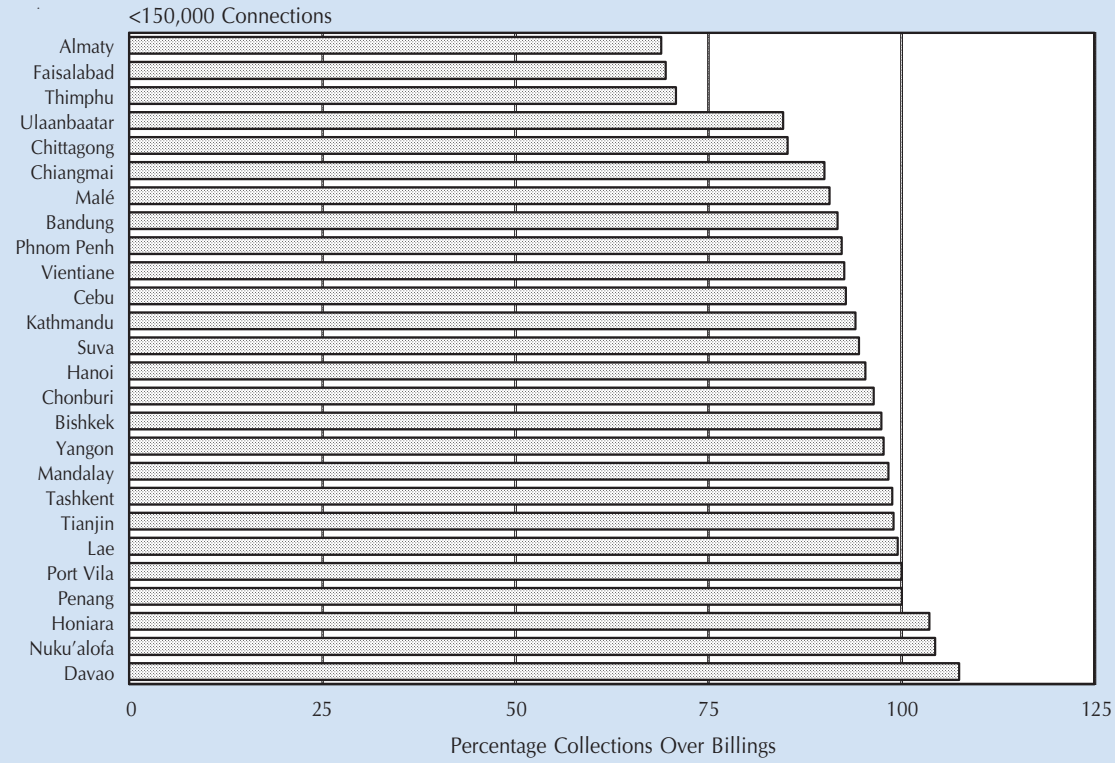
[3] Two years advance water charges and security deposit are also collected.

Table 13: ACCOUNTS RECEIVABLES

City	Accounts Receivables (Months)
Mumbai	19.7
Karachi	16.8
Faisalabad	12.0
Shanghai	11.1
Dhaka	11.0
Chittagong	10.0
Bishkek	7.7
Lahore	7.0
Tashkent	6.3
Suva	6.0
Manila	6.0
Chennai	5.8
Almaty	5.4
Honiara	5.4
Delhi	4.5
Kathmandu	4.5
Thimphu	4.0
Hong Kong	4.0
Ho Chi Minh	3.4
Vientiane	3.3
Colombo	3.2
Lae	3.0
Johor Bahru	2.5
Penang	2.0
Ulaanbaatar	2.0
Bangkok	2.0
Cebu	1.9
Taipei	1.7
Chonburi	1.6
Calcutta	1.5
Seoul	1.5
Nuku'alofa	1.5
Chiangmai	1.2
Singapore	1.1
Bandung	1.0
Jakarta	1.0
Malé	1.0
Phnom Penh	0.9
Ulsan	0.5
Kuala Lumpur	0.5
Davao	0.5
Mandalay	0.2
Tianjin	0.12
Beijing	0.08
Medan	0.03
Hanoi	0.03
Port Vila	0.00
Rarotonga	(No tariff)
Yangon	(No data)
Apia	(No data)

Figure 36: COLLECTION EFFICIENCY





Note: Collections may include arrears.

Figure 37: SEWERAGE SURCHARGE

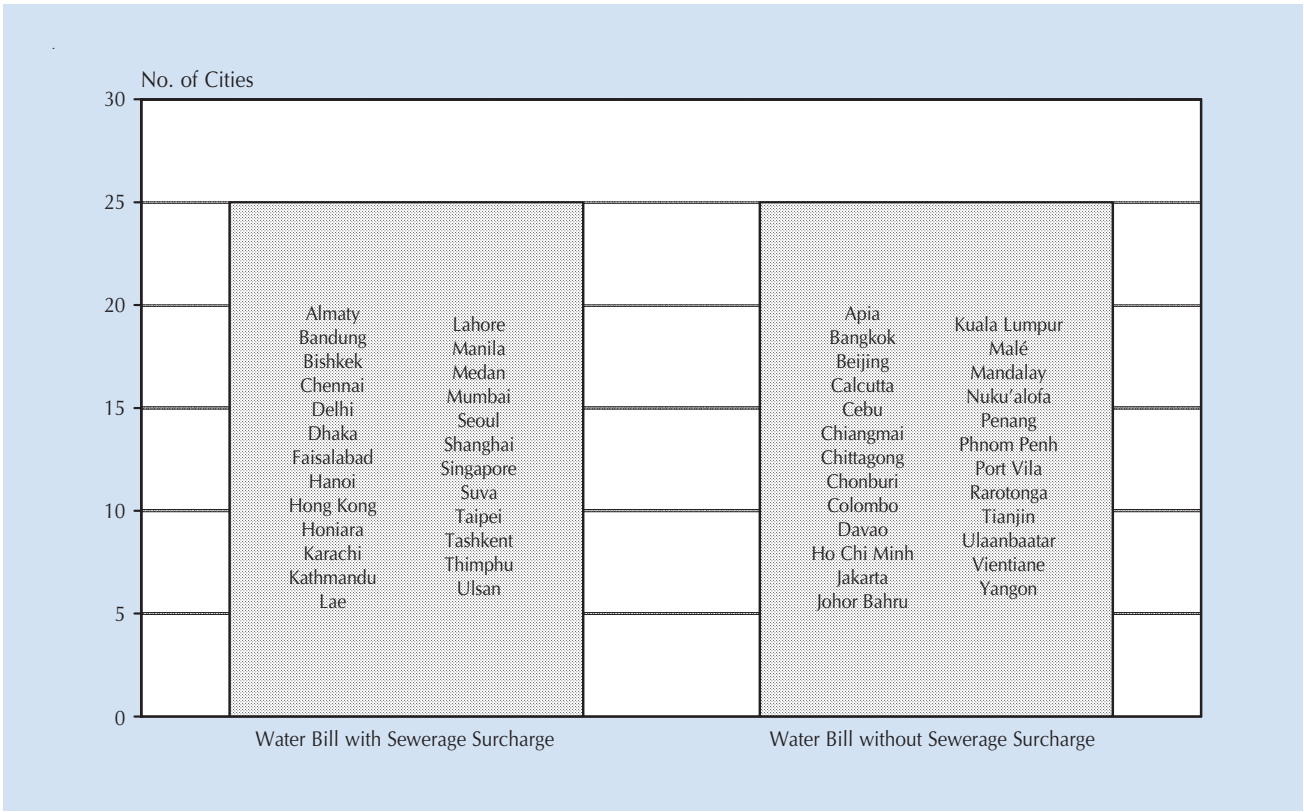
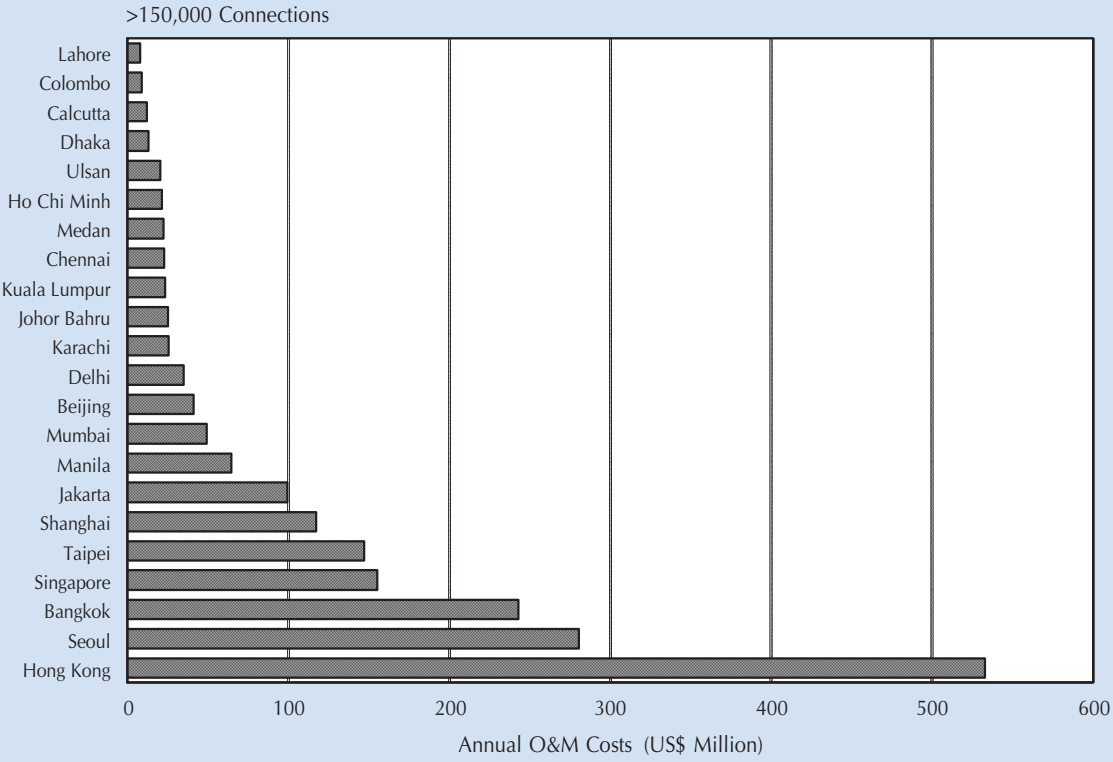


Table 14: WATER VENDING

City	Water Vending in City Price (US$/m^3)	No Significant Water Vending
Vientiane	14.68	Almaty
Malé*	14.44	Apia
Mandalay	11.33	Beijing
Faisalabad	7.38	Bishkek
Bandung	6.05	Chennai
Delhi*	4.89	Hong Kong
Manila	4.74	Honiara
Cebu	4.17	Johor Bahru
Davao*	3.79	Kathmandu
Chonburi*	2.43	Kuala Lumpur
Phnom Penh	1.64	Lahore
Bangkok*	1.62	Medan
Ulaanbaatar	1.51	Nuku'alofa
Hanoi	1.44	Penang
Mumbai*	1.12	Port Vila
Ho Chi Minh	1.08	Rarotonga
Chiangmai*	1.01	Seoul
Karachi	0.81	Singapore
Lae*	0.54	Suva
Chittagong*	0.50	Taipei
Dhaka	0.42	Tashkent
Jakarta	0.31	Thimphu
Calcutta*	0.21	Tianjin
Colombo*	0.10	Ulsan

* Some water vending but not common.

Figure 38: ANNUAL OPERATION AND MAINTENANCE COSTS



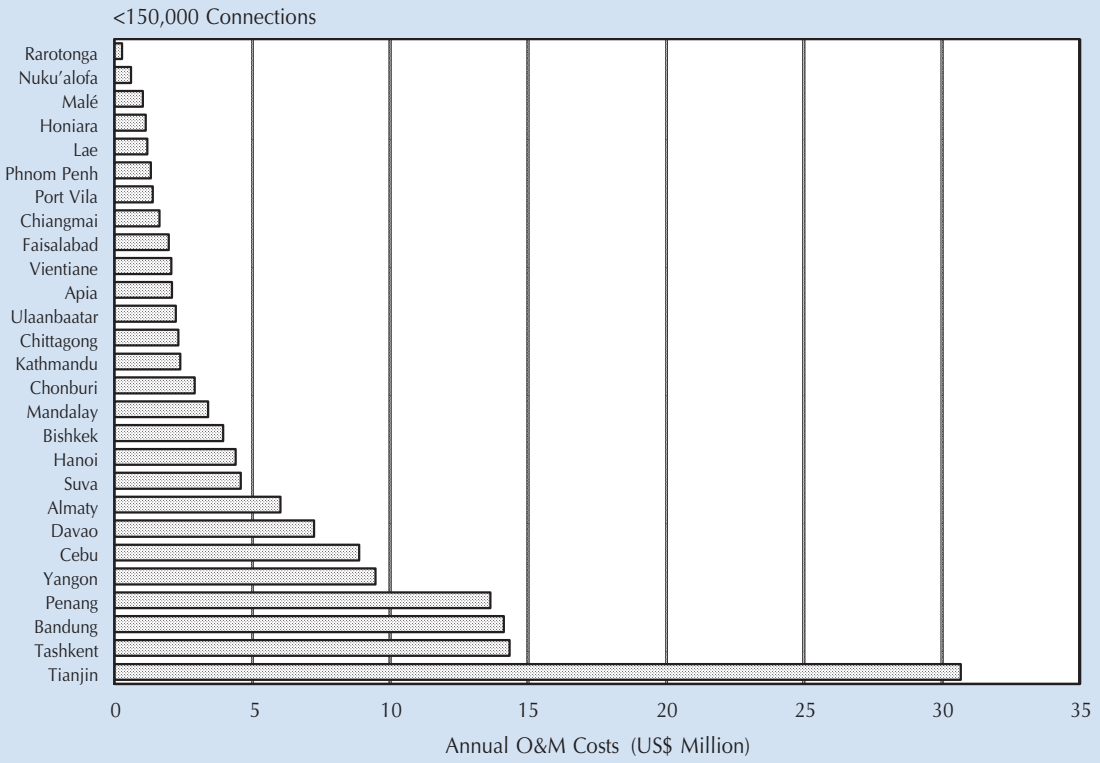
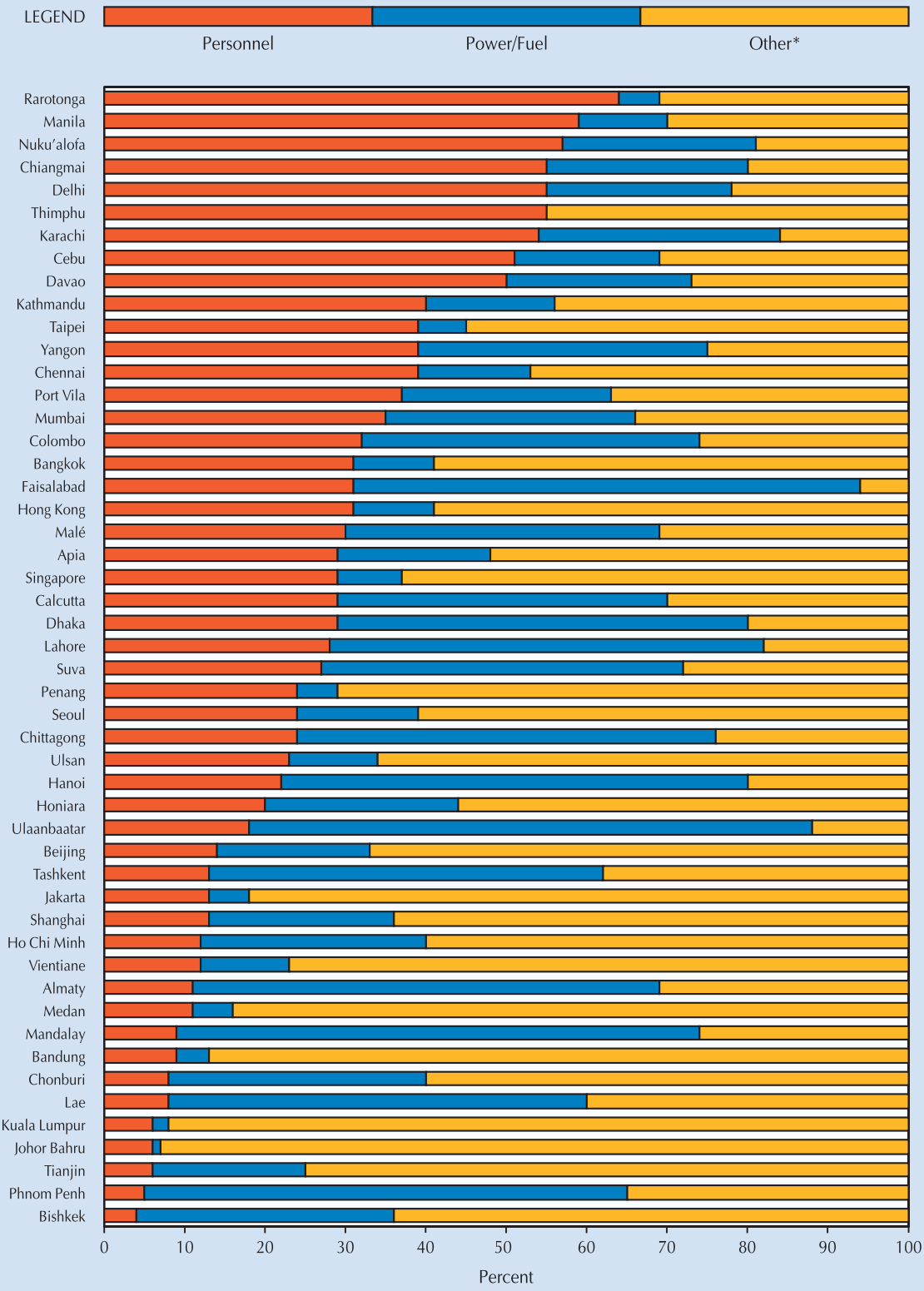
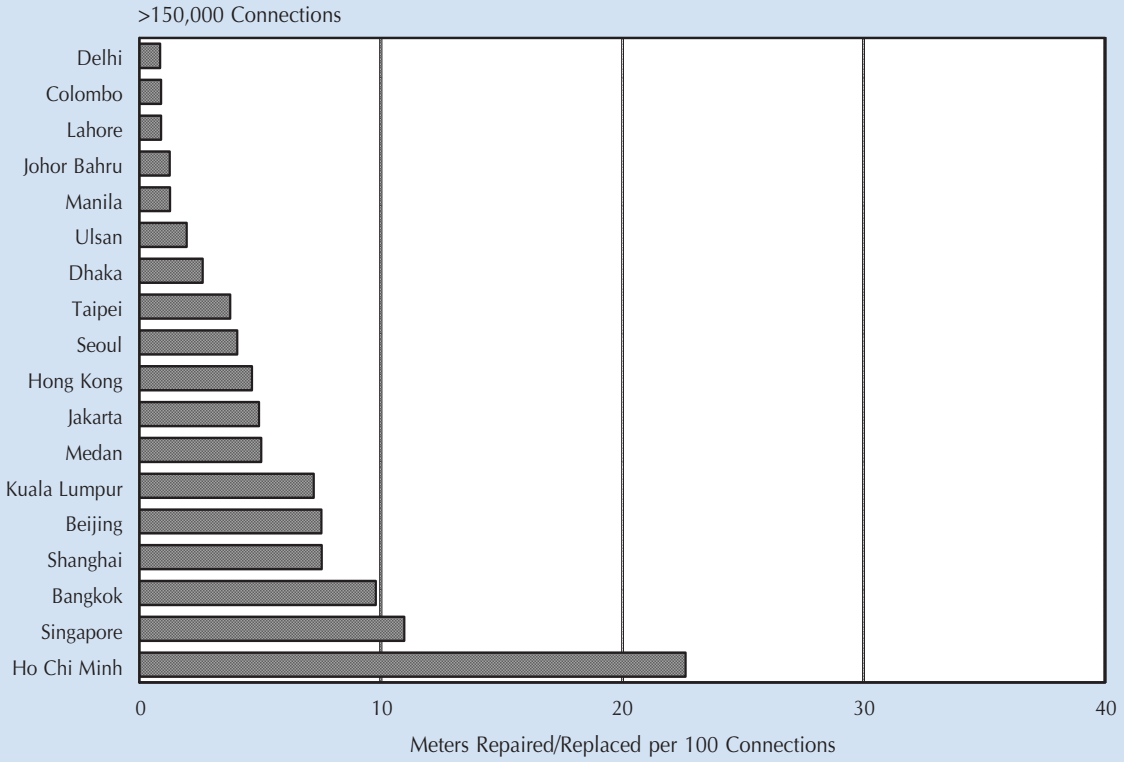


Figure 39: O&M COST COMPONENTS



* Other includes cost of transport, materials, equipment, service contracts and bulk purchase of water in some cases.

Figure 40: METERS REPAIRED OR REPLACED ANNUALLY



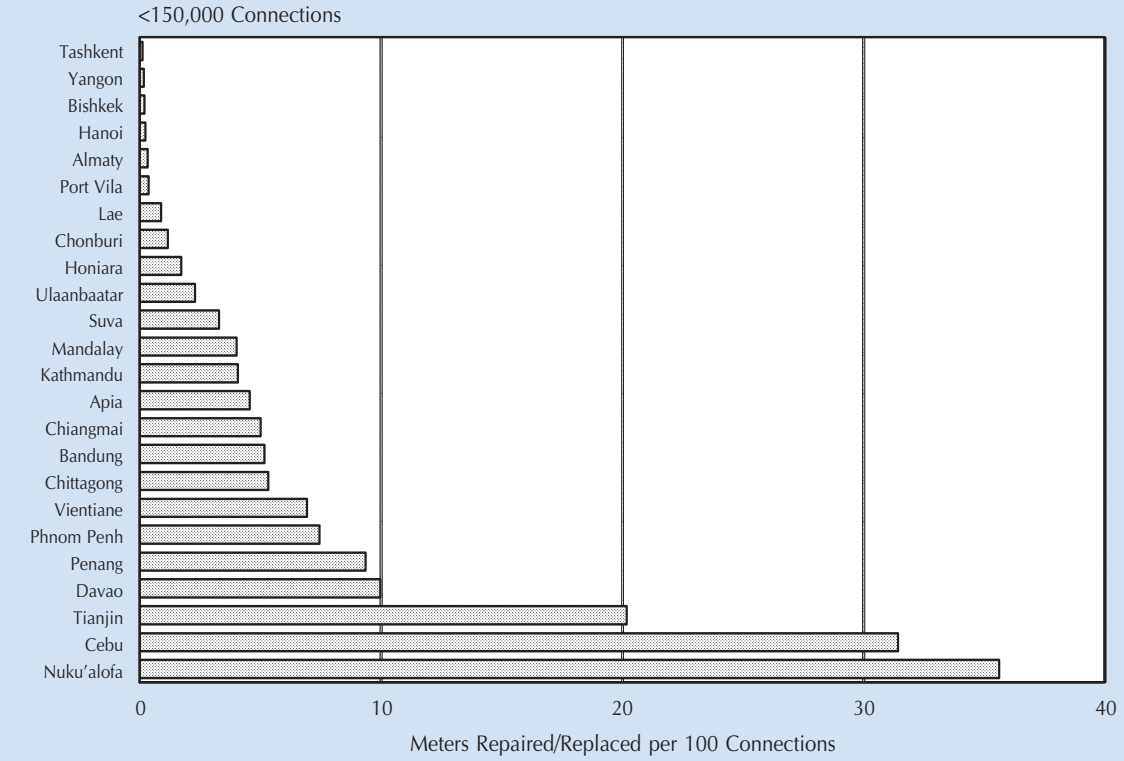
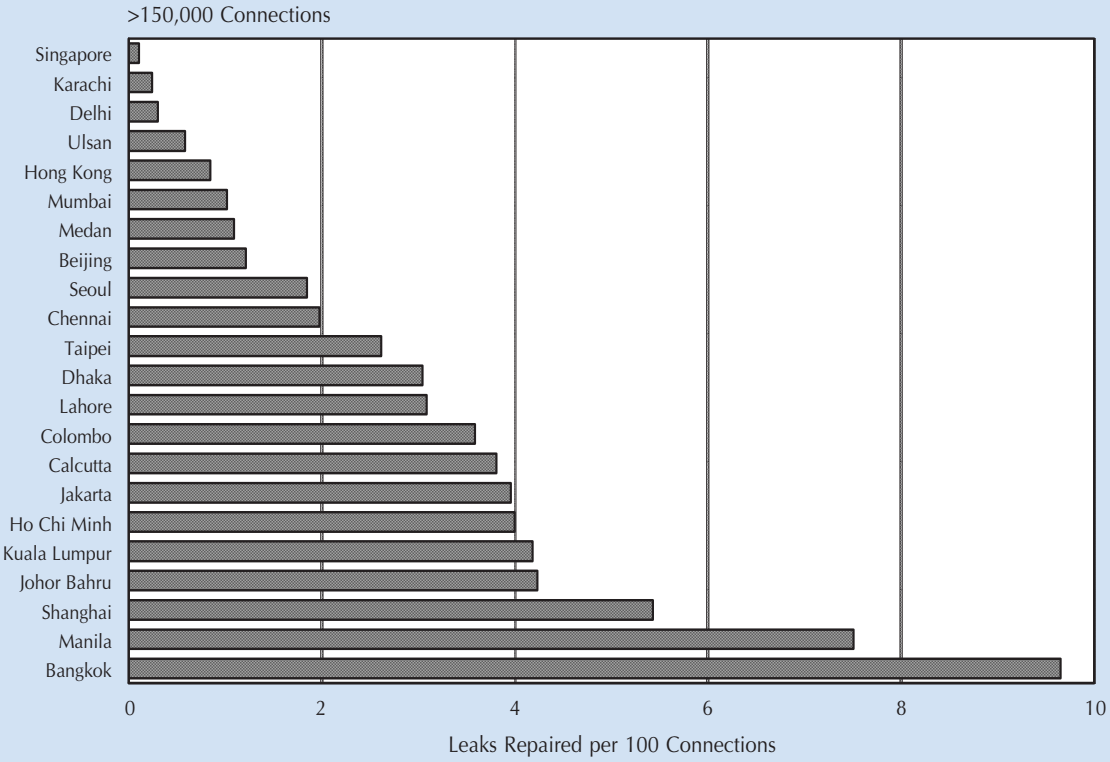


Figure 41: LEAKS REPAIRED ANNUALLY



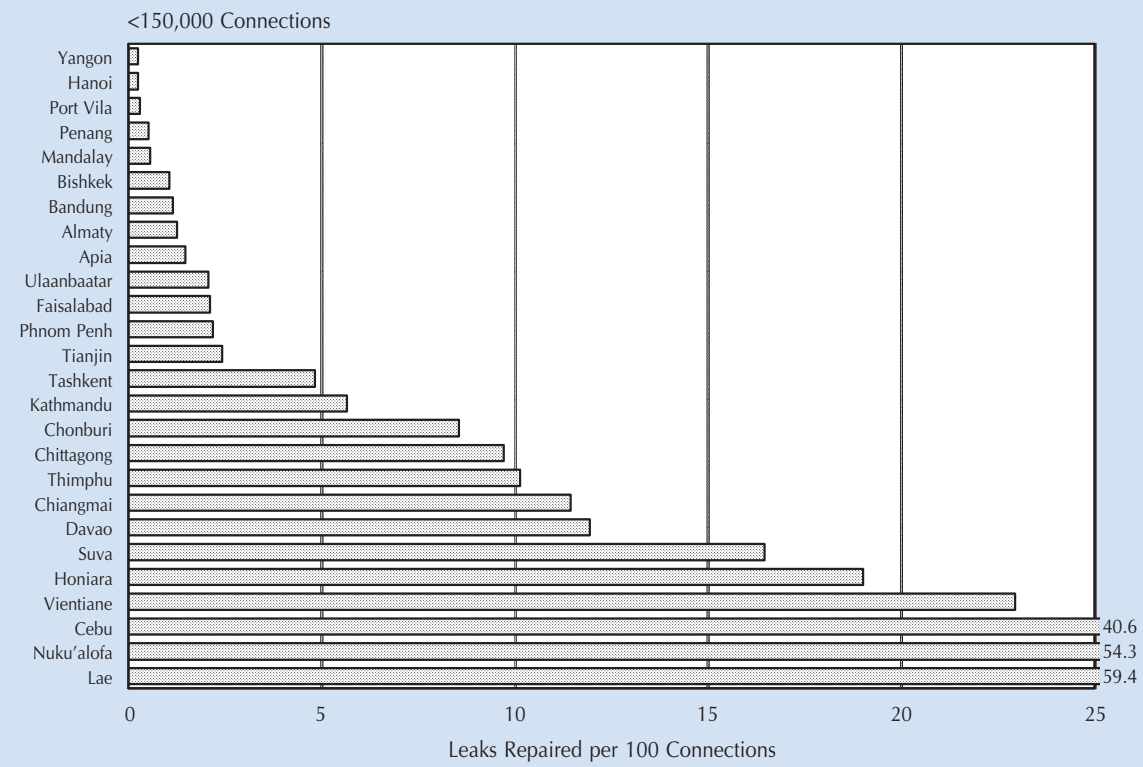
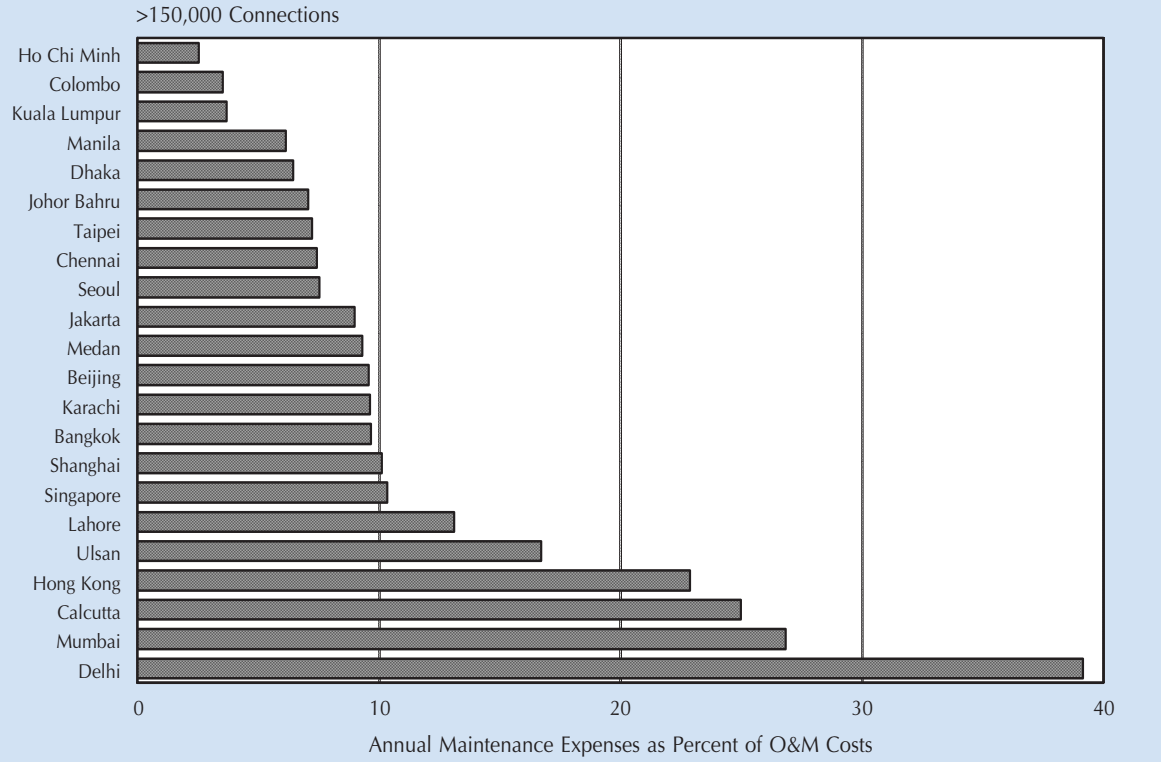


Figure 42: ANNUAL MAINTENANCE EXPENSES



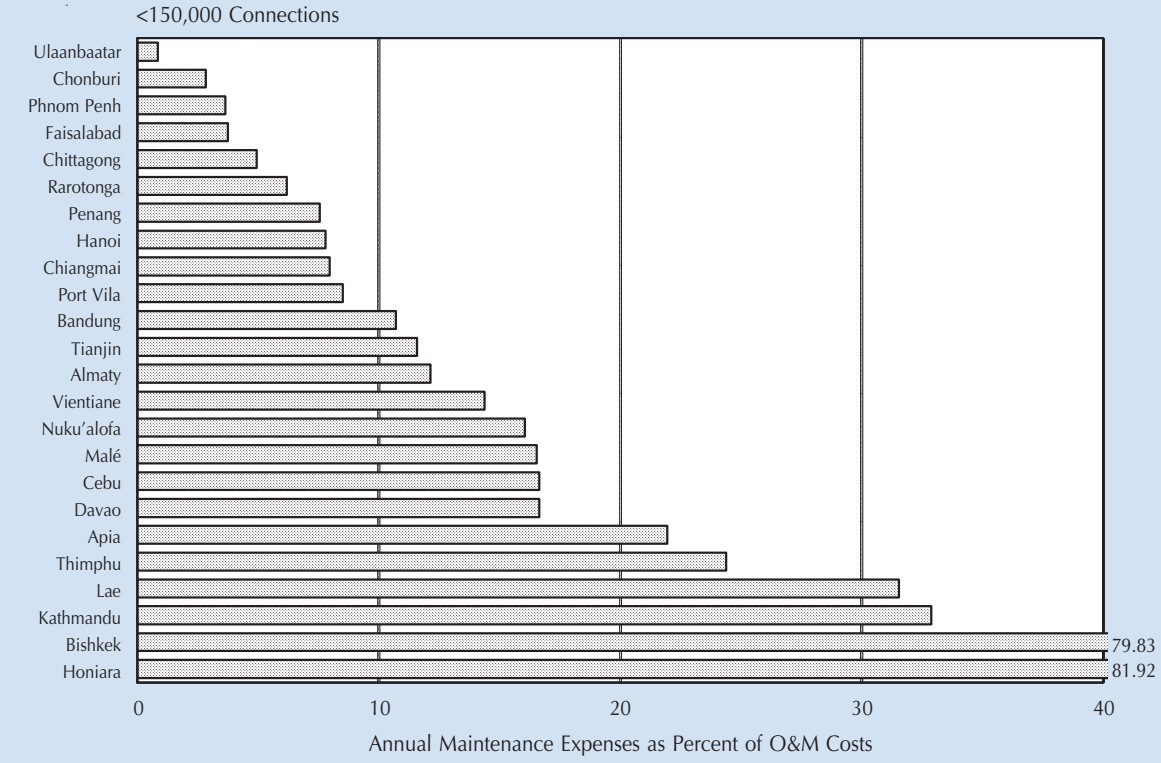
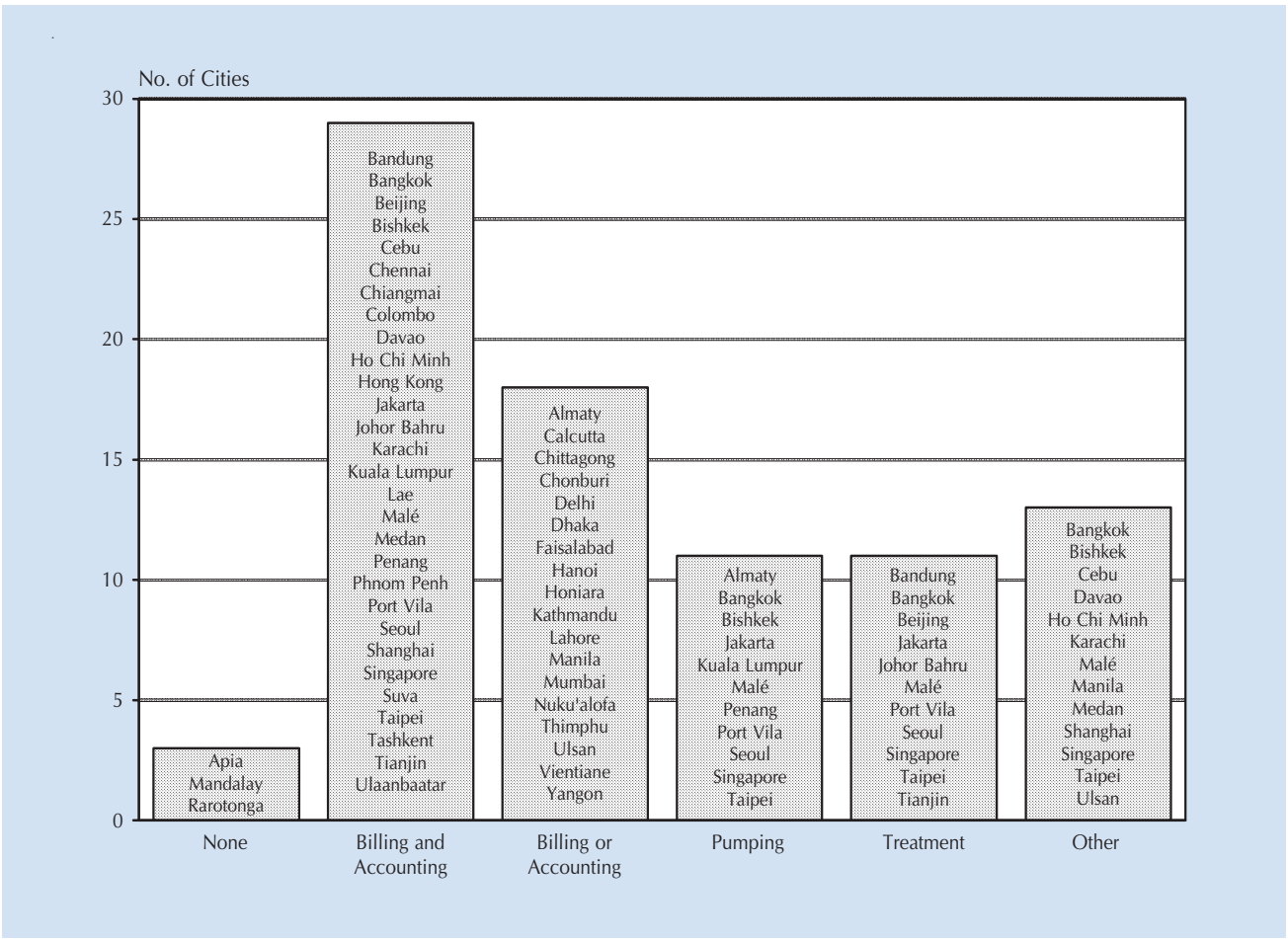


Figure 43: AUTOMATION OF OPERATIONS



Part III
Water Utility/City Profiles

BANGLADESH *Utility Profile*

Water Utility

CHITTAGONG WATER SUPPLY AND SEWERAGE AUTHORITY

Address : Chittagong WASA, Dampara, Chittagong, Bangladesh
Telephone : (880-31) 621 606, 614 663
Fax : (880-31) 610 465
Head : Sultan Mahmud Chowdhury, Chairman

The Chittagong Water Supply and Sewerage Authority (CWASA) is a government corporation set up in 1963 which is responsible for water supply and sewerage for Chittagong with a total population of one million people. Government control extends to staff and top management appointments, salaries, tariffs, and budget for O&M and development. The utility is responsible for water production and distribution. It has a partly developed management information system with a computerized billing system. CWASA is currently following its 1997-2000 Development Plan. It provides water to the urban poor through 680 public taps for which government pays on a flat rate basis.

Mission Statement

"To construct, improve, expand, operate and maintain water and sewerage works and other facilities relating to environmental sanitation."

General Data About Water Utility

Connections	: 28,101	
Staff	: 760	
Annual O&M Costs	: Tk141,037,000	: US$3,231,088
Annual Collections	: Tk153,210,950	: US$3,509,987
Annual Billings	: Tk179,711,730	: US$4,117,107
Annual Capital Expenditure	: Tk 6,293,400	: US$ 144,179
(Average over last 5 years)	Expenditure Per Connection	: US$5.13/connection
Source of Investment Funds	: 100% government loan	

Tariff Structure

(Effective 1995)

Category	Rates	
	(Tk/1000 gallons)	(US$/m^3)
DOMESTIC	17.39	0.088
NON-DOMESTIC		
Industrial	48.90	0.246
Commercial	48.90	0.246
Truck Sales	100.00	0.504

Notes:
1 All consumers pay on metered use except for standpost consumption which is paid by the government to CWASA on flat rate, but given free to consumers.
2 Billing is done monthly and consumers pay through banks.
3 About 1,511new connections were installed in 1995. Price for new connection is Tk3,000 (US$68.73) payable in advance.

Priority Need of Utility

I. As seen by Management
1) Improvement of management.
2) Amendment of labor law.

II. Consumers' Opinion
1) Reliability with 24-hour supply.
2) Water quantity and increased pressure.

Consumer Survey Findings

The average monthly consumption is about 89.9 m^3 per household of 20 persons. The monthly water bill averages Tk378.63 (US$8.67) compared to the monthly power bill of Tk828.60 (US$18.98). Of those interviewed, only 3.3% have 24-hour water supply. With only 10% considering water quality to be good, 57% boil their drinking water. About 62% experienced water service interruption in the month preceding the interview. More than 75% of those interviewed consider water pressure to be low. Overall rating of the utility is poor (73%) with another 20% rating it satisfactory.

Major Changes in the Water Utility

Not in the First Data Book.

City Profile CHITTAGONG

CHITTAGONG WATER SUPPLY

Population: 1,000,000 (1995)

Production/Distribution

Average Daily Production [1]	144,762 m^3/d
Groundwater	38%
Surface Water	62%
Treatment Type	Conventional
Treatment Capacity	158,000 m^3/d
Storage	23,905 m^3
Service Area [2]	84 sq km

Service Connections

House (20 persons/HC)	21,659
Public Tap (250 persons/PT) [3]	680
Industrial	1,572
Commercial	3,459
Institutional	731
Other	Nil
Total	***28,101***

Service Indicators

Service Coverage [4]	60%
Water Availability [5]	15 hours/day
Per Capita Consumption	139 l/c/d
Average Tariff	US$0.119/$m^3$
Drinking Water [6]	Boiled

Efficiency Indicators

Unaccounted Water [7]	35%
Non-Revenue Water	35%
Unit Production Cost	US$0.044/$m^3$
Operating Ratio	0.56
Accounts Receivable	10 months
Staff/1,000 Connections	27.7

Notes:

[1] Only 60% of production is metered.

[2] Total area of responsibility of WASA is 168 sq km.

[3] Considered as only one account paid by the government.

[4] Other water sources are tubewells and ponds.

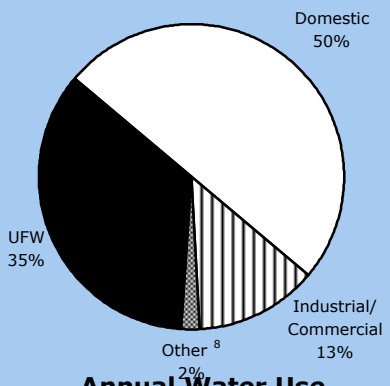
[5] About 10% of consumers get 24-hour supply. During the year, 4,000 consumer complaints were registered.

[6] About 10 water samples out of 80 tested failed the bacteriological tests.

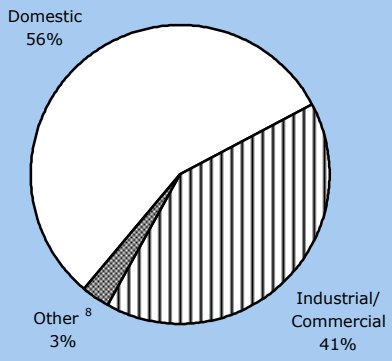
[7] In 1996-97, about 2,728 leaks were repaired. Approximately 1,500 meters are replaced or repaired annually.

[8] Other use and billing refer to institutional connections.

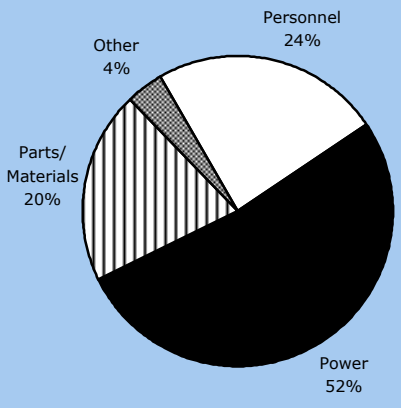
Data as of 1995-96 except leak repairs (1996-97).



Annual Water Use
52,838,130 m^3



Annual Water Billings
US$4,117,107



Annual O&M Costs
US$2,314,777

BANGLADESH *Utility Profile*

Water Utility

DHAKA WATER SUPPLY AND SEWERAGE AUTHORITY

Address : 98 Kazi Nazrul Islam Avenue, Kawran Bazar, Dhaka-1215, Bangladesh
Telephone : (880-2) 816 792
Fax : (880-2) 812 109
Head : K. Azharul Haq, Managing Director

The Dhaka Water Supply and Sewerage Authority (DWASA) is a government corporation set up in 1963 which is responsible for water supply and sewerage for Dhaka and the nearby city of Narayanganj covering a total population of 9 million people. The original water supply system which was built in 1874 has billing and collection that are privatized, although staff and top management appointments, salaries, tariffs, and budgets for O&M and development are under government control. DWASA has a partly developed management information system with a computerized billing system. It is currently following its 1997-2002 Development Plan for both water supply and sewerage. The urban poor is provided with street hydrants (public standposts) with bills paid by the city corporation.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 164,304	
Staff	: 3,033	
Annual O&M Costs	: Tk 565,560,000	: US$12,956,701
Annual Collections [1]	: Tk 660,460,000	: US$15,130,813
Annual Billings	: Tk 561,780,000	: US$12,870,103
Annual Capital Expenditure (Average over last 5 years)	: Tk1,040,760,000	: US$23,843,299
	Expenditure Per Connection	: US$145.12/connection
Source of Investment Funds	: 47% national government grant; 53% externally-funded government grant/equity	

[1] Collections include arrears from previous year

Tariff Structure

(Effective March 1997)

Category	Rates	
METERED	(Tk/m^3)	(US$/$m^3$)
Residential & Community	3.58	0.082
Commercial & Office	11.63	0.266
Industrial	52.77	1.209
NON-METERED		
Residential & Community Commercial & Office Industrial	23.19% per annum on annual valuation of holdings (for all three categories)	

Notes:

1 All consumers pay on metered use except ¼ of house connections and ¾ of institutional connections which are non-metered. Non-metered consumers pay a flat rate based on property valuation. Public standpost consumption is free to users but paid to DWASA by the city corporation.
2 Billing is done every two months and consumers pay through banks.
3 Tariffs setting aims to make the utility commercially viable and to allow it to add new facilities.
4 In 1995, 3,981new connections were installed. Price for new connections range from Tk1,268 (US$29.05) to Tk3,150 (US$72.16) for 20 mm and 25 mm connections, respectively, payable in advance.
5 Sewerage charge is added to water bill at 100% of water bill for connected users.

Priority Need of Utility

I. As seen by Management
1) Institutional reform.
2) Improvement of financial management.

II. Consumers' Opinion
1) More tubewells.
2) Privatize the water utility.

Consumer Survey Findings

Average monthly consumption is about 139 m^3 per household of 20 persons with many engaged in car washing and gardening. The water bill averages Tk487 (US$11.16) compared to the monthly power bill of Tk1,641(US$37.59). Of those interviewed, only 41% have 24-hour water supply. With only 21% considering water quality to be good, 91% boil their drinking water. About 23% experienced water service interruption in the month preceding the interview. Overall rating of the utility is fair (44%) to good (15%).

Major Changes in the Water Utility (1991-1996)

The average daily production increased by 39% while the total connections increased by 45%. While unit production cost increased by 111%, average tariff increase was only 25%. Staff/1,000 connections ratio improved from 21.3 to 18.5. UFW was further reduced from 62% to 51%, while water availability improved from an average of 6 hours/day to 17 hours/day to most consumers.

City Profile DHAKA

DHAKA WATER SUPPLY

Population: 9,000,000 (1995)

Production/Distribution

Average Daily Production	781,540 m^3/d
Groundwater	96%
Surface Water	4%
Treatment Type	Chlorination
Treatment Capacity	850,000 m^3/d
Storage	30,000 m^3
Service Area [1]	360 sq km

Service Connections

House (20 persons/HC)	160,000
Public Tap (500 persons/PT)	1,209
Industrial	1,624
Commercial	1,135
Institutional	336
Other	Nil
Total	***164,304***

Service Indicators

Service Coverage [2]	42%
Water Availability [3]	17 hours/day
Per Capita Consumption	95 l/c/d
Average Tariff	US$0.093/$m^3$
Drinking Water [4]	Boiled

Efficiency Indicators

Unaccounted Water [5]	51%
Non-Revenue Water	51%
Unit Production Cost	US$0.045/$m^3$
Operating Ratio	1.01
Accounts Receivable	11 months
Staff/1,000 Connections	18.5

Notes:

[1] Total area of responsibility of Dhaka WASA is 450 sq km.

[2] An additional 23% of the total population is served by what the utility classify as administrative loss. Other sources of water are tubewells.

[3] Approximately 40% of consumers get 24-hour water supply. About 15,000 consumer complaints are registered annually.

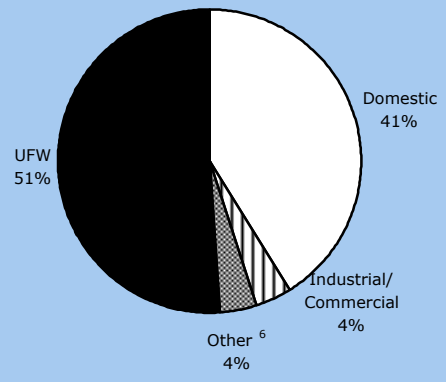
[4] About 27 water samples of 706 tested failed the bacteriological tests during the year.

[5] About 20% out of this total UFW is lost due to illegal connections. During the year, 5,000 leaks were repaired and 4,307 meters were replaced or repaired.

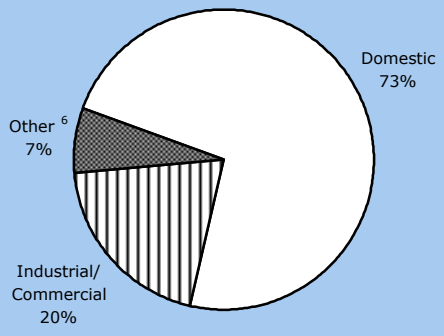
[6] Other use and billing refer to institutional connections.

[7] Other cost includes transport and miscellaneous expenses.

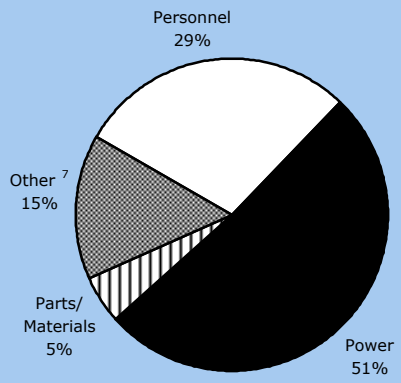
Data as of 1995-96 except tariff (1997).



Annual Water Use
285,262,100 m^3



Annual Water Billings
US$12,870,103



Annual O&M Costs
US$12,956,701

BHUTAN *Utility Profile*

Water Utility

THIMPHU CITY CORPORATION (Water Supply Unit)

Address : Thimphu City Corporation, Post Box No.215, Thimphu, Bhutan
Telephone : (975) 22265, 22757
Fax : (975) 24315
Head : Bhimlal Dhungel, Assistant Engineer

The Water Supply Unit of the Thimphu City Corporation was formed in 1982 and is responsible for water supply of Thimphu Municipality with a population of 32,000 people. The water utility used to be under the Public Works Department of the Ministry of Social Services. Government control extends to number of staff, salaries, tariffs, appointment of top management and budget for development. The water utility has a partly developed management information system with a computerized billing system. The Water Supply Unit is currently following its 1986-2000 Development Plan. No annual report is published.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 1,806	
Staff	: 46	
Annual O&M Costs	: Nu1,780,000	: US$49,728
Annual Collections	: Nu2,110,000	: US$58,947
Annual Billings	: Nu2,988,000	: US$83,475
Annual Capital Expenditure (Average over last 5 years)	: Nu1,800,000	: US$50,286
	Expenditure Per Connection	: US$27.84/connection
Source of Investment Funds	: 20% national government grant; 80% externally-funded government grant	

Tariff Structure

(Effective July 1996)

Category	Rates	
Domestic	(Nu/m^3)	(US$/$m^3$)
Total consumption	1.25	0.035
Industrial/Commercial/Institutional		
0 - 20 m^3/month	1.25	0.035
21- 40 m^3/month	1.75	0.049
Over 40 m^3/month	2.50	0.070

Notes:

1 All consumers started paying on metered use from 1 July 1996 with all connections metered. Prior to that residents paid for all services (water supply, solid waste, street lights, sanitation, etc.) together and there was no proper accounting of water supply services. The existing tariff structure is fixed with the objective of meeting at least O&M costs. Budget for expansion and other capital works is provided by the government as grant.
2 Billing is done monthly and consumers pay at the water utility office.
3 In 1996, 24 new connections were installed. Price of new connection is Nu2,500 (US$69.84) payable in advance.
4 The water bill has a 50% sewerage surcharge on water sales.

Priority Need of Utility

I. As seen by Management
1) Inadequate skilled and dedicated personnel.
2) Lack of equipment (e.g., leak detection instrument).

II. Consumers' Opinion
1) Reliability and 24-hour supply.
2) Improved operations and service.

Consumer Survey Findings

Average monthly consumption is about 75 m^3 per domestic connection of 18 persons. The monthly water bill averages Nu93.90 (US$2.62) compared to the monthly power bill of Nu178.74 (US$4.99). Of those interviewed, 33% have 24-hour water supply. About 62% consider water quality to be good; 71% boil or filter their drinking water. Only 17% experienced water service interruption in the month preceding the interview. It takes about 4-1/2 days for the utility to repair reported leaks in the system. Overall rating of the utility is fair (55%) to good (40%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile THIMPHU

THIMPHU WATER SUPPLY

Population: 32,000 (1996)

Production/Distribution

Average Daily Production	7,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	8,000 m^3/d
Storage	3,215 m^3
Service Area [1]	8.3 sq km

Service Connections

House (18 persons/HC) [2]	1,657
Public Tap	Nil
Industrial	21
Commercial	23
Institutional	105
Other	Nil
Total	***1,806***

Service Indicators

Service Coverage [3]	93%
Water Availability [4]	12 hours/day
Per Capita Consumption	93 l/c/d
Average Tariff	US$0.052/$m^3$
Drinking Water [5]	Boiled

Efficiency Indicators

Unaccounted Water [6]	37%
Non-Revenue Water [7]	53%
Unit Production Cost	US$0.019/$m^3$
Operating Ratio	0.60
Accounts Receivable	4 months
Staff/1,000 Connections	25.5

Notes:

[1] Total area of responsibility is 10.2 sq km.

[2] Each connection serves a building with 4 households.

[3] Unserved residents get water from streams.

[4] Only 20% of consumers have 24-hour water supply. About 625 consumer complaints were registered in 1996.

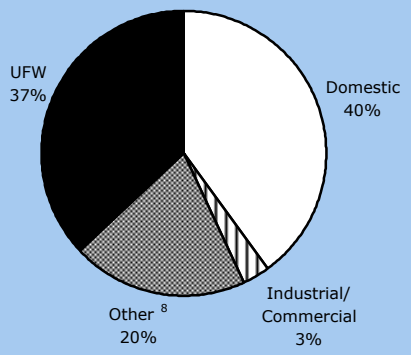
[5] About 12 samples are tested annually of which 2 fail the bacteriological tests.

[6] About 183 leaks were repaired in 1996. Full metering of all connections is on-going.

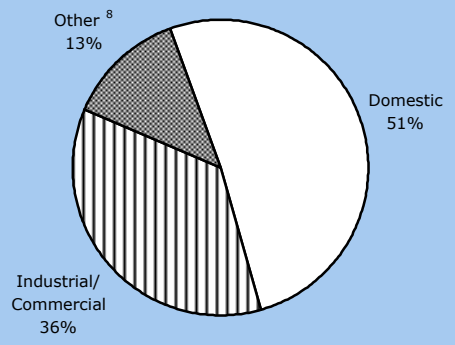
[7] A large part of NRW comes from unbilled consumption along transmission line between treatment plant and reservoirs which will be billed and charged starting 1997.

[8] Other use and billing refer to institutional connections.

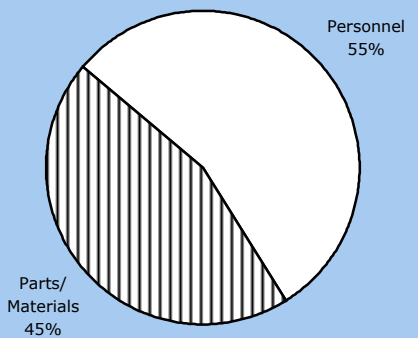
Data as of 1996.



Annual Water Use
2,555,000 m^3



Annual Water Billings
US$83,475



Annual O&M Costs
US$49,728

CAMBODIA *Utility Profile*

Water Utility

PHNOM PENH WATER SUPPLY AUTHORITY

Address : North of Railway Station, Phnom Penh, Cambodia
Telephone : (855-23) 427 657, 427 238
Fax : (855-23) 427 657, 427 238
Head : Mr. Ek Son Chan, Director General

The Phnom Penh Water Supply Authority (PPWSA) is an autonomous public enterprise established under the tutelage of the Phnom Penh Municipal Government in December 1996. The original utility which dates back to 1895 is responsible for water production and distribution to the city's population of 824,302 people. Government exercises control on staff salaries, tariffs, appointment of top management and budget for development. The water utility has a well developed management information system. Billing and accounting are fully computerized while part of the treatment facility is computerized. PPWSA is following its 1997-2001 Development Plan. It produces a type-script annual report for the government. To serve the urban poor, the utility allows residents to draw water from public underground tanks with the total bill shared by users.

Mission Statement

"To produce and provide water for general use of the public in Phnom Penh."

General Data About Water Utility

Connections	: 34,377	
Staff	: 463	
Annual O&M Costs	: KR 3,647,828,580	: US$1,332,784
Annual Collections	: KR 5,559,466,115	: US$2,031,226
Annual Billings	: KR 6,025,344,435	: US$2,201,441
Annual Capital Expenditure	: KR25,787,400,000	: US$9,421,776
(Average over last 5 years)	Expenditure Per Connection	: US$274.07/connection
Source of Investment Funds	: 92.47% national government grant; 5.23% government loan; 2.18% commercial loan; 0.12% internally generated reserves	

Tariff Structure

(Effective June 1994)

Category	Rates	
	(KR/m^3)	(US$/$m^3$)
Domestic & Institutional	250	0.091
Commercial & Industrial	700	0.256

Notes:

1 Almost all consumers pay on metered use except for less than 5% of commercial and institutional connections and 14% of house connections which are not yet metered. Non-metered consumers pay on flat rate; domestic consumers in areas with low water pressure do not pay.
2 Consumers are billed every two months and they pay at the water utility office or through utility bill collectors.
3 Tariffs set aim to balance expenses and revenues that will assure financial viability of the enterprise.
3 In 1996, about 12,803 new connections were made. Price of new connection is KR450,000 (US$164.41) for 15 mm and KR500,000 (US$182.68) for 20 mm connections payable in advance.
4 The water bill has no sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Reducing unaccounted-for-water.
2) Extension of service capacity.

II. Consumers' Opinion
1) Higher water pressure.
2) More house connections.

Consumer Survey Findings

The average monthly water consumption is 38.56 m^3 per family with monthly water bill averaging KR13,627 (US$4.98) compared to a monthly power bill of KR31,805 (US$11.62). Only 21% of the survey respondents claim to enjoy 24-hour supply; 61% complained of low water pressure. Only 24% consider water quality to be good and 33% said satisfactory; about 81% boil water for drinking. In the month preceding the survey, 21% experienced water supply interruption. Overall rating of PPWSA by the consumers surveyed ranges from fair (38%) to good (21%).

Major Changes in the Water Utility

Not in the First Data Book.

PHNOM PENH

Population: 824,302 (1996)

Production/Distribution

Average Daily Production	103,096 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	110,000 m^3/d
Storage	22,500 m^3
Service Area [1]	78 sq km

Service Connections

House (25 persons/HC)	27,387
Public Tap	Nil
Industrial	126
Commercial	6,442
Institutional	337
Other	85
Total	***34,377***

Service Indicators

Service Coverage [2]	83%
Water Availability [3]	12 hours/day
Per Capita Consumption	32 l/c/d
Average Tariff	US$0.150/$m^3$
Drinking Water [4]	Boiled

Efficiency Indicators

Unaccounted Water [5]	61%
Non-Revenue Water	61%
Unit Production Cost	US$0.035/$m^3$
Operating Ratio	0.61
Accounts Receivable	0.9 months
Staff/1,000 Connections	13.5

Notes:

[1] Total area of responsibility is 290 sq km.

[2] Unserved residents use wells and ponds as sources.

[3] About half of the consumers have 24-hour water supply. In 1996, about 20,342 consumer complaints were attended to.

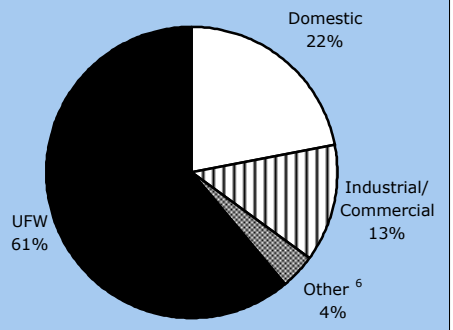
[4] A large proportion of water samples, 173 out of 192 tested, failed the bacteriological tests during the year.

[5] In 1996, about 754 leaks were repaired and 2,561 meters were replaced or repaired.

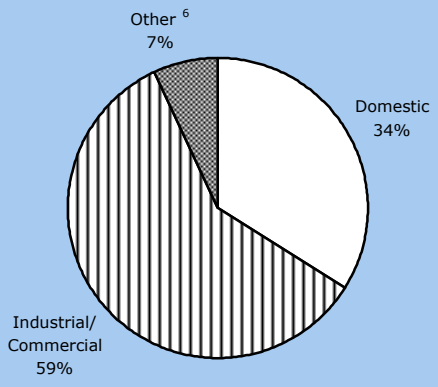
[6] Other use and billing refer to institutional and other connections serving the urban poor.

[7] Other costs are for contingency and miscellaneous expenses.

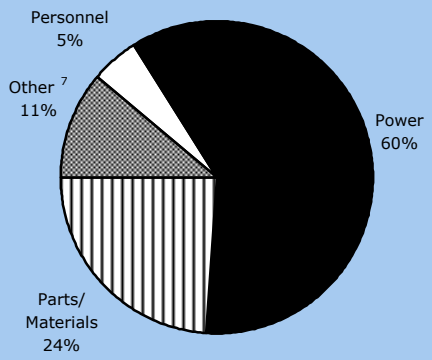
Data as of 1996.



Annual Water Use
37,630,040 m^3



Annual Water Billings
US$2,201,441



Annual O&M Costs
US$1,332,784

CHINA, PEOPLE'S REPUBLIC OF *Utility Profile*

Water Utility

BEIJING MUNICIPAL WATERWORKS COMPANY

Address : 19 Yangrou Hutong, Xicheng District, Beijing 100034, China
Telephone : (86-10) 6616 7744
Fax : (86-10) 6616 8028
Head : Xu Yang, General Manager

The Beijing Municipal Waterworks Company (BMWC) is a government enterprise responsible for the water supply of Beijing, including Beijing proper and 4 suburban counties with a system that dates back to 1910. BMWC buys raw water from the Beijing Water Conservancy Bureau, treats the water and distributes it to 5,486,000 people in its area of responsibility. Government maintains control of staff salaries, tariffs, appointment of top management, budgets for O&M and development and disconnection for non-payment of bills. The utility has a partly developed management information system. Its billing, collection and water treatment systems are computerized. BMWC is currently following its 1996- 2010 Development Plan. A type-script 1995 annual report for government is available.

Mission Statement

No Mission Statement

General Data About Water Utility

Connections	: 222,108	
Staff	: 6,031	
Annual O&M Costs	: Y341,050,000	: US$41,136,454
Annual Collections	: Y260,141,000	: US$31,377,447
Annual Billings	: Y261,821,000	: US$31,580,084
Annual Capital Expenditure	: Y548,754,000	: US$66,189,103
(Average over last 5 years)	Expenditure Per Connection	: US$298.00/connection
Source of Investment Funds	: 60.93% government loan; 25.64% externally-fund government grant; 10% construction fund in tariff;3.43% internally generated reserves	

Tariff Structure

(Effective May 1996)

Category	Rates per cubic meter	
	(Y/m^3)	(US$/$m^3$)
Domestic	0.5	0.060
Industrial, School, Hospital, etc.	0.8	0.096
Hotel (ordinary)	1.2	0.145
Hotel (High class)	2.0	0.241

Notes:
1 All consumers pay on metered use with all connections metered.
2 Consumers are billed monthly and pay at the water utility offices, banks or through utility bill collectors.
3 About 5,863 new connections were installed in 1995. Price of a new connection is Y830 (US$100.11) payable in advance.
4 There is no sewerage surcharge in the water bill.

Priority Need of Utility

I. As seen by Management
1) Decrease operations cost.
2) Improve service to consumers.

II. Consumers' Opinion
1) Improve water quality.
2) Increase water quantity and pressure.

Consumer Survey Findings

A family consumes an average of 12.46 m^3 of water per month. The average monthly water bill is Y6.30 (US$0.76) compared to the average monthly power bill of Y38.28 (US$4.62). Of those interviewed, 96% said they have 24-hour water supply. Half of the respondents perceive water quality to be good, the other half satisfactory; 92% still boil water for drinking as a matter of habit. Only 2% experienced supply interruption in the previous month. Overall rating of the utility by the surveyed consumers is good (85%).

Major Changes in the Water Utility (1988-1995)

The utility reduced its staff to 31% of its previous size. The apparent decrease in total connections from 1,153,920 to 222,108 can be explained by previous interpretation of number of house connection as those connected to the utility despite several houses being connected through the same meter. More surface water is now used with surface water accounting for 46% of total production from 31% before. There were also increases in storage capacity (191%) and treatment capacity (30%). Service coverage is now 100% from 96%. Average tariff increased by 155% while unit production cost increased by 186%. UFW was reduced from 28% to 8%.

City Profile BEIJING

BEIJING WATER SUPPLY

Population: 5,486,000 (1995)

Production/Distribution

Average Daily Production	1,851,640 m^3/d
Groundwater	54%
Surface Water	46%
Treatment Type	Conventional
Treatment Capacity	2,269,000 m^3/d
Storage	520,000 m^3
Service Area	550 sq km

Service Connections

House (35 persons/HC) [1]	176,282
Public Tap (115 persons/PT)	26
Industrial	3,558
Commercial	11,499
Institutional	9,564
Other	21,179
Total	***222,108***

Service Indicators

Service Coverage	100%
Water Availability [2]	24 hours/day
Per Capita Consumption	96 l/c/d
Average Tariff	US$0.051/$m^3$
Drinking Water [3]	Boiled

Efficiency Indicators

Unaccounted Water [4]	8%
Non-Revenue Water	8%
Unit Production Cost	US$0.061/$m^3$
Operating Ratio	1.3
Accounts Receivable	0.08 months
Staff/1,000 Connections	27.2

Notes:

[1] Each connection serves several families.

[2] Ten complaints were registered in 1995.

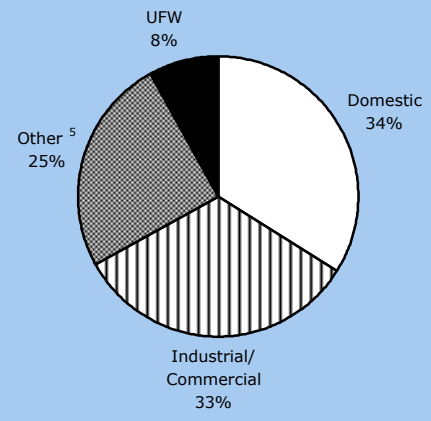
[3] None of the 6,360 water samples tested during the year failed the bacteriological tests.

[4] About 2,698 leaks were repaired in 1991; 10,444 meters were replaced and 6,289 were repaired.

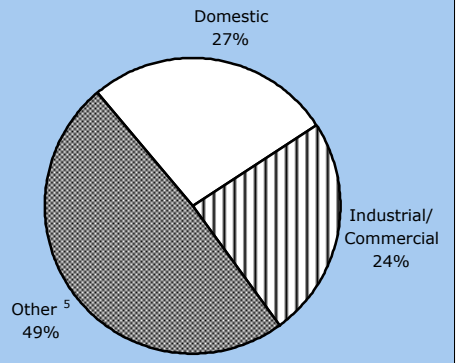
[5] Other use and billing are for local government offices and institutions.

[6] Other cost inlcudes depreciation and cost of water treatment plant construction.

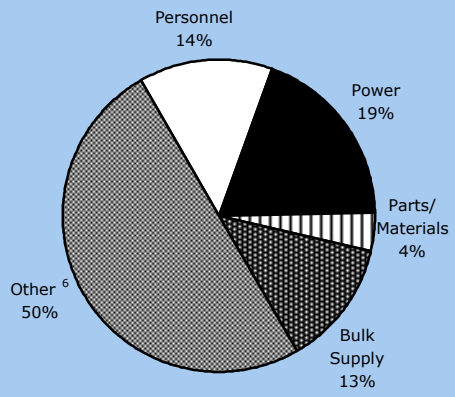
Data as of 1995.



Annual Water Use
675,848,600 m^3



Annual Water Billings
US$31,580,084



Annual O&M Costs
US$41,136,454

CHINA, PEOPLE'S REPUBLIC OF *Utility Profile*

Water Utility

SHANGHAI MUNICIPAL WATERWORKS COMPANY

Address : 484 Jiangxi Road (Central) Shanghai 200002, China
Telephone : (86-21) 6321 5577
Fax : (86-21) 6323 1346
Head : Xu Guoxiang, General Manager

The Shanghai Municipal Waterworks Company (SMWC), a government enterprise under the municipal government, is responsible for the water supply of the city with a population of 8,197,000 people. The original water system was established in 1883. SMWC buys both raw water from the conservancy bureau and treated water from Ling Qiao Water Co., Ltd. which serves the Pu Dong New Area. The state maintains control on number and salaries of staff, tariffs, appointment of top management and budgets for O&M and development. SMWC has a partly developed management information system and is guided in its development by the current 1995-2000 Development Plan. Billing, collection and archives management are computerized. The utility is also using SCADA and GIS in its operations. An intermediate format 1996 annual report published by SMWC is available.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 1,827,717	
Staff	: 11,060	
Annual O&M Costs	: Y972,373,881	: US$117,284,895
Annual Collections	: Y728,044,262	: US$ 87,814,571
Annual Billings	: Y877,251,000	: US$105,811,451
Annual Capital Expenditure	: Y581,888,408	: US$ 70,185,679
(Average over last 5 years)	Expenditure Per Connection	: US$38.40/connection
Source of Investment Funds	: 51.79% national government grant; 48.21% local government grant	

Tariff Structure

(Effective May 1997)

Category	Rates per cubic meter	
	(Y/m^3)	(US$/$m^3$)
Domestic & public hot water station	0.80	0.096
Public taps/standpipe supply	0.58	0.070
Industrial & other purposes	0.90	0.109
Nursery, home for the aged, troops	0.80	0.096
Ocean going vessels	1.30	0.157
Agricultural base	0.68	0.082

Notes:
1 All consumers pay on metered use. Billing is monthly except domestic and public taps which are billed every two months. Bills are paid through bill collectors or in banks and water utility offices.
2 In 1995, about 237,000 new connections were made.
3 The utility started charging a sewerage surcharge of 4% in 1996.

Priority Need of Utility

I. As seen by Management
1) ISO 9002 Quality Assurance System classification.
2) Improve customer relations and service.

II. Consumers' Opinion
1) Improve water quality.
2) Increase water quantity and pressure.

Consumer Survey Findings

The average monthly water consumption is 20.2 m^3 per family. The water bill averages Y12.64 (US$1.52) per month compared to the monthly power bill of Y51.70 (US$6.24). Of those interviewed, 74% considered water quality to be good although 67% boil, filter or do both to their drinking water. Only 21% claimed to have low water pressure from their tap. Service interruption in the month prior to the survey was experienced by only 2%; it takes 1-2 days for leak repairs on pipes to be made. Overall rating of SMWC ranges from good (54%) to fair (45%).

Major Changes in the Water Utility (1988-1995)

Average daily production increased by 12% while the number of connections increased by 22%. The number of staff increased by 40% bringing staff/1,000 connections ratio to 6.1 from 5.3 previously. Average tariff increased by 675% while the unit production cost increased 471%. Operating ratio improved to 1.19 from 1.92. UFW decreased from 25% to 14%. The national government grant for capital improvements increased to about 52% of total investment funds, up from 37% five years ago.

City Profile SHANGHAI

SHANGHAI WATER SUPPLY

Population: 8,197,000 (1995) [1]

Production/Distribution

Average Daily Production [2]	4,728,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	5,600,000 m^3/d
Storage	549,000 m^3
Service Area	506 sq km

Service Connections

House (3.2 persons/HC)	1,753,190
Public Tap (80 persons/PT)	516
Industrial	10,684
Commercial	13,400
Institutional	7,509
Other [3]	42,418
Total	***1,827,717***

Service Indicators

Service Coverage	100%
Water Availability	24 hours/day
Per Capita Consumption	143 l/c/d
Average Tariff	US$0.066/$m^3$
Drinking Water [4]	Boiled

Efficiency Indicators

Unaccounted Water [5]	14%
Non-Revenue Water	14%
Unit Production Cost	US$0.068/$m^3$
Operating Ratio	1.19
Accounts Receivable	11.1 months
Staff/1,000 Connections	6.0

Notes:

[1] Total population of Shanghai is 13,000,000. SMWC is responsible for the city area only.

[2] All production is metered.

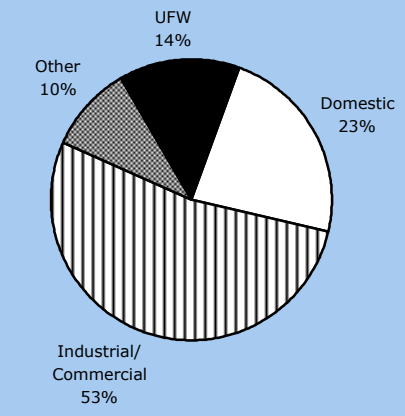
[3] Other connections are mostly connections to apartment buildings each serving several families.

[4] In 1995, about 54 water samples out of 9,758 failed to pass the bacteriological tests.

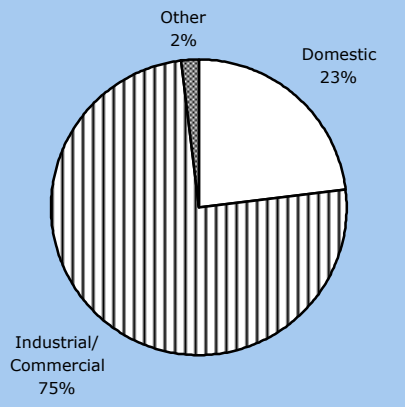
[5] About 99,225 leaks were repaired and 138,091 meters were replaced or repaired in 1995.

[6] Industrial/Commercial includes institutional use. Other use includes water used in public areas and sale to nearby towns and counties.

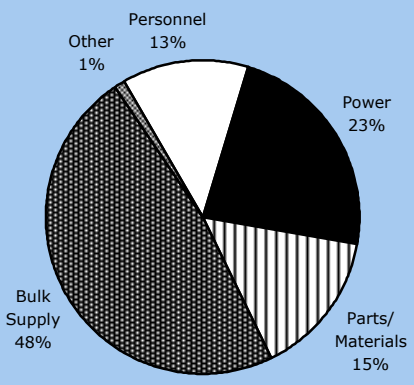
Data as of 1995.



Annual Water Use [6]
1,725,720,000 m^3



Annual Water Billings [6]
US$98.497.835



Annual O&M Costs
US$117,284,895

CHINA, PEOPLE'S REPUBLIC OF *Utility Profile*

Water Utility

TIANJIN WATERWORKS GROUP CO., LTD.

Address : 54 Jianshe Road, Heping District, Tianjin 300040, China
Telephone : (86-22) 339 3887
Fax : (86-22) 330 6720
Head : Chen Lian Xiang, General Manager

The Tianjin Waterworks Group Co., Ltd. (TWWC) is a government enterprise responsible for water supply to 4,580,000 people in the urban districts of Tianjin Municipality. It buys raw water from the Tianjin Water Conservancy Bureau and distributes it through the water system that dates back to 1898. The government maintains control on staff salaries, tariffs, appointment of top management, budgets for O&M and development and disconnection for non-payment of bills. TWWC has a partly developed management information system. Its billing, collection and water treatment systems are computerized. Development is guided by its 1996-2010 Development Plan. A type-script annual report for government for 1995 is available.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 108,866	
Staff	: 5,428	
Annual O&M Costs	: Y283,570,000	: US$34,203,385
Annual Collections	: Y239,168,000	: US$28,847,745
Annual Billings	: Y241,608,000	: US$29,142,051
Annual Capital Expenditure	: Y220,000,000	: US$26,535,757
(Average over last 5 years)	Expenditure Per Connection	: US$243.75/connection
Source of Investment Funds	: 27.3% national government grant; 27.3% local bonds; 19.1% government loan; 15.4% internally generated reserves 10.9% construction fund in tariff	

Tariff Structure

(Effective October 1994)

Category	Rates per cubic meter	
	(Y/m^3)	(US$/$m^3$)
Residential	0.68	0.082
Institutional	0.75	0.090
Industrial	0.95	0.115
Commercial	1.05	0.127
Entertainment	1.15	0.139

Notes:
1 All consumers pay on metered use.
2 Consumers are billed monthly except some households which are billed every two months. Bills are paid at the water utility offices, at banks or through utility bill collectors.
3 In 1995, about 2,001 new connections were installed. Price of new connection is Y3,000 (US$361.85) for individual town house which is payable in advance. Bulk connections serving several apartments cost Y30,000 to Y60,000 (US$3,618.51 to US$7,237.02).
4 The water bill has no sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Reduce operating cost.
2) Improve bill collection and raise rate of return.

II. Consumers' Opinion
1) Replace old water pipes and expansion.
2) Improve water quality.

Consumer Survey Findings

Average monthly consumption is 9.54 m^3 for a family averaging 3.67 persons. The water bill averages Y7.17 (US$0.86) per month compared to the monthly power bill of Y27.37 (US$3.30). Of those surveyed, 96% have 24-hour water supply. Perceptions on water quality range from good (39%) to satisfactory (54%) yet 92% boil water for drinking. Only 13% experienced any water interruption in the month preceding the survey. Repairs on leaks are attended to in 1-2 days. Overall rating of TWWC in the survey ranges from good (62%) to fair (34%).

Major Changes in the Water Utility (1988-1995)

The TWWC reduced its staff by 52% with the apparent decrease in total connections from 914,880 to 108,866. Each house connection per access gate in apartment buildings serves an average of 14 families instead of the common practice of one house connection per family or household. This increased the staff/1,000 connections from 11.4 to 49.9. Surface water now comprises 99% of production from 86% before. Treatment capacity also increased by 41%. Service coverage is 100%, up from 96%. Average tariff increased by 129% while unit production cost increased by 95%. Operating ratio also improved from 1.25 to 1.01.

City Profile TIANJIN

TIANJIN WATER SUPPLY

Population: 4,580,000 (1995)

Production/Distribution

Average Daily Production [1]	1,510,000 m^3/d
Groundwater	1%
Surface Water	99%
Treatment Type	Conventional
Treatment Capacity	1,722,000 m^3/d
Storage	256,100 m^3
Service Area	374 sq km

Service Connections

House (51.4 persons/HC) [2]	84,263
Public Tap (150 persons/PT)	669
Industrial	7,875
Commercial	7,581
Institutional	1,840
Other [3]	6,638
Total	***108,866***

Service Indicators

Service Coverage	100%
Water Availability [4]	24 hours/day
Per Capita Consumption	101 l/c/d
Average Tariff	US$0.059/$m^3$
Drinking Water [5]	Boiled

Efficiency Indicators

Unaccounted Water [6]	11%
Non-Revenue Water	11%
Unit Production Cost	US$0.056/$m^3$
Operating Ratio	1.05
Accounts Receivable	0.12 months
Staff/1,000 Connections	49.9

Notes:

[1] All production is metered.

[2] Each house connection serves an average of 14 families.

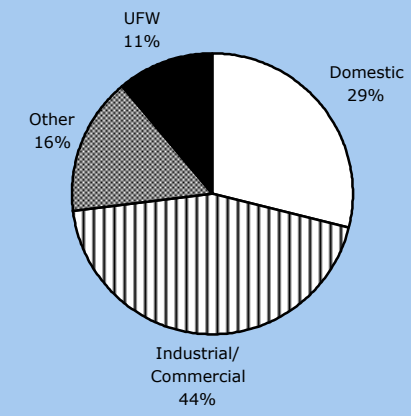
[3] Other connections serve government bodies and entertainment firms.

[4] About 1,139 complaints were registered in 1995.

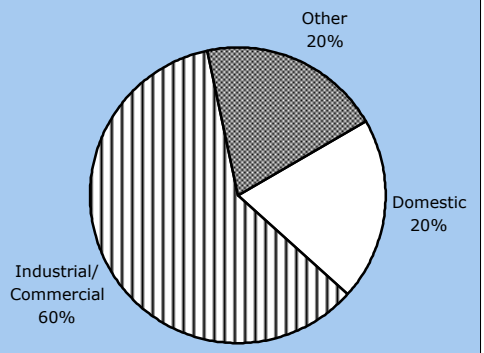
[5] In a one-year period, about 10.3% of 6,042 water samples taken failed the bacteriological tests for coliform presence.

[6] In 1995, about 2,646 leaks were repaired and 21,980 meters replaced or repaired.

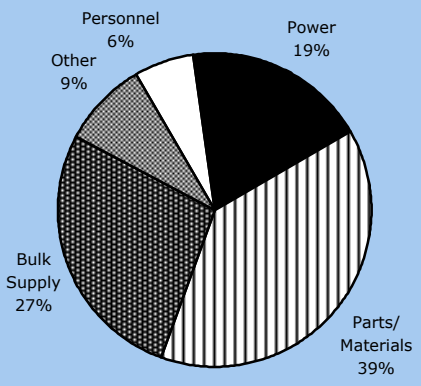
Data as of 1995.



Annual Water Use
551,150,000 m^3



Annual Water Billings
US$29,142,051



Annual O&M Costs
US$30,692,463

COOK ISLANDS *Utility Profile*

Water Utility

MINISTRY OF WORKS, ENVIRONMENT AND PHYSICAL PLANNING
(Water Supply Division)

Address : P. O. Box 102, Rarotonga, Cook Islands
Telephone : (682) 20034
Fax : (682) 21134
Head : Mr. Nooroa Parakoti, Director

The Water Supply Division is responsible for the water supply of Rarotonga Island with a population of 11,100 including the capital, Avarua Township. It is a division under the Ministry of Works, Environment and Physical Planning (MOWEPP) with a water supply system that was established in 1900. The government exercises control on the number, salary and appointment of staff, appointment of top management, budgets for O&M and development. The division has a partly developed management information system. Development is guided by its 1995-2000 Development Plan. No annual report is published by the Water Supply Division. The utility still do not collect any tariff from its consumers. As part of the government reform process, consideration is being given to the utility's privatization.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 4,265	
Staff	: 15	
Annual O&M Costs	: NZ$405,700	: US$275,181
Annual Collections [1]	: NZ$ 9,500	: US$ 6,444
Annual Billings [1]	: NZ$ 9,500	: US$ 6,444
Annual Capital Expenditure	: NZ$360,000	: US$244,184
(Average over last 5 years)	Expenditure Per Connection	: US$57.25/connection
Source of Investment Funds	: 72.2% commercial loan; 27.8% externally-funded government grant	

[1] Billings and collections are for new connection fees.

Tariff Structure

There is no tariff levied by the Government on water consumers for the water supply service at present.

Notes:
1 There were 50 new connections in 1996. Cost of new connection is NZ$200.00 (US$135.66)
2 About 95% of all industrial, commercial and institutional connections and 12% of house connections are metered.

Priority Need of Utility

I. As seen by Management
1) Improve water resources management in the island.
2) Development of water supply master plan for Rarotonga.

II. Consumers' Opinion
1) Improve water quality.
2) Better water storage facilities.

Consumer Survey Findings

No tariff is levied on the consumers. Average monthly power bill is NZ$81.50 (US$55.28). About 80% claim to have 24-hour water supply. Perception on water quality ranges from satisfactory (56%) to poor (36%) with only 8% saying quality is good. About 75% boil, filter or do both to their drinking water. Approximately 27% said water pressure is low. Water supply interruption was experienced by 55% of the respondents on the month prior to the survey. Leak repairs take about 3 days to be made after reporting to the utility. Overall rating of the utility is fair (52%) to good (17%).

Major Changes in the Water Utility (1992-1996)

The number of connections increased by 69% which are mostly residential users. However, UFW increased from 27% to 70% attributed mostly to leaks in house plumbing systems and agricultural use in residential connections where only 12% of connections are metered but comprise 98% of total connections. Staff/1,000 connections ratio improved to 3.5 from 12.6. Funding sources also changed from purely government grant to the use of commercial loans (72.2%) and externally-funded government grant (27.8%). Unit production cost decreased by 13%.

Town Profile RAROTONGA

RAROTONGA WATER SUPPLY

Population: 11,100 (1995)

Production/Distribution

Average Daily Production	10,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Slow Sand Filter
Treatment Capacity	NA
Storage	22,400 m^3
Service Area	67 sq km

Service Connections

House (4.2 persons/HC) [1]		4,175
Public Tap		Nil
Industrial	)	67
Commercial	)	
Institutional		23
Other		Nil
Total		***4,265***

Service Indicators

Service Coverage	100%
Water Availability [2]	24 hours/day
Per Capita Consumption [3]	267 l/c/d
Average Tariff [4]	NA
Drinking Water	Boiled/Filtered

Efficiency Indicators

Unaccounted Water [5]	70%
Non-Revenue Water [4]	NA
Unit Production Cost	US$0.075/$m^3$
Operating Ratio [4]	NA
Accounts Receivable [4]	NA
Staff/1,000 Connections	3.5

Notes:

[1] Some connections are for family agricultural plots.

[2] Except during drought conditions which occur every 4-5 years

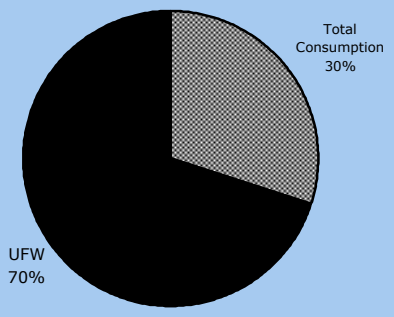
[3] Computed using total consumption and served population.

[4] No tariffs are levied at present.

[5] This is not calculated, but estimated by the utility. Most of the "unaccounted for water" is caused by leaking household plumbing systems and agricultural uses.

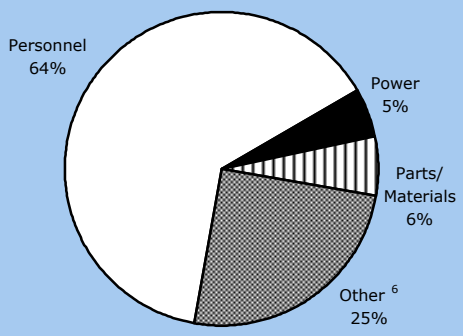
[6] Other cost includes transport, training, debt service and administrative costs.

Data as of 1996.



Annual Water Use
3,650,000 m^3

Annual Water Billings



Annual O&M Costs
US$275,181

FIJI ISLANDS *Utility Profile*

Water Utility

FIJI PUBLIC WORKS DEPARTMENT

Address : Private Mail Bag, Suva, Fiji
Telephone : (679) 315 224
Fax : (679) 303 023
Head : Ram Sumer Shandil, Director of Water and Sewerage

The Fiji Public Works Department (PWD) is a government department formed at the time of independence in 1970, and is tasked with handling the water supply and sewerage of Fiji Islands including the capital, Suva. The original water supply of Suva was constructed in 1882 and was operated with the sewerage system by the British colonial administration. The present water supply system serves Suva's population of 280,000 people. The government maintains control of number, salaries, and appointment of staff, tariffs, appointment of top management, and budgets for O&M and development. The PWD has a partly developed management information system. Its billing and accounting systems are computerized. All the utility's water supply systems have individual development plans normally drawn up for 20 years with reviews carried out after 15 years. Suva is currently following its 1983-2003 Development Plan.

Mission Statement

" To design, construct, operate and maintain to an appropriate level of efficiency, quality and economy, certain infrastructural assets (roads, buildings, water, sewerage), for the Government, on behalf of the People of Fiji."

General Data About Water Utility

Connections	: 100,876	
Staff	: 900	
Annual O&M Costs	: F$16,000,000	: US$11,255,716
Annual Collections	: F$ 8,926,674	: US$ 6,279,757
Annual Billings	: F$10,029,672	: US$ 7,055,696
Annual Capital Expenditure	: F$10,000,000	: US$ 7,034,822
(Average over last 5 years)	Expenditure Per Connection	: US$69.74/connection
Source of Investment Funds	: 95% national government grant; 5% externally-funded government grant	

Tariff Structure

Category	Water Rates per Cubic Meter	
	(F$/$m^3$)	(US$/$m^3$)
Domestic		
First 50 m^3	0.1202	0.085
51 - 100 m^3	0.3450	0.243
Over 100 m^3	0.6587	0.463
Commercial	0.4156	0.292

Notes:
1 All consumers pay on metered use. Consumers are billed quarterly and pay at post offices or at the utility office.
2 There were 1,450 new connections in 1995. Cost of new connection is F$15.68 (US$11.03) for domestic and F$72.13 (US$50.74) for commercial connections both payable in advance.
3 Sewerage charge for domestic users is F$0.15/$m^3$ (US$0.110/$m^3$) of water consumed. Industrial rate is equal to the domestic rate multiplied by factor for strength of effluent .

Priority Need of Utility

I. As seen by Management
1) Corporatisation of the utility.
2) Improved efficiency.

II. Consumers' Opinion
1) Prompt repairs.
2) Improved service.

Consumer Survey Findings

Average monthly consumption is 47.83 m^3 per family. The monthly water bill averages F$15.90 (US$11.19) compared to the monthly power bill of F$43.51 (US$30.61). About 84% claimed to have 24-hour water supply. The consumers perceived water quality to be satisfactory (51%) to good (45%). Drinking from the tap is common to 77% while the rest either boil, filter or do both to their water. Only 13% complained of low water pressure. About 28% experienced water interruption in the month preceding the survey. It takes about 4 days for reported leaks to be repaired. Overall rating of PWD is fair (49%) to good (42%).

Major Changes in the Water Utility (1991-1995)

Average daily production increased by 19% while treatment capacity also increased by 11% in Suva Water Supply. The number of connections increased by 24%. With the increase in average tariff by 77% and the reduction in unit production cost by 11%, the operating ratio improved from 1.84 to 1.04 in 1995. Unaccounted-for-water increased from 36% to 43%. Accounts receivable deteriorated to 6.0 months from 1.4 months in 1991. The utility still relies heavily on government grant for capital expenditures, up from 80% of total expenditures to 95%.

City Profile SUVA

SUVA WATER SUPPLY

Population: 280,000 (1995) [1]

Production/Distribution

Average Daily Production	95,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	100,000 m^3/d
Storage	77,500 m^3
Service Area [2]	395 sq km

Service Connections

House (5.9 persons/HC)	46,797
Public Tap	Nil
Industrial)	3,928
Commercial)	
Institutional	67
Other [3]	861
Total	***51,653***

Service Indicators

Service Coverage	98%
Water Availability [4]	24 hours/day
Per Capita Consumption	135 l/c/d
Average Tariff	US$0.223/$m^3$
Drinking Water [5]	Tap

Efficiency Indicators

Unaccounted Water [6]	43%
Non-Revenue Water	43%
Unit Production Cost	US$0.132/$m^3$
Operating Ratio	1.04
Accounts Receivable	6.0 months
Staff/1,000 Connections [7]	8.9

Notes:

[1] The water supply serves not just the city of Suva but neighboring areas on the island of Viti Levu.

[2] Total area of responsibility is 400 sq. km. Residents in the unserved areas use dug wells, rain collectors and creeks.

[3] Other connections serve government offices. Only about 0.3% of the annual water billing came from government offices where most consumption is free.

[4] There were 11,500 consumer complaints registered in 1995.

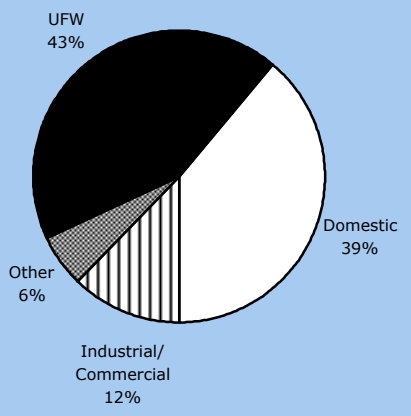
[5] None of approximately 850 water samples tested failed the bacteriological tests.

[6] In 1995, about 8,500 leaks were repaired and 1,700 meters were replaced or repaired.

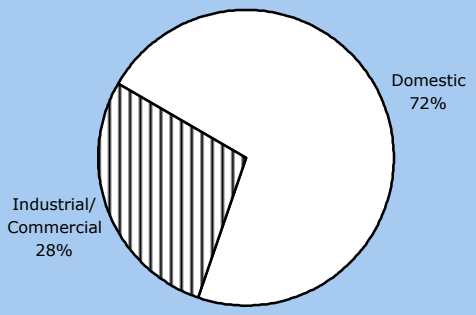
[7] This figure applies to the whole utility.

[8] Other costs include transportation expenses and cost of tools and fencing of utility facilities.

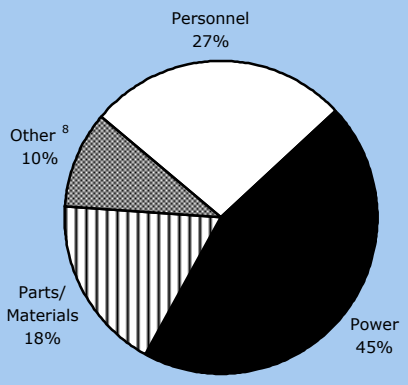
Data as of 1995.



Annual Water Use
34,675,000 m^3



Annual Water Billings [3]
US$4,430,744



Annual O&M Costs
US$4,585,853

HONG KONG, CHINA *Utility Profile*

Water Utility

WATER SUPPLIES DEPARTMENT

Address : 48/F Immigration Tower, 7 Gloucester Road, Wanchai, Hong Kong, China
Telephone : (852) 2829 4500
Fax : (852) 2824 0578
Head : Mr. Man Shiu Hu, Director of Water Supplies

The Water Supplies Department is a government entity tasked with developing and managing water services for Hong Kong, China. The utility, which dates back to 1863, buys 75% of its water from mainland China, treats the water and distributes it to Hong Kong's urban population of 6,270,000 people. It also distributes seawater for flushing. Tariffs, number and salaries of staff, appointment of top management and budgets for both O&M and development are under government control. A type-script annual report for 1995 is available. The Water Supplies Department has a partly developed management information system. Its billing and accounting systems are computerized. The utility's development direction is guided by its current 1997-2007 Development Plan.

Mission Statement

"To provide a reliable and adequate supply of wholesome potable water and sea water to our customers in the most cost-effective way; to adopt a customer-oriented approach in our services; to maintain and motivate an effective, efficient and committed workforce to serve the community; to remain conscious of our responsibilities towards the environment; to make the best use of resources and technology in our striving for continuous improvement in services."

General Data About Water Utility

Connections	: 2,099,820	
Staff	: 5,830	
Annual O&M Costs	: HK$4,127,100,000	: US$532,749,006
Annual Collections	: HK$2,311,000,000	: US$298,316,724
Annual Billings	: HK$2,539,393,000	: US$327,798,962
Annual Capital Expenditure	: HK$1,544,400,000	: US$199,359,736
(Average over last 5 years)	Expenditure Per Connection	: US$94.94/connection
Source of Investment Funds	: 100% national government grant	

Tariff Structure

(Effective 16 February 1995)

Category/Consumption	Applicable rate (4-month periods)	
DOMESTIC	(HK$/m^3)	(US$/m^3)
First 12 m^3	Free	Free
Next 31 m^3	4.16	0.537
Next 19 m^3	6.45	0.833
Remainder	9.05	1.168
NON-DOMESTIC		
Trade Purposes	4.58	0.591
Construction Purposes	7.11	0.918
Shipping Purposes		
Ocean-going	10.00	1.291
Non-ocean-going	4.58	0.591
FLUSHING WATER (Fresh)		
First 30 m^3	Free	Free
Remainder	4.58	0.591

Notes:
1 Charges are for 4-month periods. Flushing water are billed separately to registered customers.
2 All consumers pay on metered use. Consumers are billed every 4 months; large consumers are billed monthly.
3 Consumers can pay at banks, post offices, at the utility office or at government collection offices.
4 There were 64,561 new connections in 1995. Cost of new connection up to 20 mm diameter is HK$1,140 (US$147.16) payable in advance.
5 There is approximately 20% sewerage surcharge on the water bill.
6 Tariff for domestic use is set to provide the minimum quantity of water required for health and hygiene for the first tier which is free, to charge on the principle of no-subsidy on the second tier, and to generally discourage the extravagant and wasteful use of water above the level necessary to maintain a reasonable standard of living for the third and fourth tiers.

Priority Need of Utility

I. As seen by Management
1) To improve operational efficiency.
2) To enhance quality of service to customers.

II. Consumers' Opinion
1) Improve water quality.
2) Reduce water rates.

Consumer Survey Findings

The monthly water bill averages HK$243.35 (US$31.41) compared to the monthly power bill of HK$285.00 (US$36.79). Almost all (98%) claimed to have 24-hour water supply. Consumer perception of water quality is satisfactory (59%) to good (12%) with 28% saying quality is poor. About 96% boil their drinking water. Some interruptions were experienced by 19% of the respondents the month prior to the survey. Overall rating of the utility is fair (72%) to good (22%).

Major Changes in the Water Utility (1992-1996)

Average daily production increased by 5% while treatment capacity increased by 27%. The number of connections increased by 9.5%. While the average tariff increased by 50%, unit production cost increased by 84%. This is reflected in the increase in operating ratio from 1.15 in 1991 to 1.63. UFW also increased from 26% to 35.7%. Staff/1,000 connections ratio remains almost at the same level at 2.8. While capital investment in 1991 was mostly from consumer contributions (80%), funding in the last 5 years is composed of 100% national government grant.

City Profile HONG KONG

HONG KONG WATER SUPPLY

Population: 6,270,000 (1995)

Production/Distribution

Average Daily Production	2,518,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	3,935,100 m^3/d
Storage	3,200,000 m^3
Service Area	1,092 sq km

Service Connections

House (3.36 persons/HC)	1,858,278
Public Tap (89 persons/PT)	191
Industrial	79,779
Commercial	119,151
Institutional	2,956
Other [1]	39,465
Total	***2,099,820***

Service Indicators

Service Coverage	100%
Water Availability [2]	24 hours/day
Per Capita Consumption	112 l/c/d
Average Tariff	US$0.555/$m^3$
Drinking Water [3]	Boiled

Efficiency Indicators

Unaccounted Water [4]	36%
Non-Revenue Water	36%
Unit Production Cost	US$0.580/$m^3$
Operating Ratio	1.63
Accounts Receivable	4.0 months
Staff/1,000 Connections	2.8

Notes:

[1] Other connections are mainly for government institutions and fresh water for flushing.

[2] About 71,315 consumer complaints were attended to in the fiscal year ending March 1996.

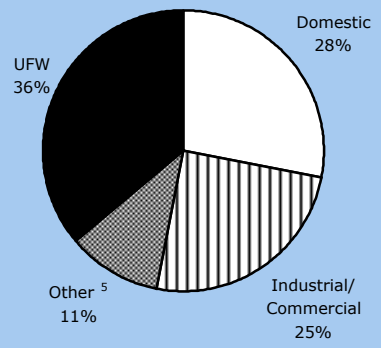
[3] While none of the 8,081 water samples tested bacteriologically failed in the last fiscal year, people still boil their water as a matter of habit.

[4] In 1995-96, 17,731 leaks were repaired, 50,694 meters were repaired and 47,259 more were replaced.

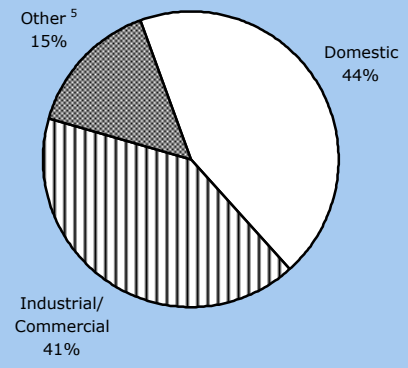
[5] Other use and billing refer to institutional and other connections.

[6] Other costs include distribution system expenses, interests, insurance, overheads, central administration and connection costs.

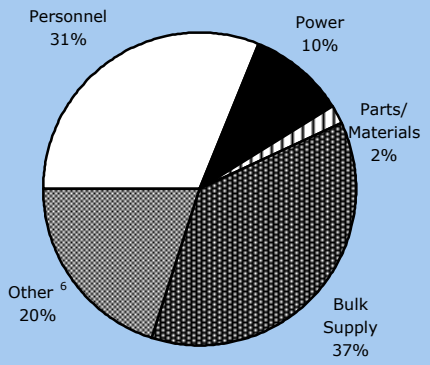
Data as of March 1996.



Annual Water Use
919,070,000 m^3



Annual Water Billings
US$327,798,962



Annual O&M Costs
US$532,749,006

INDIA *Utility Profile*

Water Utility

CALCUTTA MUNICIPAL CORPORATION (Water Supply Department)

Address : 5, S.N. Banerjee Road, Calcutta 700013, India
Telephone : (91-33) 244 4518
Fax : (91-33) 244 2578
Head : Mr. Dibyendu Roy Chowdhury, Chief Municipal Engineer

The Calcutta Municipal Corporation (CMC) was established in 1870 and is responsible for the water supply of Calcutta's 4,400,000 people and its adjoining municipalities through its Water Supply Department. The department augments its supply to the city by buying treated water from the Government of West Bengal, but it provides bulk supply to adjoining towns. Government maintains control on number, salaries and appointment of staff, tariffs, appointment of top management, budgets for O&M and development and disconnection for non-payment of bills. The department provides water free of charge to bustee dwellers. The department is currently following its 1990-1997 Development Plan. It has a partly developed management information system and its billing system is computerized. The 1996 Mayor's Annual Report and Budget Statement for Government and CMC Councilors which presents information on the department's operations is available.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 335,991	
Staff	: 5,731	
Annual O&M Costs[1]	: Rs427,939,000	: US$11,961,873
Annual Collections	: Rs 60,893,000	: US$ 1,702,110
Annual Billings	: Rs 81,527,000	: US$ 2,278,882
Annual Capital Expenditure	: Rs166,070,400	: US$ 4,642,080
(Average over last 5 years)	Expenditure Per Connection	: US$13.82/connection
Source of Investment Funds	: 48% internally generated reserves; 20% government loan; 32% other sources	

1 Difference between O&M costs and collections is met by CMC budget provision.

Tariff Structure

(Effective 1996-1997)

Domestic: Tariffs are based on property tax.		
Business/Non-Domestic: Flat Rate Based on Ferrule Size		
Ferrule Size (Inches)	Rs/month	US$/month
3/16	180	5.03
¼	240	6.71
½	550	15.37
¾	1,400	39.13
1	2,200	61.50
Metered Rates (plus meter rent)	Rs/m^3	US$/$m^3$
Non-Domestic in Town	7.00	0.196
Public Utility/Government	1.00	0.028
Supply Ships	70.00	1.957
Meter Rent (Annual)	Rs/annum	US$/annum
Below 1"	125	3.49
1" - 2"	250	6.99
Above 2"	500	13.98

Notes:
1 Consumers pay on flat rate based on ferrule size or on property tax since none of the connections are metered. They are billed annually except domestic consumers who are billed quarterly. Bills are paid at the utility offices. Users of public taps do not pay when ferrule is below 10 mm.
2 There were about 19,300 new connections in 1995. Price of new connection ranges from Rs1,440 (US$40.25) to Rs26,400 (US$737.95) payable before installation plus one year advance payment on water bill.
3 Water bill has no sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Introduce computerized pipe network distribution management system.
2) Computerize monitoring system for treatment plant, operation of valves and electrical panel board.

II. Consumers' Opinion
1) Improve water quality.
2) Increase water pressure.

Consumer Survey Findings

The average estimated monthly water consumption is 39.56 m^3 per family. Average monthly bill which is based on property tax is Rs196.49 (US$5.49) compared to the monthly power bill of Rs231.09 (US$6.46). Only 7% claimed to have 24-hour water supply with an average availability of 6.6 hours per day. Perception on water quality is good (45%) to satisfactory (33%). About 52% drink water straight from the tap. Of those surveyed, 44% claimed water pressure to be low. One-fourth experienced supply interruption in the month preceding the survey. Leak repairs take an average of about 4 days to be made. Overall utility rating is fair (48%) to good (34%).

Major Changes in the Water Utility (1991-1997)

The average daily production increased by 13% while the number of connections increased by 71%. Average tariff went down by 73% while unit production cost increased by 4%. Operating ratio increased from 1.11 to 5.25 due to the very low level of billings and collections. Accounts receivable improved from 2.0 to 1.5 months. Lack of metering prevents any meaningful measure or estimate of consumption and unaccounted for water.

City Profile CALCUTTA

CALCUTTA WATER SUPPLY

Population: 4,400,000 (1995) [1]

Production/Distribution

Average Daily Production [2]	1,165,565 m^3/d
Groundwater	15%
Surface Water	85%
Treatment Type	Conventional/Slow Sand Filter
Treatment Capacity	908,400 m^3/d
Storage	306,140 m^3
Service Area	187 sq km

Service Connections

House (5 persons/HC)	212,200
Public Tap (75 persons/PT)	11,910
Industrial)	
Commercial)	38,142
Institutional)	
Other [3]	73,739
Total	***335,991***

Service Indicators

Service Coverage [4]	66%
Water Availability [5]	10 hours/day
Per Capita Consumption	202 l/c/d
Average Tariff	US$0.011/$m^3$
Drinking Water [6]	Tap

Efficiency Indicators

Unaccounted Water [7]	50%
Non-Revenue Water	50%
Unit Production Cost	US$0.028/$m^3$
Operating Ratio	5.25
Accounts Receivable	1.5 months
Staff/1,000 Connections	17.1

Notes:

[1] This does not include commuting population of 2.5 million.

[2] Only 5% of production is metered.

[3] Other connections are for second domestic connections and to buildings serving several families.

[4] Other sources are mostly tubewells amd dug wells.

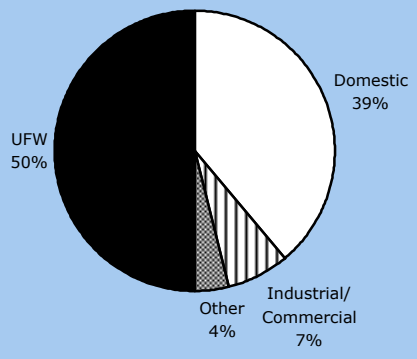
[5] Less than 1% of the population has 24-hour water supply; about 2,900 complaints were registered in 1996.

[6] In a one-year period, 356 water samples out of 2,360 tested failed the bacteriological tests.

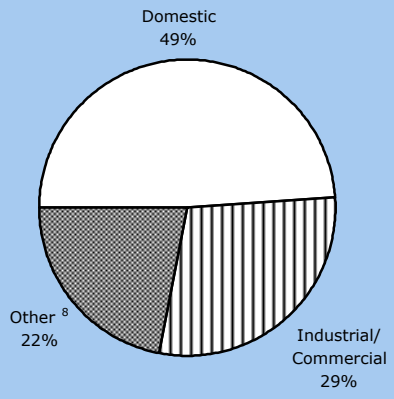
[7] UFW estimate given by the utility was 36%; 12,800 leaks were repaired in 1996.

[8] Billing for other includes bulk supply to adjoining towns.

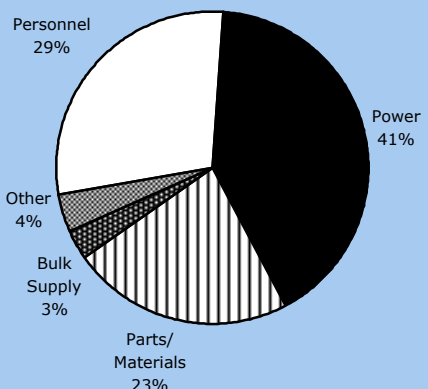
Data as of 1996-1997.



Annual Water Use
425,431,225 m^3



Annual Water Billings
US$2,278,882



Annual O&M Costs
US$11,961,873

INDIA *Utility Profile*

Water Utility

CHENNAI METROPOLITAN WATER SUPPLY AND SEWERAGE BOARD

Address : No.1 Pumping Station Road, Chintadripet, Chennai - 600 002, India
Telephone : (91-44) 852 5717, 852 4458
Fax : (91-44) 831 243
Head : Tmt. Santha Sheela Nair, IAS, Chairperson & Managing Director

The Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) is a corporate body constituted in 1978. The Board is responsible for water supply and sewerage of Chennai (formerly Madras) with its population of 4,470,000 people and also to industries outside the city limits. The private sector is involved in the maintenance of sewage pumping stations and water extraction from boreholes. Staff salaries, tariffs, appointment of top management, and budget for development are under government control. The urban poor is supplied with water through standposts and mobile water tankers. The CMWSS has a well developed management information system. It is following its 1996-2001 Development Plan. Billing and accounting systems are computerized. A glossy covered annual report for 1995-1996 is available.

Mission Statement

"To exclusively attend to the growing needs of and for planned development and appropriate regulation of water supply and sewerage services in the Chennai Metropolitan Area with particular reference to the protection of public health and for all matters connected therewith or incidental thereto."

General Data About Water Utility

Connections	: 240,523	
Staff	: 6,226	
Annual O&M Costs	: Rs811,762,000	: US$22,690,762
Annual Collections	: Rs894,285,000	: US$24,997,484
Annual Billings	: Rs936,773,000	: US$26,185,129
Annual Capital Expenditure	: Rs610,924,000	: US$17,076,853
(Average over last 5 years)	Expenditure Per Connection	: US$71.00/connection
Source of Investment Funds	: 21.3% internally generated reserves; 66.9% government loan; 10.9% commercial loan; 0.9% national government grant	

Tariff Structure

(Effective March 1994)

METERED (Rate per Cubic Meter)			UNMETERED	
Category/Consumption	RS/m^3	US$/$m^3$	Rs/month	US$/month
Class I: Domestic				
Residential - Minimum/month	10/month	0.28/month	30	0.84
0 - 30 m^3	Free	Free		
30 - 50 m^3	1.00	0.028		
Over 50 m^3	2.00	0.056		
Non - Residential	10.00	0.280	250	6.99
Minimum/month	200/month	5.59/month		
Class II: Commercial	10.00	0.280	125	3.49
Minimum/month	100/month	2.80/month		
Class III: Industrial	25.00	0.699	200	5.59
Minimum/month	200/month	5.59/month		
Class IV: Government Offices/Hospitals	10.00	0.280	100	2.80
Minimum/month	100/month	2.80/month		
Class IV A: Bulk Supply	20.00	0.559	--	--
Minimum/month	200/month	5.59/month		

Notes:
1 House connections are not metered while less than 3% of all other connections are metered. Metered consumers are billed monthly while consumers paying flat rates are billed quarterly. Bills are paid at banks, the utility office or to bill collectors.
2 There were 53,641 new connections in 1995. Price of new connection is Rs1,450 (US$40.53) for single and two-storey buildings and Rs1,900 (US$53.11) for other buildings, payable in advance.
3 All water charges are subject to 20% sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) To strengthen and develop the utility into a service-oriented commercial organization.
2) To achieve supply of 105 lpcd of water and to ensure effective sewage collection and disposal and reuse of wastewater.

II. Consumers' Opinion
1) Improve water quality.
2) Ensure regular or 24-hour supply.

Consumer Survey Findings

Average estimated monthly water consumption is about 9.62 m^3 per family. The average monthly water bill is Rs104.22 (US$2.91) compared to the monthly power bill of Rs673.96 (US$18.84). Availability of water supply averages 9.8 hours per day. Perception of water quality ranges from satisfactory (48%) to good (44%) yet 91% either boil or filter their drinking water. It takes an average of 2.5 days for leak repairs to be made. Overall rating of the utility is good (57%) to fair (40%).

Major Changes in the Water Utility (1991-1996)

The number of connections in Chennai increased by 29%. The percentage of surface water out of the total production increased from 75% to 83%. Service coverage increased to 97% from 48% although water availability remained almost the same at 4 hours/day. Unit production cost increased by 96% but operating ratio improved from 1.89 to 0.94. Accounts receivable went down from 9.5 to 5.8 months. Staff/1,000 connections also improved from 38.7 to 25.7 although the ratio is still high. From total reliance on government loans and grants in 1991, the utility is now using internally generated reserves and commercial loans for about one-third of its capital investment requirements.

City Profile CHENNAI

CHENNAI WATER SUPPLY

Population: 4,470,000 (1995)

Production/Distribution

Average Daily Production [1]	334,830 m^3/d
Groundwater	17%
Surface Water	83%
Treatment Type	Conventional/Slow Sand Filter
Treatment Capacity	284,000 m^3/d
Storage	6,970 m^3
Service Area	171 sq km

Service Connections

House (15 persons/HC)	202,527
Public Tap (150 persons/PT)	7,879
Industrial	866
Commercial	24,964
Institutional	864
Other [2]	3,423
Total	***240,523***

Service Indicators

Service Coverage	97%
Water Availability [3]	4 hours/day
Per Capita Consumption [4]	---
Average Tariff	US$0.247/$m^3$
Drinking Water [5]	Boiled

Efficiency Indicators

Unaccounted Water [6]	20%
Non-Revenue Water	20%
Unit Production Cost	US$0.186/$m^3$
Operating Ratio	0.94
Accounts Receivable	5.8 months
Staff/1,000 Connections	25.9

Notes:

[1] Only 4.4% of production is metered.

[2] Other refers to bulk supply connections to residential areas and domestic, non-residential connections such as hotels, lodges, cinema theaters and marriage halls.

[3] About 61,800 consumer complaints were registered in 1995-1996.

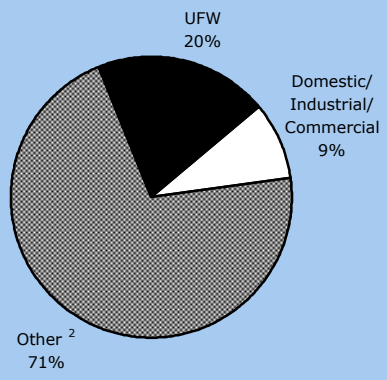
[4] No data given because house connections are not metered.

[5] For the period 1995-1996, 309 water samples out of 3,738 tested failed the bacteriological tests.

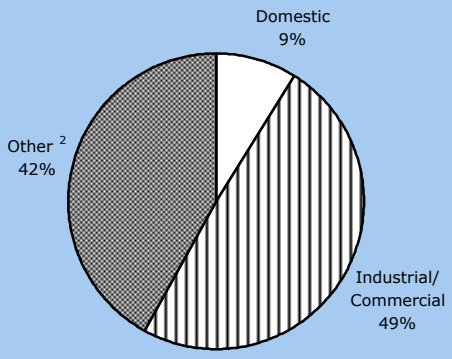
[6] Estimate given by the utility; about 4,752 leaks were repaired and 11 meters replaced or repaired in 1995-1996.

[7] Other costs include depreciation, interests, bad debts and office expenses.

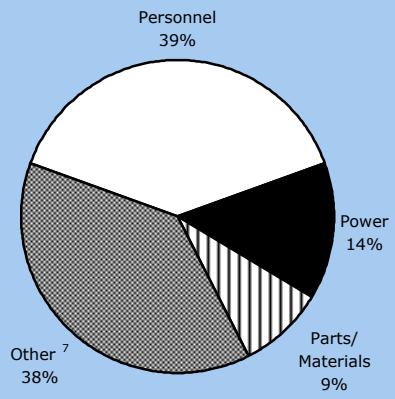
Data as of 1995-1996.



Annual Water Use
122,212,950 m^3



Annual Water Billings
US$24,146,136



Annual O&M Costs
US$22,690,790

INDIA *Utility Profile*

Water Utility

DELHI WATER SUPPLY AND SEWAGE DISPOSAL UNDERTAKING

Address : Varunalaya, Phase II, Jhandewalan, New Delhi-110005, India
Telephone : (91-11) 753 5944
Fax : (91-11) 753 5939
Head : Rakesh Mohan, Additional Commissioner

The Delhi Water Supply and Sewage Disposal Undertaking (DWSSDU) is part of the Delhi Municipal Corporation established under DMC Act of 1957. It is responsible for production and distribution of potable water and arranging treatment and disposal of wastewater for the city's population of 10,840,000 people. The DWSSDU buys raw water from the Uttar Pradesh Irrigation Board and the Bhakra Beas Management Board. It provides water in bulk to the N.D.M.C. and the Cantonment Board for distribution in their respective areas. The government maintains control of the number of staff and their salaries, tariffs, appointment of top management and budget for development. The DWSSDU has a partly developed management information system. Its billing system is computerized. Development direction is guided by its 1992-1997 Development Plan. A type-script annual report for government for 1995 is available. Water for the urban poor is supplied through public standposts, tubewells or deep borehole handpumps or by tankers, all free of charge.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 1,169,495	
Staff	: 25,057	
Annual O&M Costs	: Rs2,074,800,000	: US$75,605,870
Annual Collections	: Rs 887,800,000	: US$24,816,212
Annual Billings	: Rs 846,200,000	: US$23,653,389
Annual Capital Expenditure	: Rs1,256,500,000	: US$35,122,292
(Average over last 5 years)	Expenditure Per Connection	: US$30.03/connection
Source of Investment Funds	: 97.0% government loan; 0.6% commercial loan	
	2.4% national government grant	

Tariff Structure

(Since 1991)

METERED USE	**Consumption**	**Applicable Rates**	
Category	(m^3)	(Rs/m^3)	($US\$/m^3$)
Domestic	0 - 20 m^3	0.35	0.010
	Above 20 m^3	0.70	0.020
Commercial and Institutions	0 - 50 m^3	3.00	0.084
	Above 50 m^3	5.00	0.140
Industrial	0 - 50 m^3	5.00	0.140
	51 - 100 m^3	6.50	0.182
	Above 100 m^3	8.00	0.224
UNMETERED USE	**Ferrule Size (inch)**	**Applicable Rates**	
Domestic	¼" - Up to 3 taps	15.00	0.42
	Per extra tap	5.00	0.14
	3/8"-Up to 3 taps	30.00	0.84
	Per extra tap	7.00	0.20
	½" - Up to 3 taps	60.00	1.68
	Per extra tap	10.00	0.28
Non-Domestic	Double the above rates for Domestic		

Notes:

1 Most consumers pay either on metered use or flat rate since not all connections are metered. Consumers are billed quarterly except bulk consumers who are billed monthly being fully metered. Bill payments are made at banks or at the utility office.
2 Tariffs allows subsidy to domestic users by the commercial and industrial users. Consumption management and conservation is sought to be ensured through a slab system of pricing within categories of users.
3 There were 31,608 new connections in 1995. Price of new connection is Rs525 (US$14.68) payable in advance.
4 Sewerage surcharge for is included in the water bill.

Priority Need of Utility

I. As seen by Management
1) Additional sources of raw water and check leakage.
2) Revision of tariff.

II. Consumers' Opinion
1) Increase water supply and longer supply hours.
2) Increase water pressure.

Consumer Survey Findings

In Delhi, the average estimated monthly water consumption is 52.08 m^3 per family. Monthly water bill is Rs63.02 (US$1.76) compared to the monthly power bill of Rs487.60 (US$13.63). Only 16% claimed to have 24-hour water supply with water availability averaging 4.9 hours/day. Perception on water quality is good (47%) to satisfactory (44%). About 62% or those surveyed claim to drink water direct from the tap. About 36% said water pressure is low and 29% experienced water interruption in the month preceding the survey. It takes an average of 2.2 days for repairs to be made. Overall rating of the utility is fair (68%) to good (22%).

Major Changes in the Water Utility (1991-1996)

Average daily production for Delhi Water Supply increased by 15%, treatment capacity by 35% and treated water storage by 123%. Service coverage went up from 69% in 1992 to 86% although water availability decreased by half. Unit production cost increased by 118% while the tariff rates remained the same. Operating ratio increased from 0.81 to 1.48. UFW was reduced from the estimated 30% in 1992 to 26%. For the utility, the total number of connections increased by 24% and staff increased by 11% bringing an improvement in staff/1,000 connections ratio from 23.9 to 21.4.

City Profile DELHI

DELHI WATER SUPPLY

Population: 10,840,000 (1996) [1]

Production/Distribution

Average Daily Production	2,610,000 m^3/d
Groundwater	11%
Surface Water	89%
Treatment Type	Conventional/Slow Sand Filter
Treatment Capacity	2,590,000 m^3/d
Storage	1,260,000 m^3
Service Area [2]	1,397 sq km

Service Connections

House (6.5 persons/HC)	1,096,916
Public Tap (350 persons/PT) [3]	Nil
Industrial	15,000
Commercial)	57,579
Institutional)	
Other [3]	Nil
Total	***1,169,495***

Service Indicators

Service Coverage [4]	86%
Water Availability [5]	3.5 hours/day
Per Capita Consumption	209 l/c/d
Average Tariff	US$0.034/$m^3$
Drinking Water [6]	Tap

Efficiency Indicators

Unaccounted Water [7]	26%
Non-Revenue Water	44%
Unit Production Cost	US$0.037/$m^3$
Operating Ratio	1.48
Accounts Receivable	4.5 months
Staff/1,000 Connections	21.4

Notes:

[1] Includes floating population of about 500,000.

[2] Total area of responsibility is 1,484 sq km.

[3] There are about 11,000 public taps that are not metered and not billed and about 7,500 known unauthorized connections.

[4] This is for those served by the piped system only. About 11% are served by tubewells and 1% by tankers operated by the utility.

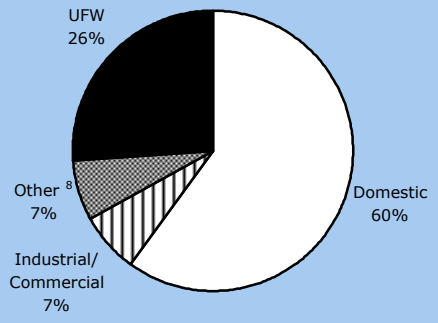
[5] Only 30% of consumers get 24-hour water supply. About 15,165 consumer complaints were registered during the year.

[6] About 474 water samples out of 49,263 failed the bacteriological tests in 1995-1996.

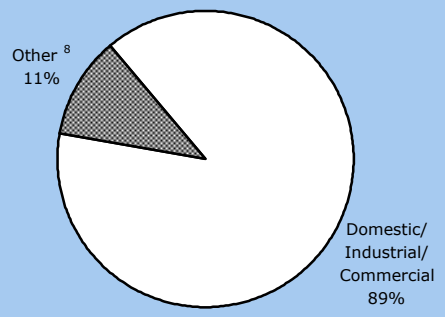
[7] In 1995-1996, about 3,537 leaks were repaired and 10,100 meters replaced or repaired.

[8] Other water use and billing represent bulk supply to the New Delhi Municipal Corporation (NDMC) and the Cantonment Board.

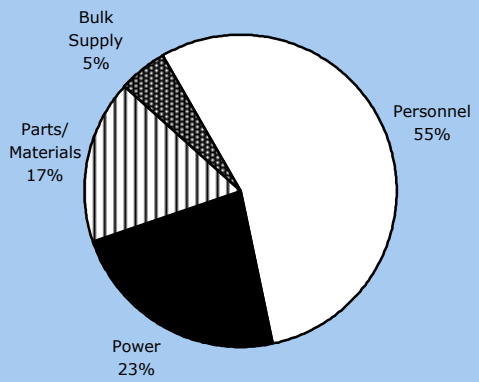
Data as of 1995-1996.



Annual Water Use
952,650,000 m^3



Annual Water Billings
US$23,649,476



Annual O&M Costs
US$34,993,711

INDIA *Utility Profile*

Water Utility

BRIHANMUMBAI MUNICIPAL COPORATION (Hydraulic Engineer's Department)

Address : Municipal Corporation Offices, Ground Floor, Annex Building, Mahapalika Marg, Mumbai-400 001, India
Telephone : (91-22) 262 0025
Fax : (91-22) 262 6437
Head : Mr. S.N. Turkar, Hydraulic Engineer

The Hydraulic Engineer's Department is a local utility under the Brihanmumbai Municipal Corporation (BMC) founded in 1888. It is responsible for water supply and sewerage of Mumbai's (formerly Bombay) 10,350,000 people. The BMC buys raw water from the Irrigation Department of the Government of Maharashtra. The government maintains control of appointments to top management. The utility provides connections to slum dwellers but they have to take metered connections. An intermediate format annual report for 1996-1997 is available from BMC. The utility has a partly developed management information system. Its billing system is computerized. BMC is currently following the 1981-2001 Development Plan.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 271,530	
Staff	: 9,041	
Annual O&M Costs [1]	: Rs1,843,000,000	: US$51,516,422
Annual Collections [2]	: Rs2,436,200,000	: US$68,097,834
Annual Billings [2]	: Rs2,683,200,000	: US$75,002,096
Annual Capital Expenditure	: Rs 776,420,000	: US$21,423,340
(Average over last 5 years)	Expenditure Per Connection	: US$78.90/connection
Source of Investment Funds	: 40% internally generated reserves; 60% government loan	

[1] Includes interests and depreciation
[2] Includes arrears from previous years.

Tariff Structure

(Effective April 1996)

WATER CHARGES	Applicable Rate	
Category	(Rs/m^3)	(US$/$m^3$)
1. Residences, dormitories, educational institutions, places of worship	0.60	0.017
2. Religious/social halls, hospitals/nursing homes & sports facilities	6.00	0.168
3. Industrial establishments, government utilities and premises	11.00	0.307
4. Shopping centers, factories, works, mills, restaurants and lodging houses	18.00	0.503
5. Aerated water, ice and ice cream factories, cinema/film labs and ships	22.00	0.615
6.Race course facilities and hotels	35.00	0.978

MINIMUM CHARGES
(All the above rates are subject to following quarterly minimum charges.)

Size of Meter	DOMESTIC		NON-DOMESTIC	
(mm)	(Rs)	(US$)	(Rs)	(US$)
15	30	0.84	200	5.59
20	60	1.68	350	9.78
25	100	2.80	600	16.77
40	100	2.80	600	16.77
50	100	2.80	600	16.77
80 and above	270	7.55	1,800	50.31

Notes:
1 Consumers with meters pay on metered use and are billed quarterly. However, about 70% of meters are not functioning and consumers pay on flat rate. Those with bills exceeding RS3,000 (US$83.86) per quarter are billed monthly. Others pay per property tax and are billed every 6 months. Bills are paid at the utility offices at wards.
2 There were 2,918 new connections in 1995. Price of new house connection ranges from Rs275 (US$7.69) to Rs610 (US$17.05) for 15 mm to 25mm connections payable in advance.
3 Additional charges for sewerage at 50% of water charges are levied on consumers connected to the utility.

Priority Need of Utility

I. As seen by Management
1) Reduction in unaccounted-for-water.
2) Equitable distribution of available supply.

II. Consumers' Opinion
1) Increase water pressure.
2) Increase supply hours/24-hours supply.

Consumer Survey Findings

Average estimated monthly consumption is about 19.45 m^3 per family. The monthly water bill averages Rs50.83 (US$1.42) compared the power bill of Rs368.95 (US$10.31). The average number of hours of water availability is 5.5 hours. About 38% perceive water quality to be good while 47% said satisfactory. More than half of the respondents drink water direct from the tap. About 17% experienced water supply interruption in the month preceding the survey. Repairs for reported leaks take an average of 4-5 days. Overall rating of the utility ranges from good (43%) to fair (43%).

Major Changes in the Water Utility (1991-1996)

The number of service connections increased by 92% but water availability still remains low at 5 hours/day. Average tariff increased by 6% while unit production cost went up by 85%. Operating ratio increased from 0.66 to 1.08. Accounts receivable deteriorated to 19.7 months from 2.5 months. Staff/1,000 connections improved from 61.0 to 33.3 although this is still very high. UFW was reduced from 24% to 18%. Capital investments are now funded with more government loans (46% to 60%) and less own contribution.

City Profile MUMBAI

MUMBAI WATER SUPPLY

Population: 10,350,000 (1996)

Production/Distribution

Average Daily Production	2,601,506 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	2,451,000 m^3/d
Storage	1,191,000 m^3
Service Area	438 sq km

Service Connections

House (43.5 persons/HC)	237,624
Public Tap	Nil
Industrial	4,741
Commercial	29,165
Institutional [1]	--
Other	Nil
Total	***271,530***

Service Indicators

Service Coverage	100%
Water Availability [2]	5 hours/day
Per Capita Consumption	178 l/c/d
Average Tariff	US$0.058/$m^3$
Drinking Water [3]	Tap

Efficiency Indicators

Unaccounted Water [4]	18%
Non-Revenue Water [5]	NA
Unit Production Cost	US$0.052/$m^3$
Operating Ratio	1.08
Accounts Receivable	19.7 months
Staff/1,000 Connections	33.3

Notes:

[1] Included under house connections.

[2] None of the consumers get 24-hour water supply. About 67,500 consumer complaints were registered during the year.

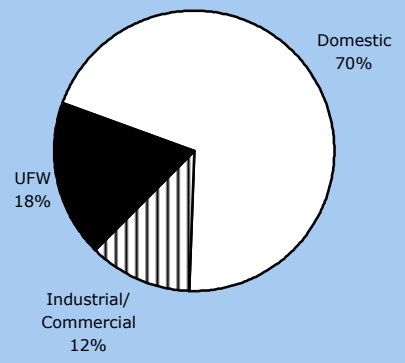
[3] In 1995, only 3 out of 64,245 samples tested were found positive for e-coli presence.

[4] In a one-year period, 2,763 leaks were repaired. About 70% of meters are not functioning.

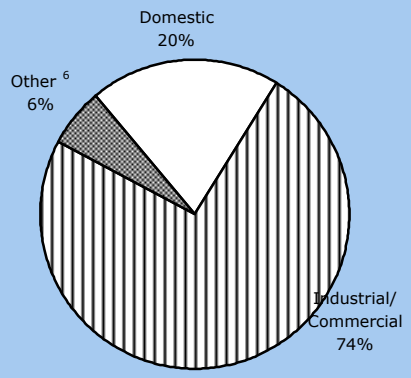
[5] No estimate was given.

[6] Other billing is from water consumers outside the BMC limits.

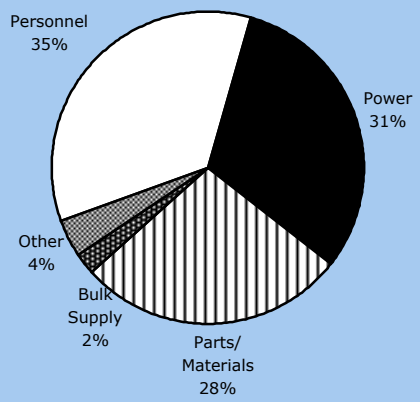
Data as of 1995-1996.



Annual Water Use
949,549,690 m^3



Annual Water Billings
US$45,615,038



Annual O&M Costs
US$49,170,650

INDONESIA *Utility Profile*

Water Utility

PDAM KODYA DATI II BANDUNG

Address : Jalan Badaksinga 10, Bandung 40132, Indonesia
Telephone : (62-22) 250 9030, 250 6581
Fax : (62-22) 250 8063
Head : Ir. Ibrahim Suriamihardja, President Director

PDAM Kodya Dati II Bandung is a government enterprise set up in 1974 and is responsible for the water supply and sewerage systems of Bandung, a city with a population of 2,250,000 people. The utility buys raw water from the Department of Irrigation of West Java Province. The private sector is involved in meter reading and leak repair. The government exercises control on salaries and appointment of staff, tariffs, appointment of top management, and budgets for O&M and development. PDAM Kodya Bandung provides public bathing, washing and toilet facilities for the urban poor. The utility has a partly developed management information system. Billing, accounting and part of the treatment system are computerized. It has a development plan covering the period 1995-2000. A type-script annual report for government for 1995 is available.

Mission Statement

"To reduce UFW to 25% in the year 2000; to increase production capacity to cover up to 80% of the population in the year 2000; to improve human resources capability; and, to improve financial performance to provide it with the capability to support regional autonomy."

General Data About Water Utility

Connections	: 132,087	
Staff	: 1,022	
Annual O&M Costs	: Rp34,991,420,576	: US$14,115,135
Annual Collections	: Rp40,010,460,104	: US$16,139,758
Annual Billings	: Rp36,600,505,230	: US$14,764,222
Annual Capital Expenditure	: Rp24,200,000,000	: US$ 9,762,001
(Average over last 5 years)	Expenditure Per Connection	: US$73.91/connection
Source of Investment Funds	: 82.5% internally generated reserves; 7.9% government loan; 9.6% consumer contribution	

Tariff Structure

(Effective April 1994)

Customer Group		Consumption (m^3)/Rate							
		0 - 15 m^3		16 - 30 m^3		31 - 50 m^3		Over 50 m^3	
		(Rp/m^3)	(US$/$m^3$)	(Rp/m^3)	(US$/$m^3$)	(Rp/m^3)	(US$/$m^3$)	(Rp/m^3)	(US$/$m^3$)
Social:	PT/Religious Institutions	300	0.121	300	0.121	300	0.121	300	0.121
	Orphanage/ Hospitals	300	0.121	400	0.161	500	0.202	600	0.242
Residential:	Small Class Household	300	0.121	500	0.202	600	0.242	800	0.323
	Middle Class Household	500	0.202	700	0.282	1,000	0.403	2,000	0.807
	High Class Household	600	0.242	800	0.323	1,200	0.484	1,400	0.565
	Government/Military	500	0.202	800	0.323	1,300	0.524	1,500	0.605
Commercial:	Small Business/Trade	800	0.323	1,200	0.484	1,500	0.605	2,000	0.807
	Large Business/Trade	1,000	0.403	1,400	0.565	1,900	0.766	2,400	0.968
Industrial:	Small Industry	800	0.323	1,200	0.484	1,500	0.605	2,000	0.807
	Large Industry	800	0.323	1,200	0.484	1,500	0.605	2,000	0.807
Minimum Consumption: 10 m^3/month for all except Large Industry and Large Business/Trade with minimum of 30 m^3/month.									

Notes:
1 All connections are metered. Consumers pay on metered use and are billed monthly. Bills are paid at the utility office.
2 There were 4,342 new connections in 1995. Price of new connection payable in advance is as follows: Public tap - Rp156,500 to Rp192,500 (US$63.13 to US$77.65), House connection - Rp192,500 to Rp385,000 (US$77.65 to US$155.30), Institutional - Rp341,250 (US$137.66), Commercial - Rp355,750 to Rp530,000 (US$143.51 to US$213.80) and Industrial - Rp402,000 to Rp675,000 (US$162.16 to US$272.29).
3 The water bill has a 30% sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Reduction in unaccounted-for-water to 25% by year 2000.
2) Increase production to cover 80% of population by year 2000.

II. Consumers' Opinion
1) Increase water quantity and pressure.
2) Improve service.

Consumer Survey Findings

The average monthly water consumption is 21.66 m^3 per family. Monthly water bill is Rp20,400 (US$8.23) compared to the average monthly power bill of Rp31,270 (US$12.61). About 70% of the respondents said they have 24-hour water supply. Consumer perception of water quality is satisfactory (49%) to good (36%). About 97% of consumers boil their drinking water. Some (43%) respondents think that water pressure is low. About 22% experienced service interruption during the month preceding the survey. It takes the utility about 5 days to repair leaks reported to them. Overall rating is fair (46%) to good (32%).

Major Changes in the Water Utility (1991-1995)

The number of connections increased by 62% while number of staff went up by only 4%. Staff /1,000 connections ratio improved from 1.20 to 7.7. Water production shifted to use of more surface water with 94% of total production now coming from this source from 74% in 1992. Average tariff increased by 68% while unit production cost went up by 273%. Operating ratio improved from 1.09 to 0.96. Service coverage increased slightly from 39% to 42%. Accounts receivable decreased from 2.7 to 1.0 month. Internally generated reserves and consumer contribution now account for 92% of total capital investments from 43% with government loans decreasing to 7.9% from 57% in 1992.

City Profile BANDUNG

BANDUNG WATER SUPPLY

Population: 2,250,000 (1995)

Production/Distribution

Average Daily Production	191,767 m^3/d
Groundwater	6%
Surface Water	94%
Treatment Type	Conventional
Treatment Capacity	239,328 m^3/d
Storage	35,000 m^3
Service Area [1]	100 sq km

Service Connections

House (6 persons/HC)	117,750
Public Tap (100 persons/PT)	2,330
Industrial	558
Commercial	9,841
Institutional	1,489
Other [2]	119
Total	***132,087***

Service Indicators

Service Coverage [3]	42%
Water Availability [4]	6 hours/day
Per Capita Consumption	120 l/c/d
Average Tariff	US$0.369/$m^3$
Drinking Water [5]	Boiled

Efficiency Indicators

Unaccounted Water [6]	43%
Non-Revenue Water	51%
Unit Production Cost	US$0.202/$m^3$
Operating Ratio	0.96
Accounts Receivable	1.0 month
Staff/1,000 Connections	7.7

Notes:

[1] Total area of responsibility in the city is 167 sq km.

[2] Other connections are orphanages, hospitals, and places of worship.

[3] Remaining 58% of the population not served by the utility rely mostly on tubewells and dug wells.

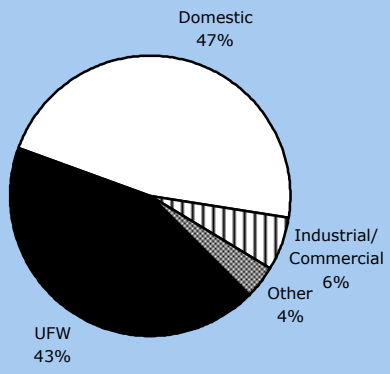
[4] Only about 25% of consumers get 24-hour supply; about 11,360 consumer complaints were registered in 1995.

[5] For 1995, 126 water samples out of 1,108 failed the bacteriological tests.

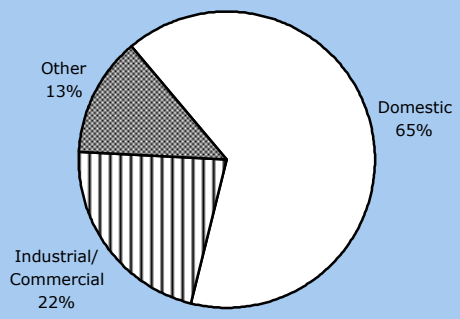
[6] About 1,516 leaks were repaired and 6,829 meters were replaced or repaired in 1995.

[7] Other costs refer to maintenance, general administration and loan interests.

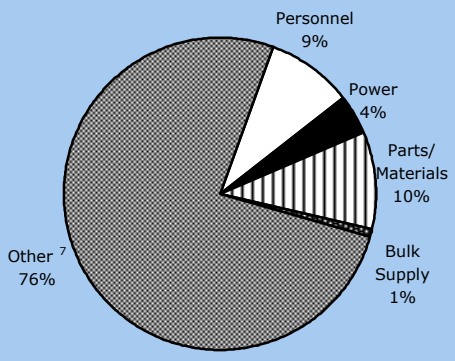
Data as of 1995.



Annual Water Use
69,994,955 m^3



Annual Water Billings
US$14,764,222



Annual O&M Costs
US$14,115,135

INDONESIA *Utility Profile*

Water Utility

PDAM DKI JAKARTA (PAM JAYA)

Address : Jalan Penjernihan II, Pejompongan, Jakarta, Indonesia
Telephone : (62-21) 570 4250
Fax : (62-21) 571 1796
Head : Ir. H. Rama Boedi, President Director

The PDAM DKI Jakarta (Pam Jaya), a government corporation set up in 1977, is responsible for the water supply and sewerage of Jakarta, a city of 9,116,000 people. Pam Jaya buys treated water from PDAM Bogor and PDAM Tangerang. The private sector is involved in billing and collection. The government maintains control over staff salaries, tariffs, appointment of top management, and budgets for O&M and development. Pam Jaya provides water to slum areas through public taps.

The utility has a partly developed management information system. Its billing, accounting, pumping and treatment systems are computerized. Development is guided by its current development plan covering 1997-2005. A glossy covered annual report for 1995 is available.

Mission Statement

"Provide drinking water for all people in Jakarta."

General Data About Water Utility

Connections	: 362,424	
Staff	: 2,133	
Annual O&M Costs	: Rp246,270,129,000	: US$ 99,342,529
Annual Collections	: Rp267,003,396,000	: US$107,706,090
Annual Billings	: Rp247,339,817,000	: US$ 99,774,029
Annual Capital Expenditure	: Rp161,980,000,000	: US$ 65,340,863
(Average over last 5 years)	Expenditure Per Connection	: US$180.19/connection
Source of Investment Funds	: 76.7% government loan; 15.5% internally generated reserves; 7.8% national government grant	

Tariff Structure

(Effective July 1994)

Customer Group		Consumption (m^3)/Rate					
		0 - 30 m^3		31 - 50 m^3		Over 50 m^3	
		(Rp/m^3)	(US$/$m^3$)	(Rp/m^3)	(US$/$m^3$)	(Rp/m^3)	(US$/$m^3$)
Social:	Orphanage/Dormitory	390	0.157	390	0.157	390	0.157
	Government Hospital	625	0.252	625	0.252	930	0.375
Non-Commercial:	Household	390	0.157	775	0.313	875	0.353
	High Class Household	1,175	0.474	1,550	0.625	1,845	0.744
	Embassy/Consulate	1,550	0.625	1,950	0.787	2,340	0.944
	Government Institution	1,175	0.474	1,175	0.474	1,950	0.787
Commercial:	Small shops	1,350	0.544	1,350	0.544	1,900	0.766
	Restaurants/Offices	1,550	0.625	1,550	0.625	2,200	0.887
	Large Hotels/Buildings	3,100	1.251	3,100	1.251	3,100	1.251
Industrial:	Small Industry	1,175	0.474	2,325	0.938	2,500	1.008
	Large Industry	3,275	1.321	3,275	1.321	3,275	1.321
Special (Per m^3 rate): Public Tap - Rp780 (US$0.315)/$m^3$; Water Trucks - Rp930 (US$0.375)/$m^3$; Water Barge - Rp2,950 (US$ 1.190)/m^3; Ships - Rp5,050 (US$ 2.037)/m^3							

Notes:
1 All connections are metered. Consumers pay on metered use and they are billed monthly except military offices and residences which are billed quarterly. Bills are paid at banks, post offices or at the utility office.
2 There were 21,500 new connections in 1995. Customers pay a guarantee fee of Rp25,000 (US$10.08) for households, Rp40,000 (US$16.14) for small commercial and Rp200,000 (US$80.68) for large commercial users upon connection. They also pay a monthly meter maintenance cost ranging from Rp1,000 (US$0.40) for ½" meter to Rp110,000 (US$44.37) for 16" meter.
3 The water bill does not include any sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Decrease unaccounted-for-water.
2) Increase total production capacity.

II. Consumers' Opinion
1) Improved and stable supply of water.
2) Proper maintenance and timely billing.

Consumer Survey Findings

The average monthly water consumption is 55.2 m^3 per family. Monthly water bill is Rp45,500 (US$18.35) compared to the average monthly power bill of Rp44,560 (US$17.97). About 70% of those surveyed said that they have 24-hour water supply. Perception of water quality is good (51%) to fair (39%). About 83% boil their drinking water. Only 16% experienced service interruption in the month preceding the survey. It takes the utility an average of 2.5 days to repair leaks reported to them. Overall rating of the utility is good (69%) to fair (25%).

Major Changes in the Water Utility (1991-1995)

While the number of connections increased by 29%, number of staff went down by 25%. The staff/1,000 connections improved from 10.2 to 5.9. Average tariff increased by 105% but unit production went up 418%, and operating ratio increased from 0.42 to 0.98. Coverage improved from 25% to 38%. Average daily production increased by 10% and treatment capacity also increased by 50%. UFW decreased from 57% to 53%. Accounts receivable also improved from 1.5 to 1.0 month.

City Profile JAKARTA

JAKARTA WATER SUPPLY

Population: 9,116,000 (1995)

Production/Distribution

Average Daily Production	972,086 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	1,315,872 m^3/d
Storage	170,042 m^3
Service Area [1]	212 sq km

Service Connections

House (6 persons/HC)	312,168
Public Tap (300 persons/PT)	2,023
Industrial	945
Commercial	42,784
Institutional	2,129
Other [2]	2,375
Total	***362,424***

Service Indicators

Service Coverage [3]	27%
Water Availability [4]	18 hours/day
Per Capita Consumption	135 l/c/d
Average Tariff	US$0.611/$m^3$
Drinking Water [5]	Boiled

Efficiency Indicators

Unaccounted Water [6]	53%
Non-Revenue Water	53%
Unit Production Cost	US$0.280/$m^3$
Operating Ratio	0.98
Accounts Receivable	1.0 month
Staff/1,000 Connections	5.9

Notes:

[1] The total area of responsibility is 407 sq km.

[2] Other connections serve places of worship, orphanages, hospitals, etc.

[3] Estimate given by utility is 38%; other sources of water for the rest of the city population are tubewells, dug wells and rain collectors.

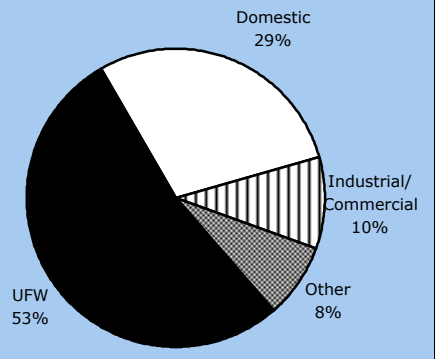
[4] Only 25% of consumers get 24-hour supply; about 17,480 complaints were registered in 1995.

[5] Out of 720 water samples, 210 failed the bacteriological tests.

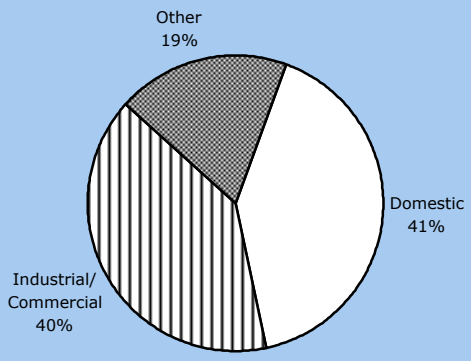
[6] In 1995, 14,347 leaks were repaired and about 18,000 meters replaced or repaired.

[7] Other cost includes maintenance, new connection, depreciation and administration costs.

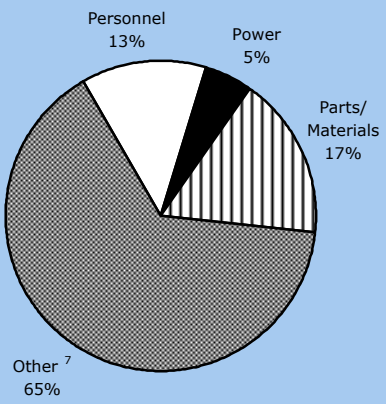
Data as of 1995.



Annual Water Use
354,811,390 m^3



Annual Water Billings
US$100,933,240



Annual O&M Costs [7]
US$99,342,529

INDONESIA *Utility Profile*

Water Utility

PDAM TIRTANADI MEDAN

Address : Jln. Sisingamangaraja No.1, Medan 20212, Indonesia
Telephone : (62-61) 571 666
Fax : (62-61) 572 771
Head : Ir. Kumala Siregar, Managing Director

The PDAM Tirtanadi Medan, a government enterprise established in 1979, manages the water supply of Medan and nearby towns and cities with a population of 1,963,700 people. The private sector is involved in billing and collection. The government maintains control over the utility on tariffs, appointment of top management, and budgets for O&M and development. The urban poor are provided with public taps or house connections with connection fees payable in installment. The utility has a well developed management information system. Billing, accounting, data monitoring and water treatment plants are computerized. It has a type-script annual report for government for 1995.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 188,202	
Staff	: 923	
Annual O&M Costs	: Rp55,596,280,000	: US$22,426,898
Annual Collections	: Rp55,138,700,000	: US$22,242,315
Annual Billings	: Rp55,254,800,000	: US$22,298,149
Annual Capital Expenditure (Average over last 5 years)	: Rp29,797,665,000	: US$12,020,034
	Expenditure Per Connection	: US$63.87/connection
Source of Investment Funds	: 61% government loan; 24% internally generated reserves; 15% national government grant	

Tariff Structure

(Effective November 1994)

Customer Group		Consumption (m^3)/Rate							
		0 - 15 m^3		16 - 30 m^3		31 - 50 m^3		Over 50 m^3	
		(Rp/m^3)	(US$/$m^3$))	(Rp/m^3)	(US$/$m^3$))	(Rp/m^3)	(US$/$m^3$	(Rp/m^3)	(US$/$m^3$))
Social:	PT/Orphanage	240	0.097	240	0.097	240	0.097	240	0.097
	Dormitory/ Hospitals	240	0.097	250	0.101	280	0.113	350	0.141
Residential:	Small Class Household	240	0.097	480	0.194	710	0.286	1,190	0.480
	Middle Class Household	240	0.097	530	0.214	810	0.327	1,260	0.508
	High Class Household	270	0.109	550	0.222	930	0.375	1,430	0.577
	Embassy/Consulate	530	0.214	700	0.282	1,120	0.452	1,960	0.791
	Government/Military	350	0.141	700	0.282	1,120	0.452	1,960	0.791
Commercial:	Small Business/Trade	1,050	0.424	1,400	0.565	1,400	0.565	2,240	0.904
	Large Business/Trade	1,260	0.508	1,260	0.508	1,400	0.565	2,240	0.904
Industrial:	Small Industry	1,260	0.508	1,260	0.508	2,100	0.847	2,680	1.081
	Large Industry	1,260	0.508	1,260	0.508	2,100	0,847	2,800	1.129
Ports: (Air, Sea, River)		4,200	1.694	4,200	1.694	4,200	1.694	4,760	1.920

Notes:
1 All connections are metered. Consumers pay on metered use except PDAM offices and former owners of spring sources who get free water, and some public taps on flat rate. Consumers are billed monthly and pay at banks and to bill collectors
2 There were 21,300 new connections in 1995. Price of new connection is Rp200,000 (US$80.68) which may be paid in advance or by installment depending on paying capacity .
3 The water bill has a 6.76% sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) To reduce non-revenue water.
2) To develop personnel capability.

II. Consumers' Opinion
1) More water and increase pressure.
2) Improve service.

Consumer Survey Findings

Average monthly water consumption is 45.14 m^3 per family. Monthly water bill is Rp36,800 (US$14.84) compared to the average monthly power bill of Rp47,850 (US$19.30). All respondents said they have 24-hour service. Perception of water quality is good (66%) to satisfactory (34%). However, 97% boil their drinking water. None of the respondents experienced water interruption during the month preceding the survey. It takes the utility about one day to repair leaks reported to them. Overall consumer rating of the utility is good (55%) to fair (42%).

Major Changes in the Water Utility (1991-1995)

Average daily production and treatment capacity both increased by 36% and 100%, respectively. Number of connections went up by 64% while the staff increased by only 7%. Staff/1,000 connections ratio decreased from 6.9 to 4.9. Average tariff increased by 66% and unit production cost also increased by 116%. Operating ratio went up slightly from 1.02 to 1.2. Service coverage improved from 39% to 63%. UFW was reduced from 34% to 27%. There is more government funding for capital investments now at 76% of the total investments where there was none in 1991.

City Profile MEDAN

MEDAN WATER SUPPLY

Population: 1,963,702 (1995)

Production/Distribution

Average Daily Production	264,400 m^3/d
Groundwater	22%
Surface Water	78%
Treatment Type	Rapid Sand Filter
Treatment Capacity	311,000 m^3/d
Storage	79,200 m^3
Service Area [1]	166 sq km

Service Connections

House (6.64 persons/HC)	168,741
Public Tap (60 persons/PT)	1,854
Industrial	280
Commercial	14,474
Institutional	58
Other [2]	2,795
Total	***188,202***

Service Indicators

Service Coverage [3]	63%
Water Availability [4]	24 hours/day
Per Capita Consumption	131 l/c/d
Average Tariff	US$0.266/$m^3$
Drinking Water [5]	Boiled

Efficiency Indicators

Unaccounted Water [6]	27%
Non-Revenue Water	29%
Unit Production Cost	US$0.232/$m^3$
Operating Ratio	1.2
Accounts Receivable	0.03 month
Staff/1,000 Connections	4.9

Notes:

[1] Utility's total area of responsibility is 265 sq km.

[2] Other connections include schools, mosques, churches, consulates and airports.

[3] Other sources of water are tubewells and shallow hand dug wells.

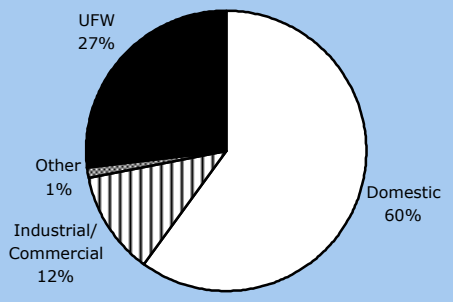
[4] About 200 consumer complaints were registered in 1995.

[5] Bacteriological tests on water samples show 72 failing the tests out of 2,400 samples tested.

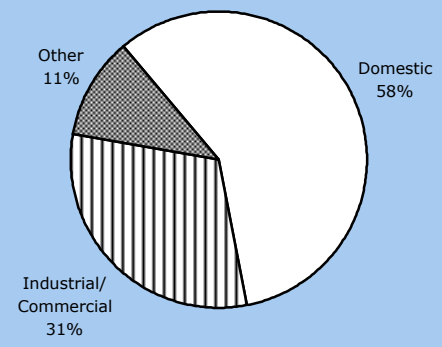
[6] In 1995, about 2,050 leaks were repaired and 9,500 meters replaced or repaired.

[7] Other costs include depreciation and loan interest.

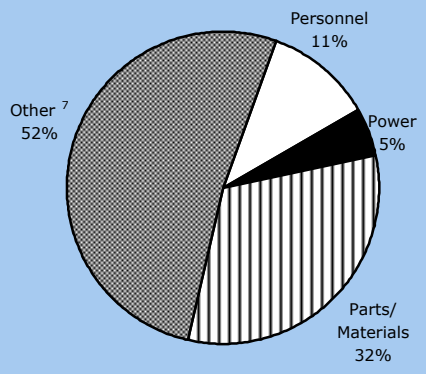
Data as of 1995.



Annual Water Use
96,506,000 m^3



Annual Water Billings
US$18,611,940



Annual O&M Costs
US$22,426,898

KAZAKSTAN *Utility Profile*

Water Utility

INDUSTRIAL ENTERPRISE ALMATY VODOCANAL

Address : Jarokova Str.#196, Almaty, Kazakstan 480057
Telephone : (7-3272) 440 017, 442 112
Fax : (7-3272) 448 402
Head : Sharipbek Shardarbekov, Director General

The Almaty Vodocanal is a government enterprise formed in 1937 under the Almaty City Government. It is responsible for water supply and sewerage for the city and surrounding small villages with a total population of 1,250,000 people. The government exercises control over the utility on staff salaries, tariffs and appointment of top management. The utility has a partly developed management information system. Its accounting and pumping systems are computerized. Development of the vodocanal is guided by its development plan for the period 1995- 2000. A type-script annual report for 1996 intended for the government is available.

Mission Statement

"Improve operation and service by leak reduction, groundwater source development, distribution construction and rehabilitation, public taps in water deficient regions, metering of consumers and expansion of sewage treatment system."

General Data About Water Utility

Connections	: 102,778	
Staff	: 1,565	
Annual O&M Costs	: T 494,820,000	: US$ 6,553,907
Annual Collections	: T 843,000,000	: US$11,165,563
Annual Billings	: T1,224,000,000	: US$16,211,921
Annual Capital Expenditure	: T 80,592,000	: US$ 1,067,444
(Average over last 5 years)	Expenditure Per Connection	: US$10.39/connection
Source of Investment Funds	: 78% internally generated reserves; 21% national government grant 1% commercial loan	

Tariff Structure

(Effective November 1996)

Category	Water Rates per Cubic Meter	
	(T/m^3)	(US$/$m^3$)
Domestic/residential	4.72	0.062
Institutional	4.76	0.063
Industrial	13.18	0.175
Commercial	13.18	0.175

Notes:
1 Most consumers pay on metered use. Some non-metered residential and institutional consumers pay on flat rate. Consumers are billed monthly, although for small private houses, billing is done yearly. Bills are paid at banks or at the water utility office.
2 There were 1,350 new connections installed in 1996. Price of new connection ranges from T5,000 (US$66.23) to T20,000 (US$264.90) depending on the size of connection and distance from the mains. Connection fees are paid in advance.
3 Sewerage charge is 57% to 92% of the water bill depending on the type of connection.

Priority Need of Utility

I. As seen by Management
1) Address non-payment of bills by some users.
2) Lower expenses for power and electricity.

II. Consumers' Opinion
1) Improve water quality.
2) Increase water pressure.

Consumer Survey Findings

Average monthly water consumption is 23.73 m^3 per family. Monthly water bill averages T112.59 (US$1.49) compared to the monthly power bill of T165.94 (US$2.20). About 61% of those surveyed said they have 24-hour water supply. Perception of water quality is good (47%) to fair (44%). While 47% drink water from the tap, about 52% boil, filter or do both to their drinking water. Only 21% complained of low water pressure with the rest finding it adequate or high. About 28% experienced service interruption during the month preceding the survey. Leak repairs take a little more than a day to be completed after being reported to the utility. Overall rating of the utility is fair (45%) to good (43%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile ALMATY

ALMATY WATER SUPPLY

Population: 1,250,000 (1995)

Production / Distribution

Average Daily Production	900,000 m^3/d
Groundwater	70%
Surface Water	30%
Treatment Type	Chlorination/Slow Sand Filter
Treatment Capacity	900,000 m^3/d
Storage	128,600 m^3
Service Area	188 sq km

Service Connections

House (6 persons/HC)	83,000
Public Tap (150 persons/PT)	2,318
Industrial	1,100
Commercial	2,300
Institutional	2,060
Other [1]	12,000
Total	***102,778***

Service Indicators

Service Coverage [2]	99%
Water Availability [3]	24 hours/day
Per Capita Consumption [4]	186 l/c/d
Average Tariff	US$0.056/$m^3$
Drinking Water [5]	Tap

Efficiency Indicators

Unaccounted Water [6]	13%
Non-Revenue Water	32%
Unit Production Cost	US$0.018/$m^3$
Operating Ratio	0.37
Accounts Receivable	5.4 months
Staff/1,000 Connections	13.9

Notes:

[1] Other connections are bulk connections to residential areas.

[2] Estimate given by utility.

[3] During the year, 21 consumer complaints were attended to.

[4] Based on house and public tap consumptions.

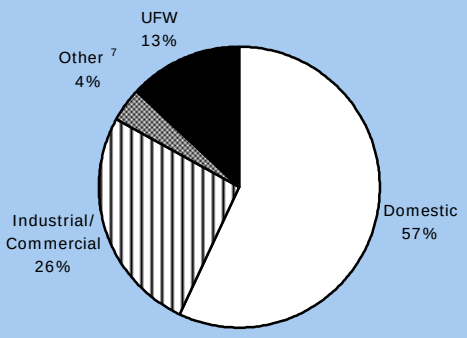
[5] Results of bacteriological tests on 300 water samples taken in 1995 are not known.

[6] Because of limited metering it is likely that the estimated water consumption figures are much higher than actual. There were 1,301 leaks repaired in 1996; 350 meters were replaced or repaired.

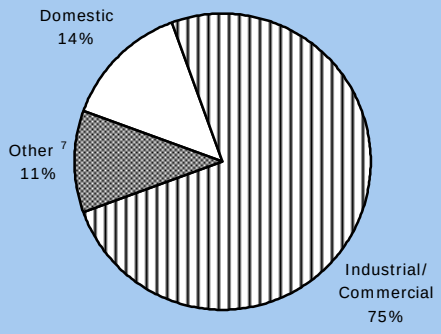
[7] Other refers to consumption and billing from institutional and bulk connections to residential areas.

[8] Other costs are loan amortization, taxes and social benefits of employees.

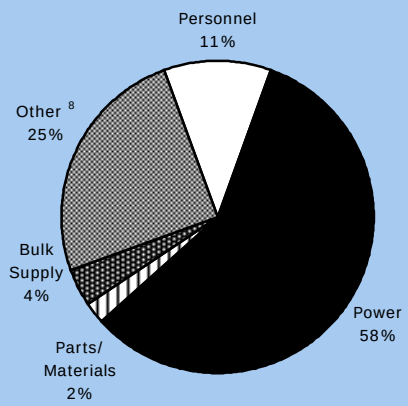
Data as of 1996.



Annual Water Use
328,500,000 m^3



Annual Water Billings
US$16,211,921



Annual O&M Costs
US$6,031,775

KOREA, REPUBLIC OF *Utility Profile*

Water Utility

SEOUL METROPOLITAN GOVERNMENT (Office of Waterworks)

Address : 27-1 Hap-Dong, Seodaemun-Ku, Seoul, Republic of Korea
Telephone : (82-2) 390 7332
Fax : (82-2) 362 3653
Head : Jang-Ho Son, Assistant Mayor

The Office of Waterworks is part of the Seoul Metropolitan Government established in 1908 and is responsible for water supply in the city of Seoul with a population of 10,595,943 people. The utility buys raw water from KOWACO but sells water to neighboring Kwacheon and Hanam cities. Meter reading in apartments and residential areas is contracted to a private company. The government exercises control over the utility on number, appointment and salaries of staff, tariffs, appointment of top management, and budgets for O&M and development. Development is guided by the utility's development plan for the period 1996-2011. Billing, accounting, pumping and treatment systems are computerized. A type-script annual report for government for 1995 is available.

Mission Statement

"Supply of safe, clean and plentiful water to the citizen."

General Data About Water Utility

Connections	: 1,873,186	
Staff	: 4,332	
Annual O&M Costs	: W248,523,303,000	: US$280,500,342
Annual Collections	: W287,575,461,000	: US$324,577,270
Annual Billings	: W296,753,000,000	: US$334,935,666
Annual Capital Expenditure	: W256,451,667,000	: US$289,448,834
(Average over last 5 years)	Expenditure Per Connection	: US$154.52/connection
Source of Investment Funds	: 75.1% internally generated reserves; 14.4% government loan 10.5% commercial loan	

Tariff Structure

(Effective January 1996)

	Residential		Commercial 1st Class		Commercial 2nd Class		Public Bath 1st Class		Public Bath 2nd Class		Institutional	
Base Volume (m^3)	10		20		30		500		200		20	
Base Rate												
(Won/month)	1,200		3,740		12,400		96,190		115,170		3,400	
(US$/month)	1.35		4.22		14.00		108.57		129.99		3.84	
Excess Use (m^3)	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$
11 - 20	180	0.203										
21 - 30	220	0.248	400	0.451							300	0.339
31 - 40	460	0.519	400	0.451	520	0.587					300	0.339
41 - 50	540	0.609	400	0.451	520	0.587					300	0.339
51 - 100	770	0.869	480	0.542	630	0.711					360	0.406
101 - 200	:	:	510	0.576	760	0.858					400	0.451
201 - 300	:	:	510	0.576	890	1.005			960	1.084	400	0.451
301 - 500	:	:	580	0.655	980	1.106			960	1.084	450	0.508
501 - 1,000	:	:	:	:	:	:	230	0.260	1,070	1.208	:	:
1,001 - 2,000	:	:	:	:	:	:	260	0.293	1,170	1.321	:	:
2,001 - 3,000	:	:	:	:	:	:	320	0.361	1,210	1.366	:	:
Over 3,001	770	0.869	580	0.655	980	1.106	350	0.395	1,240	1.400	450	0.508

Notes:
1 All consumers pay on metered use. Consumers are billed monthly except residential users who are billed every 2 months. Bills are paid at banks and post offices.
2 Tariff setting aims for total cost recovery.
3 There were 23,396 new connections in 1995. Price of new connection is W1,751,723 (US$1,977.11) payable in advance.
4 Water bill includes a 38.3 % sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Reduction of leakage.
2) Protection of water sources.

II. Consumers' Opinion
1) Improve water quality.
2) Replace pipes and repair leaks.

Consumer Survey Findings

The average monthly water consumption is 32.4 m^3 per family. Monthly water bill averages W7,260.80 (US$8.20) compared to the monthly power bill of W23,775.18 (US$26.83). Almost all (99%) have 24-hour water supply. Perception of water quality is satisfactory (56%) to poor (29%) so most residents (81%) boil their drinking water. Only 8% experienced any water supply interruption during the month preceding the survey. It takes about 2-3 days before leaks can be repaired after these have been reported to the utility. Overall consumer rating of the utility is fair (74%) to good (10%).

Major Changes in the Water Utility (1991-1995)

The number of service connections increased by 17% while the number of staff increased by 18%. Average tariff went up by 37% while unit production cost increased by 33%. Operating ratio improved from 1.20 to 0.84. Accounts receivable increased from 0.3 to 1.5 months. Treatment capacity increased by 10% and storage also went up by 19%. Capital investments now are funded from a mix of internally generated reserves, government and commercial loans.

SEOUL WATER SUPPLY

Population: 10,595,943 (1995)

Production/Distribution

Average Daily Production	4,959,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	6,190,000 m^3/d
Storage	1,120,000 m^3
Service Area	606 sq km

Service Connections

House (6.5 persons/HC)	1,628,956
Public Tap	Nil
Industrial	23
Commercial	210,292
Institutional	5,838
Other	Nil
Total	***1,845,109***

Service Indicators

Service Coverage	100%
Water Availability [1]	24 hours/day
Per Capita Consumption	209 l/c/d
Average Tariff	US$0.281/$m^3$
Drinking Water [2]	Boiled

Efficiency Indicators

Unaccounted Water [3]	34%
Non-Revenue Water	35%
Unit Production Cost	US$0.155/$m^3$
Operating Ratio	0.84
Accounts Receivable	1.5 months
Staff/1,000 Connections	2.3

Notes:

[1] About 63,800 consumer complaints were attended to in 1993.

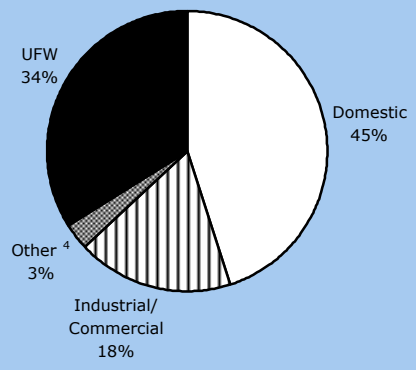
[2] While none of the 4,808 water samples failed the bacteriological tests, consumers still boil their water for drinking.

[3] Leaks in 34,057 sites were repaired and 74,771 meters were replaced or repaired in 1995.

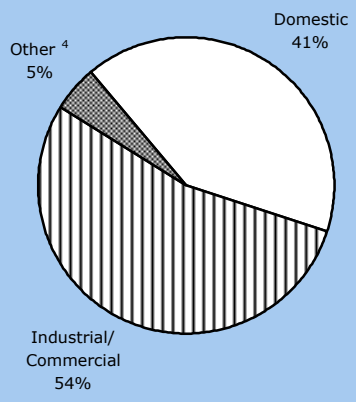
[4] This represents water sold to Kwacheon and Hanam and institutional use.

[5] Other costs include depreciation.

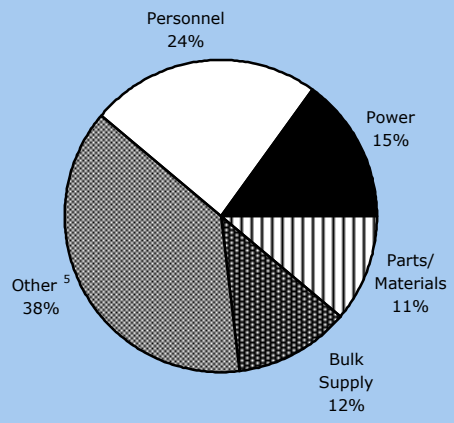
Data as of 1995.



Annual Water Use
1,810,035,000 m^3



Annual Water Billings
US$334,935,666



Annual O&M Costs
US$280,500,342

KOREA, REPUBLIC OF *Utility Profile*

Water Utility

ULSAN CITY WATER AND SEWERAGE BOARD

Address : 646-4 Shin-Jung 1 Dong, Nam Ku, Ulsan City, Kyung-Nam, Republic of Korea
Telephone : (82-522) 743 020
Fax : (82-522) 746 928
Head : Ho Kun Song, Director

The Ulsan City Water and Sewerage Board is a government department formed in 1979. It is responsible for the water supply and sewerage of Ulsan, a city of 990,626 people. The administrative district adjustment in 1994 added the rural areas and 9 small water supply systems under the Board's jurisdiction. The utility buys raw water from the Korean Water Resource Development Company, a private company half-owned by the government. The government exercises control on staff salaries. The utility's billing system is computerized. It has a current development plan for the period 1994-1999. A type-script 1995 annual report for government is available.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 268,177	
Staff	: 204	
Annual O&M Costs	: W17,885,000,000	: US$20,186,230
Annual Collections	: W24,738,000,000	: US$27,920,993
Annual Billings	: W25,023,000,000	: US$28,242,664
Annual Capital Expenditure	: W45,326,000,000	: US$51,158,014
(Average over last 5 years)	Expenditure Per Connection	: US$190.76/connection
Source of Investment Funds	: 58% internally generated reserves; 35% government loan 7% national government grant	

Tariff Structure

	Residential		Commercial 1st Class		Commercial 2nd Class		Public Bath 1st Class		Public Bath 2nd Class		Institutional	
Base Volume (m^3)	10		20		30		200		200		30	
Base Rate												
(Won/month)	1,860		8,200		16,600		91,500		138,000		10,500	
(US$/month)	2.10		9.25		18.74		103.27		155.76		11.85	
Excess Rate (m^3)	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$	W/m^3	US$/$m^3$
11 - 20	290	0.327										
21 - 30	290	0.327	480	0.542								
31 - 50	380	0.429	480	0.542	630	0.711					560	0.632
51 - 100	490	0.553	560	0.632	740	0.835					:	:
101 - 200	:	:	630	0.711	780	0.880					:	:
201 - 300	:	:	630	0.711	:	:	500	0.564	1,550	1.749	:	:
301 - 500	:	:	660	0.745	:	:	600	0.677	1,750	1.975	:	:
Over 501	490	0.553	660	0.745	780	0.880	760	0.858	1,850	2.088	560	0.632

Notes:
1 All consumers pay on metered use. Consumers are billed monthly and they can pay at banks or post offices.
2 Tariffs set aim to balance the water utility's budget.
3 There were 55,336 new connections in 1996. Price of new connection averages W800,000 (US$902.93) payable in advance.
4 The water consumption bill includes a sewerage surcharge of about 20.8%.

Priority Need of Utility

I. As seen by Management
1) Price of water should at least cover production cost.
2) Water quality improvement.

II. Consumers' Opinion
1) Improve water quality.
2) Leak repair and replace old distribution lines.

Consumer Survey Findings

The average monthly water consumption is 25.9 m^3 per family. Monthly water bill averages W13,980 (US$15.78) compared to the average monthly power bill of W39,630 (US$44.73). About 93% of those interviewed said they have 24-hour water supply. While 32% perceive water quality to be satisfactory, a large number (65%) think it is poor. Most consumers (81%) boil their drinking water while the rest filter their water. About 29% said they experienced water interruption in the month preceding the survey. Leak repairs take less than 6 days to be made after reporting them to the utility. Overall consumer rating of the utility is good (46%) to fair (39%).

Major Changes in the Water Utility (1991-1996)

The average daily production increased by 42% and treatment capacity went up by 81%. There is a shift to the use of more groundwater from only 1% in 1991 to 10% of the total production. The number of connections increased by more than 5-1/2 times with the additional users in the small rural systems and the shift from bulk metering of groups of residences to individual metering. Average tariff increased by 19% while unit production cost went up by 56%. Operating ratio increased from 0.53 to 0.71. There were improvements in accounts receivable (1.0 to 0.5 months) and staff/1,000 connections (5.5 to 0.8). UFW went up from 30% to 33%. As a percentage of capital investment, government grants decreased from 30% to 7%, but government loans now comprise 35% of total funding.

ULSAN WATER SUPPLY

Population: 990,626 (1996)

Production/Distribution

Average Daily Production	290,000 m^3/d
Groundwater	10%
Surface Water	90%
Treatment Type	Conventional
Treatment Capacity	408,000 m^3/d
Storage	58,500 m^3
Service Area [1]	110 sq km

Service Connections

House (3.32 persons/HC)	249,623
Public Tap	Nil
Industrial	Nil
Commercial	17,719
Institutional	835
Other	Nil
Total	***268,177***

Service Indicators

Service Coverage [2]	84%
Water Availability [3]	24 hours/day
Per Capita Consumption	157 l/c/d
Average Tariff	US$0.396/$m^3$
Drinking Water [4]	Boiled

Efficiency Indicators

Unaccounted Water [5]	33%
Non-Revenue Water	33%
Unit Production Cost	US$0.191/$m^3$
Operating Ratio	0.71
Accounts Receivable	0.5 months
Staff/1,000 Connections	0.8

Notes:

[1] The area of responsibility increased to 1,052 sq km with the inclusion of rural areas in 1994.

[2] Other sources of water are ponds, streams and tubewells.

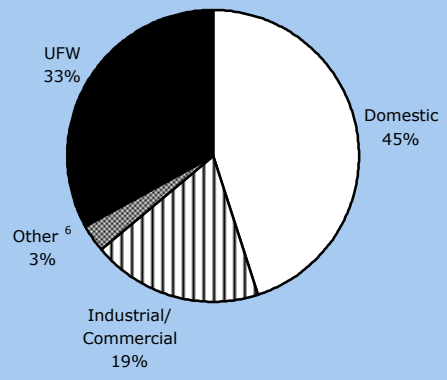
[3] About 1,825 consumer complaints were attended to in 1995.

[4] None of the 52 water samples taken in 1996 failed the bacteriological tests; people boil water for drinking as a matter of practice.

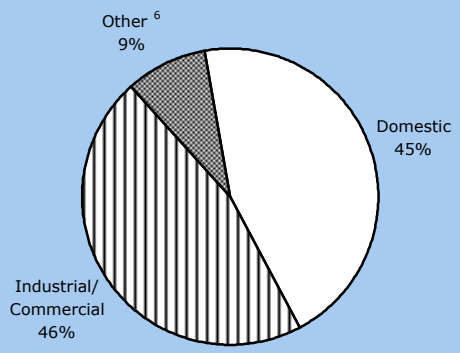
[5] In 1996, about 1,566 leaks were repaired and 5,254 meters were replaced or repaired.

[6] Other use and billing are for public baths and institutional connections.

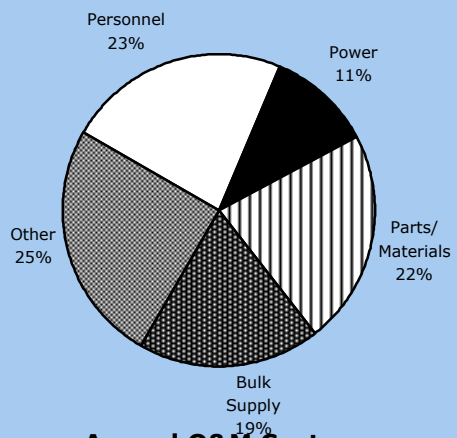
Data as of 1996.



Annual Water Use
105,850,000 m^3



Annual Water Billings
US$28,242,664



Annual O&M Costs
US$20,186,230

KYRGYZ REPUBLIC *Utility Profile*

Water Utility

INDUSTRIAL ENTERPRISE BISHKEK VODOCANAL

Address : Microrayon #10, Building #35, Bishkek, Kyrgyzstan 720023
Telephone : (7-3312) 421 655, 420 746
Fax : (7-3312) 424 419, 422 851
Head : Asylbek Isaev, Director

The Bishkek Vodocanal is a government enterprise formed in 1931 under the Bishkek City Government. It is responsible for water supply and sewerage for the city which has a population of 605,000 people. The government exercises control over the utility on tariff setting and appointment of top management. The vodocanal provides public taps for the urban poor with help from the city government through its Department of Construction, and people pay the equivalent of US$1.00/person/year. The utility has a well developed management information system. Its billing, accounting, pumping and planning systems are computerized. Development direction is provided by its development plan for the period 1997-2001. The utility has a type-script annual report for government for 1996.

Mission Statement

"Improve operations and service through leak repair, rational water use by meter installation, source and distribution rehabilitation, and maintenance."

General Data About Water Utility

Connections	: 63,079	
Staff	: 435	
Annual O&M Costs	: Som68,395,000	: US$3,946,055
Annual Collections	: Som75,087,640	: US$4,332,188
Annual Billings	: Som77,083,000	: US$4,447,310
Annual Capital Expenditure	: Som 2,596,440	: US$ 149,802
(Average over last 5 years)	Expenditure Per Connection	: US$2.37/connection
Source of Investment Funds	: 72% internally generated reserves; 28% national government grant	

Tariff Structure

(Effective August 1996)

Category	Water Rates per Cubic Meter	
	(Som/m^3)	(US$/$m^3$)
Population	0.48	0.028
Enterprises	1.50	0.087

Notes:

1 Most consumers pay on flat rate based on established per capita consumption per user category. Only industrial connections are fully metered with almost no metering in the other categories. Consumers are billed monthly while small private houses are billed yearly.
2 Bills are paid at banks, post offices, water utility office or to bill collectors. Industrial and commercial users are allowed to pay bills on a barter basis using products like pipes, fuel, power and even consumer goods.
3 There were only 52 new connections in 1996. Price of new connection is approximately Som2,000 (US$115.39) payable immediately before or after installation.
4 Sewerage charge is 46% to 67% of the water bill depending on the category of user.

Priority Need of Utility

I. As seen by Management
1) Improve bill collection efficiency.
2) Water quality improvement.

II. Consumers' Opinion
1) Increase water supply and pressure.
2) More hot water supply and water for irrigation.

Consumer Survey Findings

The average estimated monthly water consumption is 11.92 m^3 per family. Monthly water bill averages Som12.04 (US$0.69) compared to a family's power bill of Som32.80 (US$1.89). Of those surveyed, about 69% said they have 24-hour water supply. Perception of water quality among users is good (68%) to satisfactory (28%). About 78% drink water from the tap, while the rest boil their drinking water. Some 36% of consumers complained of low water pressure from their tap. Service interruptions were experienced by 37% of the consumers. It takes a little more than a day for the utility to repair reported leaks in pipes. Overall rating of Bishkek Vodocanal by its consumers range from fair (60%) to good (24%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile BISHKEK

BISHKEK WATER SUPPLY

Population: 605,000 (1996) [1]

Production/Distribution

Average Daily Production	400,000 m^3/d
Groundwater	100%
Surface Water	Nil
Treatment Type	Chlorination
Treatment Capacity	506,800 m^3/d
Storage	161,000 m^3
Service Area	167 sq km

Service Connections

House (7 persons/HC)	55,757
Public Tap (42 persons/PT)	1,759
Industrial	89
Commercial	1,462
Institutional	748
Other [2]	3,264
Total	***63,079***

Service Indicators

Service Coverage [3]	98%
Water Availability [4]	24 hours/day
Per Capita Consumption	112 l/c/d
Average Tariff	US$0.053/$m^3$
Drinking Water [5]	Tap

Efficiency Indicators

Unaccounted Water [6]	42%
Non-Revenue Water	47%
Unit Production Cost	US$0.027/$m^3$
Operating Ratio	0.89
Accounts Receivable	7.7 months
Staff/1,000 Connections	6.9

Notes:

[1] Unofficial but more realistic count is 1,000,000.

[2] Other connections are bulk supply to residential areas each serving about 90 persons.

[3] Estimate given by utility.

[4] In 1996, about 6,474 consumer complaints were registered.

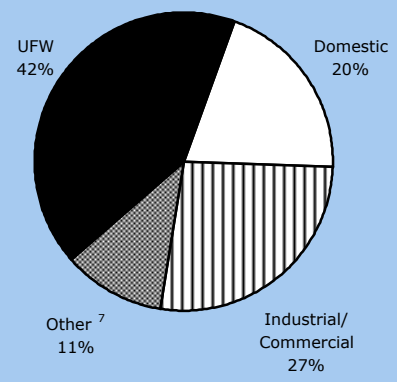
[5] Of 16,622 water samples tested, 143 failed the bacteriological tests in 1996.

[6] There were 673 leaks repaired during the year, 128 meters replaced or repaired.

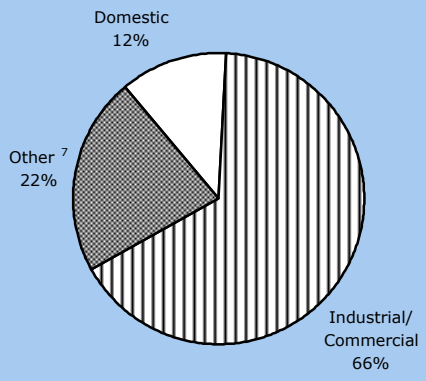
[7] Other use and billing are for institutional connections. Domestic use and billing include those from bulk supply to residential areas.

[8] Other costs include loan amortization, social needs, emergency fund, construction and house connection services.

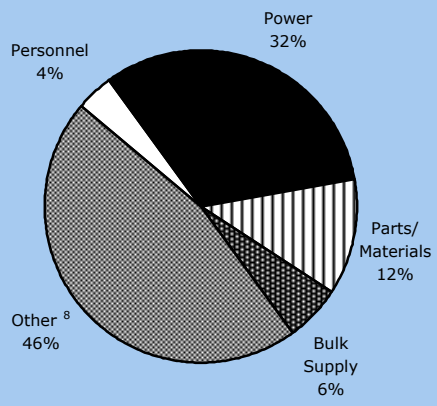
Data as of 1996.



Annual Water Use
146,000,000 m^3



Annual Water Billings
US$4,447,303



Annual O&M Costs
US$3,946,055

LAO PEOPLE'S DEMOCRATIC REPUBLIC *Utility Profile*

Water Utility

NAM PAPA LAO (Lao Water Supply Authority)

Address : Phone Kheng Road, Thatluang Neua Village, Sat Settha District, Vientiane, Lao PDR
Telephone : (856-21) 412 880
Fax : (856-21) 414 378
Head : Dr. Somphone Dethoudon, General Manager

The Nam Papa Lao (NPL), a national government enterprise established in 1962, is responsible for the water supply of the entire country. It is also responsible for the four inner cities in Vientiane Municipality with a population of 266,960 people. The government exercises control on staff salaries, tariffs, appointment of top management, and budgets for O&M and development. NPL provides standpipes for 2-4 households each in poor communities with lower water tariffs. The utility has a partly developed management information system. Only the billing system is computerized. It has a current development plan covering the period 1992-1997. A type-script annual report for government for 1995 is available.

Mission Statement

"NAM PAPA LAO's basic political responsibility is to produce clean water according to hygiene principles and supply this clean water to administrative and institutional buildings, factories and communities from 5,000 people and up according to their needs."

General Data About Water Utility

Connections	: 37,914	
Staff	: 609	
Annual O&M Costs	: KN2,430,119,206	: US$2,377,807
Annual Collections	: KN2,359,192,890	: US$2,308,408
Annual Billings	: KN2,623,152,251	: US$2,566,685
Annual Capital Expenditure	: KN2,184,395,494	: US$2,137,373
(Average over last 5 years)	Expenditure Per Connection	: US$56.37/connection
Source of Investment Funds	: 68.7% internally generated reserves; 19.9% water connection guarantee fee 9.9% commercial loan; 1.5% national government grant	

Tariff Structure

(Effective July 1996)

Monthly Consumption (m^3)	Tariff Rate (KN/m^3)	Tariff Rate (US$/$m^3$)	Monthly Consumption (m^3)	Tariff Rate (KN/m^3)	Tariff Rate (US$/$m^3$)
Domestic			**Industries/Enterprises**		
0 - 5 m^3 (Minimum)	500/month	0.49/month	0 - 15 m^3 (Minimum)	2400/month	2.35/month
6 - 10 m^3	120	0.117	16 - 50 m^3	175	0.171
11 - 30 m^3	150	0.147	51 - 100 m^3	185	0.181
Over 30 m^3	175	0.171	Over 100 m^3	195	0.191
Government Offices/			**Hotels/Restaurants**		
0 - 10 m^3 (Minimum)	1200/month	1.17/month	0 - 50 m^3 (Minimum)	8750/month	8.56/month
11 - 30 m^3	145	0.142	51 - 100 m^3	250	0.245
31 - 100 m^3	170	0.166	Over 100 m^3	280	0.274
Over 100 m^3	190	0.186	**Diplomatic Personnel/ Foreigners**		
			0 - 10 m^3 (Minimum)	--	4.00/month
			Over 10 m^3	--	0.50

Notes:
1 All consumers pay on metered use except users of public taps which are free. Consumers are billed monthly and pay at banks, the utility office or to bill collectors.
2 Tariff setting objectives are to recover costs and to have enough profit for extension and expansion.
3 There were 1,815 new connections in 1995. Price of new connection is KN89,643 (US$87.71) payable in advance.
4 The water bill does not have any sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Investment funds for nationwide expansion and skills upgrading for technicians/staff.
2) Modern production equipment for utilities.

II. Consumers' Opinion
1) Tariff policy (i.e., lower price).
2) Improve piped water distribution system.

Consumer Survey Findings

The average monthly water consumption is 47.07 m^3 per family. The monthly water bill is KN7,319 (US$7.16) compared to the monthly power bill of KN12,746 (US$12.47). About 87% of those surveyed said they have 24-hour water supply. Consumer perception of water quality is satisfactory (59%) to good (28%). However, only 15% drink water from the tap. About 33% complain of low water pressure. About 27% experienced interruption in service during the month preceding the survey. Leak repairs take less than 4 days to be made after reporting to the utility. Overall consumer rating of the utility is fair (54%) to good (39%).

Major Changes in the Water Utility (1991-1995)

For Vientiane, average daily production increased by 21%, treatment capacity by 67%. The number of service connection also went up by 24% with service coverage going up to 54% from 33%. Average tariff went up by 96% while unit production cost increased by 104%. Accounts receivable improved from 10 to 3.3 months. For NPL, staff/1,000 connections improved from 20.0 to 16.1. Capital investments by NPL are almost totally independent of government sources, with funding mostly from internally generated reserves, water connection guarantee fee and commercial loans.

City Profile VIENTIANE

VIENTIANE WATER SUPPLY

Population: 266,960 (1995)

Production/Distribution

Average Daily Production	70,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional/Slow Sand Filter
Treatment Capacity	100,000 m^3/d
Storage	9,200 m^3
Service Area [1]	59 sq km

Service Connections

House (6.5 persons/HC)	22,273
Public Tap (16.25 persons/PT)	24
Industrial	2,491
Commercial	260
Institutional	753
Other	Nil
Total	***25,801***

Service Indicators

Service Coverage [2]	54%
Water Availability	24 hours/day
Per Capita Consumption	172 l/c/d
Average Tariff	US$0.127/$m^3$
Drinking Water [3]	Boiled

Efficiency Indicators

Unaccounted Water [4]	33%
Non-Revenue Water	39%
Unit Production Cost	US$0.081/$m^3$
Operating Ratio	0.95
Accounts Receivable	3.3 month
Staff/1,000 Connections	16.1

Notes:

[1] The total area of responsibility of Nam Papa Lao is 1,982 sq km.

[2] This is based on computed data. The utility gave a coverage of 92%; those not covered use wells, rivers and rainwater.

[3] While 208 water samples were tested in 1995, no data was available on the results.

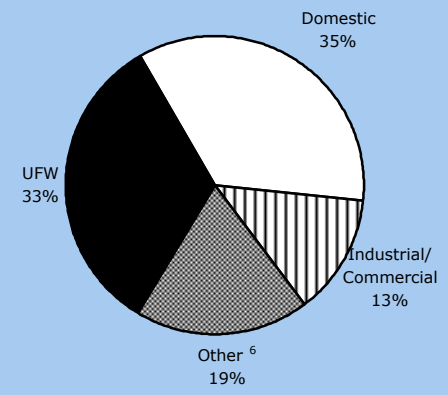
[4] Estimate given by NPL is 28%. In 1995, approximately 5,917 leaks were repaired and 1,789 meters replaced or repaired.

[5] Ratio is for entire NPL.

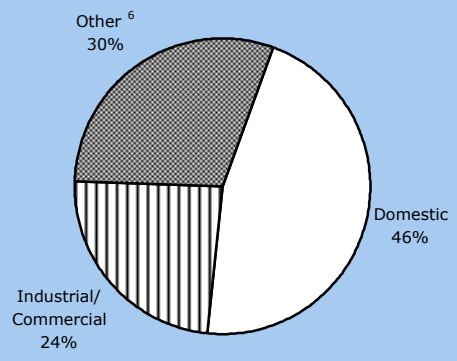
[6] Other use and billing refer to institutional connections.

[7] Other costs include depreciation and loan interests.

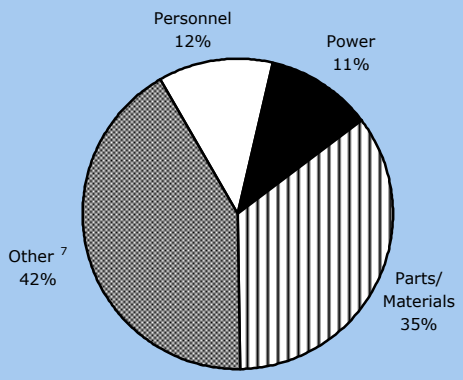
Data as of 1995.



Annual Water Use
25,550,000 m^3



Annual Water Billings
US$2,177,967



Annual O&M Costs
US$2,064,213

MALAYSIA *Utility Profile*

Water Utility

SYARIKAT AIR JOHOR SDN. BHD. (Johor Water Company)

Address : Bangunan Ibu Pejabat, SAJ, Jalan Garuda, Larkin 80350 Johor Bahru, Malaysia
Telephone : (607) 224 4040
Fax : (607) 223 4060
Head : Mohd. Hatta Bin Bakri, Managing Director

The Johor Water Company (JWC), a full-fledged corporatised government company formed in 1987, is responsible for water supply for the whole Johor State with a population of 2.4 million. It took over the responsibility from the Public Works Department. The private sector is involved in source development, water production and leak repair. Tariff setting is the only area where the government exercises control over the utility. JWC helps the urban poor by allowing them to connect with reduced water connection fees. JWC has a partly developed management information system. Its billing, accounting and treatment systems are computerized. The utility is currently following its 1995-2005 Development Plan. A type-script 1995 annual report for the government is available.

Mission Statement

"To become an efficient water utility corporation which will join the ranks of world-class utility providers."

General Data About Water Utility

Connections	: 534,650	
Staff	: 1,544	
Annual O&M Costs	: RM162,358,943	: US$64,313,307
Annual Collections	: RM204,191,519	: US$80,883,945
Annual Billings	: RM168,863,760	: US$66,889,982
Annual Capital Expenditure	: RM125,945,129	: US$49,889,138
(Average over last 5 years)	Expenditure Per Connection	: US$93.31/connection
Source of Investment Funds	: 47.3% internally generated reserves; 39.4% government loan 6.1% commercial loan; 7.2% other sources	

Tariff Structure

(Effective April 1991)

Classification	Tariff Rates (RM)	Tariff Rates (US$)
Tariff 1 - Domestic (Households)		
Minimum charge per month	3.00	1.19
0 - 15 m^3	0.30/m^3	0.119/m^3
16 - 30 m^3	0.70/m^3	0.277/m^3
31 - 45 m^3	0.95/m^3	0.376/m^3
Over 45 m^3	1.15/m^3	0.456/m^3
Tariff 2 - Industrial & Commercial (Shops, etc.)		
Minimum charge per month	10.00	3.96
0 - 20 m^3	1.20/m^3	0.330/m^3
Over 20 m^3	1.60/m^3	0.634/m^3
Tariff 3 - Government & Hospitals (Offices)	1.15/m^3	0.456/m^3
Minimum charge per month	5.00	1.98
Tariff 4 - Shipping	3.70/m^3	1.466/m^3
Tariff 5 - Plantation Estates	0.65/m^3	0.257/m^3

Notes:
1 All consumers pay on metered use. Consumers are billed monthly and pay at post offices or at the utility office.
2 Tariff setting considers social obligation, covering total operating cost and financing part of project development.
3 There were 10,723 new connections in 1995. Price of new connection is RM125 (US$49.51) payable in advance.
4 Water bill has no sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Tariff review.
2) Improving core competency.

II. Consumers' Opinion
1) Increase water pressure.
2) Reduce breakdown and improve pipe system.

Consumer Survey Findings

The average monthly water consumption in Johor Bahru is 32.3 m^3 per family. The monthly water bill averages RM18.65 (US$7.39) compared to RM39.30 (US$15.57) for the monthly power bill. All the respondents said they have 24-hour water supply. Water quality perception is good (71%) to satisfactory (28%). However, about 75% boil or filter their drinking water. About 10% claimed to have experienced service interruption in the month preceding the survey. Leak repairs take an average of less than a day to be completed after reporting to JWC. Overall rating of JWC by consumers is good (57%) to fair (43%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile JOHOR BAHRU

JOHOR BAHRU WATER SUPPLY

Population: 1,004,000 (1995)

Production/Distribution

Average Daily Production	372,880 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	478,973 m^3/d
Storage	472,900 m^3
Service Area	1,091 sq km

Service Connections

House (5.2 persons/HC)	192,856
Public Tap	Nil
Industrial	4,534
Commercial	25,698
Institutional	333
Other	Nil
Total	***223,421***

Service Indicators

Service Coverage	100%
Water Availability [1]	24 hours/day
Per Capita Consumption	193 l/c/d
Average Tariff	US$0.391/$m^3$
Drinking Water [2]	Tap

Efficiency Indicators

Unaccounted Water [3]	21%
Non-Revenue Water	21%
Unit Production Cost	US$0.186/$m^3$
Operating Ratio	0.61
Accounts Receivable	2.5 months
Staff/1,000 Connections [4]	1.2

Notes:

[1] About 14,400 consumer complaints were registered in 1995.

[2] During the year, 75 out of 7,824 water samples failed the bacteriological tests.

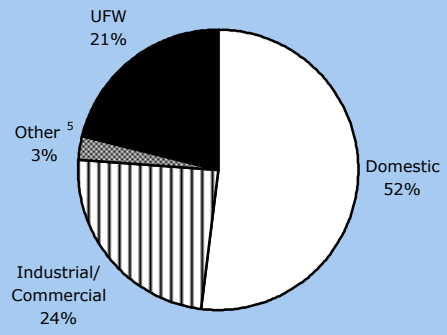
[3] In 1995, about 9,456 leaks were repaired and 2,818 meters were replaced or repaired.

[4] Ratio of the entire utility is 2.9.

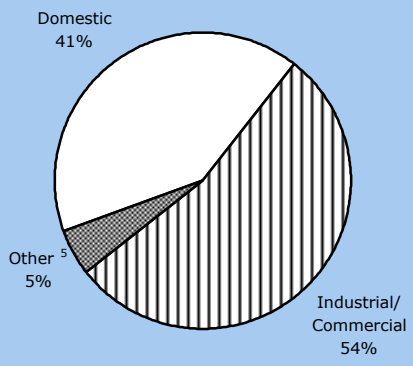
[5] Other refers to institutional use and billings.

[6] Other costs include rental, maintenance, depreciation and others.

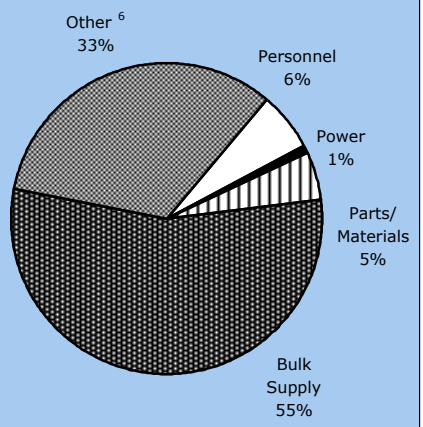
Data as of 1995.



Annual Water Use
136,101,200 m^3



Annual Water Billings
US$41,842,268



Annual O&M Costs
US$25,351,323

MALAYSIA *Utility Profile*

Water Utility

SELANGOR WATERWORKS DEPARTMENT

Address : P.O. Box 5001, Jalan Pantai Baru, 59990 Kuala Lumpur, Malaysia
Telephone : (60-3) 282 6244
Fax : (60-3) 282 7535
Head : Ir. Liew Wai Kiat, Director

The Selangor Waterworks Department (SWD), a government department established in 1972, is tasked to manage the water supply of the State of Selangor with a total population of 3.5 million including Kuala Lumpur's 1,374,700 people. The private sector is involved in source development and production. The government exercises control over the number, salaries and appointment of staff, tariffs, appointment of top management and budgets for O&M and development. The utility has a partly developed management information system. Its billing, accounting and pumping systems are computerized. SWD has a 1995-2020 development plan although a 30-year concession is planned for approval in 1997 which will privatize overall management and operation of the water supply system including capital expenditures. A glossy covered 1995 annual report is available.

Mission Statement

"To provide continuous water supply with the highest quality and at the most economic price."

General Data About Water Utility

Connections	: 932,860	
Staff	: 1,322	
Annual O&M Costs	: RM501,455,614	: US$198,635,617
Annual Collections	: RM431,632,213	: US$170,977,308
Annual Billings	: RM411,497,534	: US$163,001,598
Annual Capital Expenditure	: RM295,982,310	: US$117,243,934
(Average over last 5 years)	Expenditure Per Connection	: US$125.68/connection
Source of Investment Funds	: 56.9% internally generated reserves; 22.8% government loan 20.3% commercial loan	

Tariff Structure

(Effective 1991)

Category	Rate/Cubic Meter		Minimum Charge/Month	
Domestic	(RM/m^3)	(US$/$m^3$)	(RM)	(US$)
Residential (incl. Gov't quarters)				
0 - 15	0.42	0.166	3.00	1.19
16 - 40	0.65	0.257		
Over 41	1.05	0.416		
Condominium	0.75	0.297	100.00	39.61
Residential Flats (Government)	0.50	0.198	20.00	7.92
Industrial/Commercial	1.20	0.475	20.00	7.92
Bulk Supply (Camps, universities)	0.65	0.257	100.00	39.61
Government Offices	0.80	0.317	10.00	3.96
Religious Homes	0.33	0.131	3.00	1.19
Charitable Institutions	0.42	0.166	3.00	1.19
Ships	2.10	0.832	none	none

Notes:
1 All consumers pay on metered use. Consumers are billed every 2 months and pay at banks, post offices, the utility office or at automated teller machines.
2 Tariffs set should be able to balance revenue and operating expenditure and those for capital works.
3 There were 6,636 new connections in 1995. Price of new connection ranges from RM10 (US$3.96) to RM200 (US$79.22) payable in advance.
4 The water bill does not have sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Shortage of manpower.
2) Using latest technology in water supply operation and maintenance.

II. Consumers' Opinion
1) Water quality.
2) No interruption of supply.

Consumer Survey Findings

For Kuala Lumpur, the average monthly water consumption is 49.78 m^3 per family. Monthly water bill averages RM35.73 (US$14.15) compared to the monthly power bill of RM72.66 (US$28.78). Of those surveyed, 83% claim 24-hour water supply. Perception of water quality is satisfactory (45%) to good (39%). While some drink water from the tap, all either boil or filter their drinking water. About 53% said they had service interruption in the month preceding the survey. It takes about 3 days for leak repairs to be made after reporting them to the utility. Overall rating of the utility is fair (50) to good (43%).

Major Changes in the Water Utility (1991-1996)

Average daily production and number of service connections for Kuala Lumpur Water Supply both increased to 35% and 23%, respectively. Unit production cost went up by 385%. Operating ratio increased from 0.13 to 0.60. Accounts receivable improved from 1.0 to 0.5 months. For SWD, the total connection increased by 38% while the number of staff decreased by 21%. The utility staff/1,000 connections ratio improved from 2.5 to 1.4. Capital investments which used to be funded 84% by government grant now depend on internally generated reserves (57%) and commercial loans (20%) with still some government loans (23%).

City Profile KUALA LUMPUR

KUALA LUMPUR WATER SUPPLY

Population: 1,374,700 (1996)

Production/Distribution

Average Daily Production [1]	486,467 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity [2]	1,586,554 m^3/d
Storage	204,545 m^3
Service Area	243 sq km

Service Connections

House (5 persons/HC)	126,253
Public Tap	Nil
Industrial)	29,004
Commercial)	
Institutional	1,373
Other [3]	368
Total	***156,998***

Service Indicators

Service Coverage [4]	100%
Water Availability [5]	24 hours/day
Per Capita Consumption	200 l/c/d
Average Tariff	US$0.342/$m^3$
Drinking Water [6]	Boiled

Efficiency Indicators

Unaccounted Water [7]	36%
Non-Revenue Water	36%
Unit Production Cost	US$0.131/$m^3$
Operating Ratio	0.60
Accounts Receivable	0.5 months
Staff/1,000 Connections [8]	1.12

Notes:

[1] Actual average production for Kuala Lumpur in 1996.

[2] Treatment plants are also used to serve requirements within Selangor State but outside of Kuala Lumpur.

[3] Other connections are bulk connections to residential areas.

[4] Estimate given by utility. Residents in commercial and bulk connections difficult to determine.

[5] About 18,250 consumer complaints were registered in 1996.

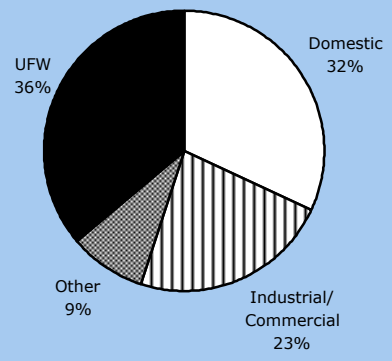
[6] In 1996, about 100 water samples out of 1,286 tested failed the bacteriological tests.

[7] During the year, 6,570 leaks were repaired, 11,330 meters were replaced or repaired.

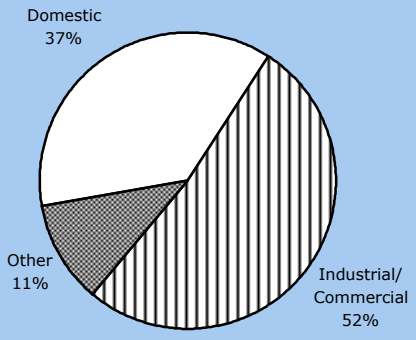
[8] Ratio for the entire utility IS 1.4.

[9] Water use and billing for bulk supply to residential areas are included under domestic. Other use and billing are for institutional connections.

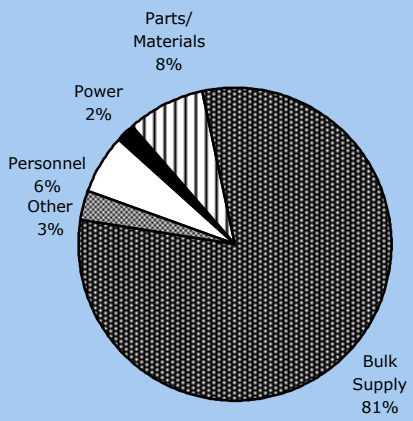
Data as of 1996.



Annual Water Use [9]
177,560,455 m^3



Annual Water Billings [9]
US$38,899,411



Annual O&M Costs
US$23,339,454

MALAYSIA *Utility Profile*

Water Utility

PIHAK BERKUASA AIR PULAU PINANG (Penang Water Authority)

Address : Level 33, KOMTAR, 10000 Penang, Malaysia
Telephone : (60-4) 261 0169
Head : Dato' Lee Yow Ching, General Manager
Fax : (60-4) 282 3581

The Penang Water Authority, a statutory body formed in 1973, is responsible for the water supply of the whole Penang State which includes Penang Island. While it is still under government control, it is autonomous in its operations acting like a corporatised company. The urban poor are given interest-free loans up to a maximum of RM1,000 (US$396.12) to install house connections. Low-cost housing projects do not have to pay towards 'water mains contribution'. The utility has a well developed management information system. Hand-held computers are used in meter reading and billing. Accounting and pumping systems are also fully computerized. PWA follows its 1996-2005 Development Plan. A glossy covered annual report for 1993 is available.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 263,258	
Staff	: 1,058	
Annual O&M Costs	: RM 57,027,990	: US$22,589,816
Annual Collections	: RM102,865,491	: US$40,746,877
Annual Billings	: RM102,914,202	: US$40,766,172
Annual Capital Expenditure	: RM 28,744,000	: US$11,386,017
(Average over last 5 years)	Expenditure Per Connection	: US$43.25/connection
Source of Investment Funds	: 63% internally generated reserves; 14% government loan 23% water mains contribution	

Tariff Structure

(Effective 1993)

Classification	Charges (RM)	Charges (US$)
Domestic Supplies		
Individual *Minimum Charge/month*	2.50	0.99
0 - 20 m^3	0.22/m^3	0.087/m^3
20 - 60 m^3	0.42/m^3	0.166/m^3
Above 60 m^3	0.70/m^3	0.277/m^3
Bulk[1] *Minimum Charge/month*	26.00	10.30
0 - 90 m^3	(Minimum)	(Minimum
Above 90 m^3	0.35/m^3	0.139/m^3
Trade *Minimum Charge/month*	10.00	3.96
Ordinary		
0 - 20 m^3	0.52/m^3	0.206/m^3
Above 20 m^3	0.70/m^3	0.277/m^3
Special (Contractors, ice manufacturers, etc.)	0.90/m^3	0.357/m^3
Shipping	1.50/m^3	0.594/m^3

Notes:

1 Bulk domestic rates apply to domestic dwellings, institutions and schools whose consumption are not considered trade consumption, that have more than 16 occupants.
2 All consumers pay on metered use. Consumers with bills less than RM200 (US$79.22)/month are billed monthly, and every two months for those with more than RM200/month . Bills are paid at banks, post offices, water utility, telephone and electricity offices, municipal councils and the Penang Development Corporation.
3 Tariffs set are intended to sell water at the lowest possible cost consistent with the need to obtain sufficient income to cover recurrent cost and sustain development.
4 There were 14,730 new connections in 1995. Price of new connection is RM150 (US$59.42) payable in advance.
5 The water bill has no sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Corporatisation/privatisation.
2) Human resources development.

II. Consumers' Opinion
1) Improve water quality.
2) Minimize interruptions of supply.

Consumer Survey Findings

The average monthly water consumption is 50.09 m^3 per family. Average monthly bill is RM 20.70 (US$8.20) compared to the monthly power bill average of RM89.65 (US$35.51). About 97% said they have 24-hour water supply. Perception of water quality is satisfactory (39%) and good (37%), although 95% of the consumers either boil or filter their drinking water. Only 8% experienced any interruption in water supply in the month preceding the survey. It takes less than 2 days for leak repairs to be made. Overall rating of the utility is fair (56%) to good (41%).

Major Changes in the Water Utility (1990-1995)

Data presented in the First Data Book was for the entire Penang State while the data in the City Profile (opposite page) is for Penang Island only, hence, no meaningful comparisons can be made. For PWA, the number of connections increased by 28% while the total number of staff went down by 5%. Staff/1,000 connections ratio improved from 5.4 to 4.0. Annual O&M costs increased by 24% but annual collections increased even more by 110%. The percentage of government loans used in capital investments went down from 50% to 14%. The utility is relying more on internally generated reserves and water mains contribution from consumers.

Island Profile PENANG ISLAND

PENANG ISLAND WATER SUPPLY

Population: 600,000 (1995) [1]

Production/Distribution

Average Daily Production	304,084 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional/Slow Sand Filter
Treatment Capacity	150,000 m^3/d
Storage	241,000 m^3
Service Area [1]	293 sq km

Service Connections

House (5 persons/HC)	120,632
Public Tap (50 persons/PT)	14
Industrial)	
Commercial [2])	12,204
Institutional)	
Other	Nil
Total	***132,850***

Service Indicators

Service Coverage [3]	99%
Water Availability [4]	24 hours/day
Per Capita Consumption	244 l/c/d
Average Tariff	US$0.208/$m^3$
Drinking Water [5]	Boiled/Filtered

Efficiency Indicators

Unaccounted Water [6]	20%
Non-Revenue Water	20%
Unit Production Cost	US$0.123/$m^3$
Operating Ratio	0.74
Accounts Receivable	2.0 months
Staff/1,000 Connections [7]	4.4

Notes:

[1] Population and service area refer to those of the capital, Georgetown, and its contiguous area throughout Penang Island.

[2] Industrial, commercial and institutional connections are classified under trade connections by the utility.

[3] People in the remote hill areas rely on dug wells and mountain streams.

[4] There were about 21,900 consumer complaints registered in 1995.

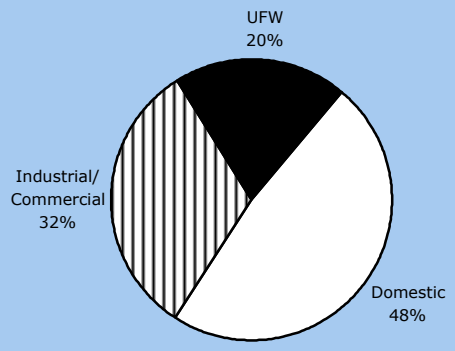
[5] About 16 water samples out of 1,307 failed the bacteriological tests.

[6] In 1995, approximately 692 leaks were repaired and 12,440 meters were replaced or repaired.

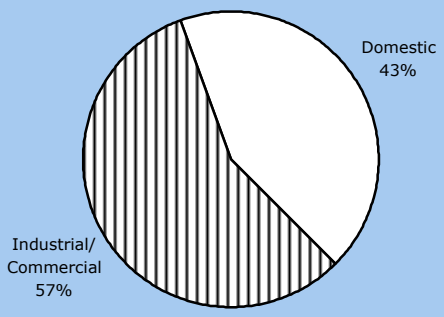
[7] Ratio is for 1996. For entire utility, ratio is 4.0 (1995).

[8] Total consumption and billing for institutional connections are combined with those under Industrial/Commercial.

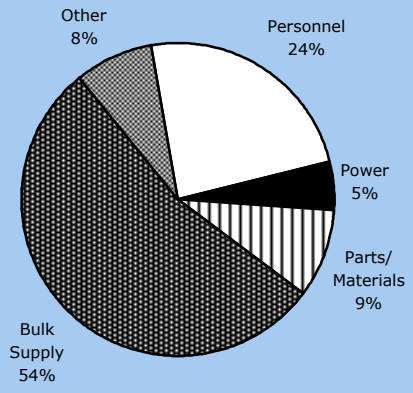
Data as of 1995.



Annual Water Use [8]
110,990,660 m^3



Annual Water Billings [8]
US$18,449,479



Annual O&M Costs
US$13,626,461

MALDIVES *Utility Profile*

Water Utility

MALE' WATER AND SEWERAGE COMPANY, LTD.

Address : P.O. Box 20148,Male', Republic of Maldives
Telephone : (960-32) 3209
Fax : (960-32) 4306
Head : Jan M.R. Olsen, General Manager

The Male' Water and Sewerage Company, Ltd. (MWSC) is a joint venture company established in 1995 between the Government of Maldives (70% share) and a Danish Group (30% share). It is responsible for the water supply and sewerage of Male' with a population of 78,000 people. Prior to 1995, the Government of Maldives operated a water utility, distributing desalinated water via communal distribution points (tap bays) to the public, at no cost. In 1996, the MWSC installed additional desalination equipment and a new distribution system supplying water to individual metered property connections and a water tariff was introduced. The private sector is involved in all aspects of operations to the extent that it holds 30% of the shares of MWSC. While the government is the major stockholder, it has no influence on day-to-day operations of the utility. For the urban poor, the MWSC will install a number of single public taps where low pressure water can be obtained at no cost. MWSC has a well developed management information system. Its billing, accounting, pumping, treatment and water production systems are computerized. Development directions are in the joint venture agreement.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 9,600	
Staff	: 73	
Annual O&M Costs[1]	: Rf32,272,000	: US$2,741,886
Annual Collections[2]	: Rf18,138,000	: US$1,541,037
Annual Billings[2]	: Rf19,996,000	: US$1,698,895
Annual Capital Expenditure	: Rf18,660,000	: US$1,585,387
(Average over last 5 years)	Expenditure Per Connection	: US$165.14/connection
Source of Investment Funds	: 87% share capital; 13% equity loan	

[1] This includes cost of new connections.
[2] These are based on limited production. Full capacity was attained only in November 1996.

Tariff Structure

(Effective 1996)

Category	Water Rates per Cubic Meter	
Consumption	(Rf/m^3)	(US$/$m^3$)
Domestic		
0 - 90 liters/day	25.32	2.151
91 - 270 liters/day	75.95	6.453
Above 270 liters/day	101.26	8.603
Institutional	75.95	6.453
Commercial	101.26	8.603

Notes:
1 All consumers pay on metered use. Consumers are billed monthly and they pay at the utility office. Cost of consumption from public taps is met by government and provided to the consumers at no cost.
2 The tariff structure is designed to provide cross subsidy, supplying a low cost sustainable volume of water to each customer. It aims to allow the utility to maintain financial viability with no external subsidy, to provide an adequate profit and rate of return to satisfy investors with sufficient control to prevent taking advantage of a monopoly of an essential service.
3 All connections are new as part of the on-going development project.
4 The utility operates the sewerage system serving the whole of Male'. There is no direct sewerage charge but the water rate is expected to cover the operational cost of the sewerage system.

Priority Need of Utility

I. As seen by Management
1) Implementation of agreed water policy with government.
2) Sewerage system upgrade and maintenance.

II. Consumers' Opinion
1) Improve quality and taste of water.
2) Lower price of water.

Consumer Survey Findings

The average monthly water consumption is 4.88 m^3 per family. Monthly water bill averages Rf288.13 (US$24.48) compared to the monthly power bill of Rf958.34 (US$81.42). About 86% of the consumers claim to have 24-hour water supply. Consumer perception of water quality is good (45%) to satisfactory (31%). About 71% drink water from the tap. Perception of water pressure is high (50%) to adequate (31%). Only 6% experienced interruption in service during the month preceding the survey. Leak repairs take about 1.5 days to be completed from the time they are reported to the utility. Overall rating of the utility by the consumers is good (46%) to fair (36%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile MALE'

MALE' WATER SUPPLY

Population: 78,000 (1996)

Production/Distribution

Average Daily Production [1]	2,400 m^3/d
Groundwater	Nil
Surface Water	Nil
Treatment Type	Desalination
Treatment Capacity	3,300 m^3/d
Storage	23,000 m^3
Service Area	1.8 sq km

Service Connections

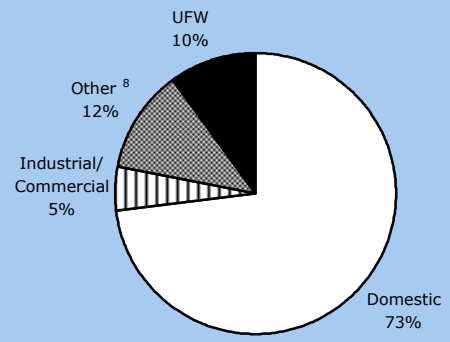
House (9 persons/HC)	8,285
Public Tap [2]	--
Industrial)	650
Commercial)	
Institutional	650
Other	15
Total	***9,600***

Service Indicators

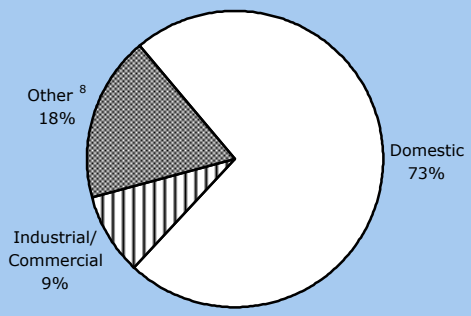
Service Coverage	100%
Water Availability [3]	24 hours/day
Per Capita Consumption [4]	16 l/c/d
Average Tariff	US$4.860/$m^3$
Drinking Water [5]	Tap

Efficiency Indicators

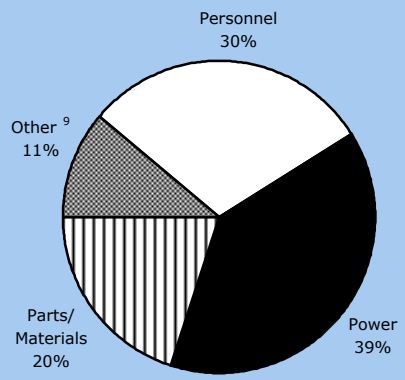
Unaccounted Water [6]	10%
Non-Revenue Water	10%
Unit Production Cost	US$2.646/$m^3$
Operating Ratio	0.6
Accounts Receivable	1.0 month
Staff/1,000 Connections	7.6



Annual Water Use [7]
388.360 m^3



Annual Water Billings [7]
US$1,698,895



Annual O&M Costs [7]
US$1,027,613

Notes:

[1] Source of production is desalinated seawater. Average daily production in 1996 was 1,064 cu. m./day since 2,400 cu. m./day capacity was attained only in November 1996.

[2] Existing 23 tap bays with 5 single taps each are being phased out. Government used to provide free water from the tap bays.

[3] About 300 consumer complaints were registered annually in the past.

[4] Almost 90% of consumers have individual rain collectors and yard well.

[5] None of the 3,500 water samples tested annually failed the bacteriological tests.

[6] Estimate made by utility. Individual metering of connections were undertaken in 1996.

[7] The figures do not reflect full year of normal, full-scale operation. The four plants were commissioned one after the other starting January 1996, and full capacity was attained only in November 1996.

[8] Other use and billing refer to institutional connections.

[9] Other cost is for transport and membrane replacement fund.

Data as of 1996.

MONGOLIA *Utility Profile*

Water Utility

WATER SUPPLY AND SEWERAGE SYSTEM COMPANY (USAG)

Address : Khukh Tengeriin Gudamj 5, Ulaanbaatar 49, Mongolia
Telephone : (976-1) 50120, 51355
Fax : (976-1) 312194
Head : Osoryn Erdenebaatar, Chairman

The Water Supply and Sewerage System Company (USAG) is a state enterprise established in 1975 under the Municipality of Ulaanbaatar. It is responsible for water supply and sewerage of Ulaanbaatar City and suburban residential areas called *ger* (round canvass-and-felt tents) areas with a total population of 695,100 people excluding distant sub-districts. Operating a water supply system that started in 1959, USAG distributes water partly through piped connections and partly by tanker trucks to public water kiosks. Almost all connections can be classified as bulk supply connections, each serving a large number of people. USAG enjoys some autonomy with government controlling only tariffs, appointment of top management and budget for development. The utility has a partly developed management information system. Its billing and accounting systems are computerized. USAG is currently following its development plan for the period 1997 - 2000. An intermediate format 1996 financial report is available in lieu of an annual report.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 1,830	
Staff	: 1,060	
Annual O&M Costs	: Tug2,056,203,800	: US$2,581,484
Annual Collections	: Tug2,037,003,000	: US$2,557,378
Annual Billings	: Tug2,562,896,100	: US$3,217,617
Annual Capital Expenditure	: Tug 90,000,000	: US$ 112,992
(Average over last 5 years)	Expenditure Per Connection	: US$61.74/connection
Source of Investment Funds	: 100% national government grant	

Tariff Structure

(Effective September 1996)

Service Type	Tariffs	
Domestic Consumers	(Tug/m^3)	(US$/$m^3$)
1. Central piped water supply system	34	0.043
2. Delivery by tanker trucks		
- Water supply through kiosks	400	0.502
- Delivery by trucks	600	0.753
Institutions and Industrial		
1. Central piped water supply system	93	0.117
2. Delivery by tanker trucks		
- Water distribution w/in 10 km	800	1.004
- Water distribution up to 10 km	1,200	1.507
- Delivery by tanker trucks	300	0.377

Notes:
1 All consumers pay on flat rate basis except some metered industrial and commercial connections. Households drawing water from piped connections pay on normative or flat rate. Water vending occurs in water kiosks supplied by USAG through its subsidiary TANK Company.
2 Consumers are billed monthly. They can pay through bill collectors or banks.
3 There were 20 new connections in 1995. Constructors bear all costs of connection.

Priority Need of Utility

I. As seen by Management
1) Water metering.
2) Replacement of equipment.

II. Consumers' Opinion
1) Expand water distribution system with more water trucks, tankers and kiosks.
2) Improved hygiene and lengthen distribution hours in kiosks.

Consumer Survey Findings

Average estimated monthly water consumption is 24.5 m^3 per family. Monthly water bill averages Tug809.16 (US$1.06) compared to the monthly power bill of Tug3,670.14 (US$4.61). Only 57% said they have 24-hour water supply. Consumer perception of water quality is good (87%). However, 89% of consumers boil their drinking water. About 57% of those surveyed experienced service interruption during the month preceding the survey. Leak repairs take less than 2 days to be completed after reporting to the utility. Overall rating of USAG by the consumers is good (55%) to fair (37%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile ULAANBAATAR

ULAANBAATAR WATER SUPPLY

Population: 695,100 (1996) [1]

Production/Distribution

Average Daily Production	160,000 m^3/d
Groundwater	100%
Surface Water	Nil
Treatment Type	Chlorination
Treatment Capacity	---
Storage	42,000 m^3
Service Area [2]	126 sq km

Service Connections

House (2,418 persons/HC) [3]	19
Public Tap (10,846 persons/PT)	38
Industrial	68
Commercial	564
Institutional	362
Other [3]	779
Total	***1,830***

Service Indicators

Service Coverage	100%
Water Availability [4]	21 hours/day
Per Capita Consumption [5]	177 l/c/d
Average Tariff	US$0.102/$m^3$
Drinking Water [6]	Boiled

Efficiency Indicators

Unaccounted Water [7]	49%
Non-Revenue Water	49%
Unit Production Cost	US$0.038/$m^3$
Operating Ratio	0.74
Accounts Receivable	2 months
Staff/1,000 Connections [8]	579.2

Notes:

[1] This is 89% of Ulaanbaatar population. It does not include those of distant sub-districts served by small water systems.

[2] Total area of responsibility is 166 sq km.

[3] House and other connections include bulk supply to housing and apartment units and water service centers where tankers draw water for delivery to water kiosks in ger areas.

[4] About 95% of consumers have 24-hour water supply. In 1996, about 109 consumer complaints were registered.

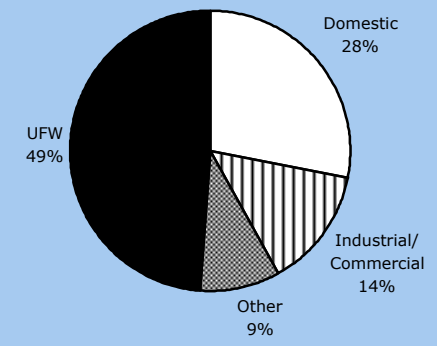
[5] Computed from consumption in kantors or housing units with bulk supply connections.

[6] While 1,310 water samples were tested in 1996, no data was given on the results.

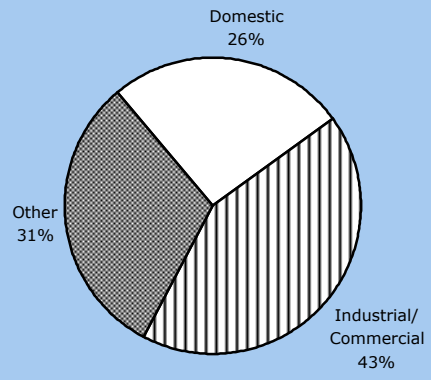
[7] During the year, 38 leaks were repaired and 42 meters replaced or repaired.

[8] The unusually high ratio is due to the low number of connections since most of them are bulk supply to housing units, apartments, student camps and bath houses.

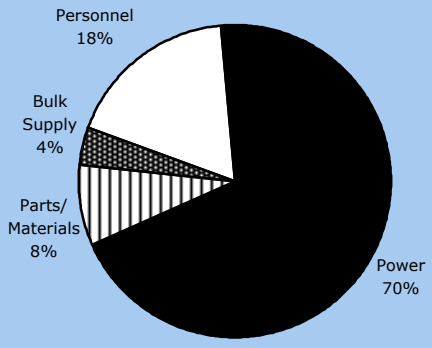
Data as of 1996.



Annual Water Use
58,400,000 m^3



Annual Water Billings
US$3,020,304



Annual O&M Costs
US$2,222,060

MYANMAR *Utility Profile*

Water Utility

MANDALAY CITY DEVELOPMENT COMMITTEE
(Water and Sanitation Department)

Address : Corner of 26th and 72nd Streets, Mandalay, Myanmar
Telephone : (95-2) 36173
Fax :
Head : U Tun Kyi, Head of Water and Sanitation Department

The Water and Sanitation Department of the Mandalay City Development Committee was formed in 1992 to be responsible for the water supply of Mandalay, a city with a population of about 670,000 people. The government exercises control over the utility on the number, salaries and appointment of staff, tariffs, appointment of top management, and budgets for O&M and development. The utility has a partly developed management information system. It has a development plan covering the period 1996-2000.

Mission Statement

No Mission Statement

General Data About Water Utility

Connections	: 49,708	
Staff	: 315	
Annual O&M Costs	: MK21,029,018	: US$ 3,402,423
Annual Collections	: MK95,467,945	: US$15,446,388
Annual Billings	: MK97,104,090	: US$15,711,111
Annual Capital Expenditure	: MK91,819,000	: US$14,856,001
(Average over last 5 years)	Expenditure Per Connection	: US$298.87/connection
Source of Investment Funds	: 100% government loan	

Tariff Structure

(Effective August 1996)

Consumption	Tariff Rate	
(m^3/month)	(MK/m^3)	(US$/$m^3$)
0 - 30 m^3	5	0.809
Over 30 m^3	10	1.618

Notes:
1 All consumers pay on metered use. Billing is done quarterly and consumers pay at the water utility office
2 There were 3,619 new connections in 1995. Price of new connection is MK3,000 (US$485.39) payable in advance.
3 The water bill has no sewerage surcharge.
4 The seemingly high rates and prices in US dollars are probably distorted by the disparity between the official exchange rate and the unofficial rate.

Priority Need of Utility

I. As seen by Management
1) Financial improvements.
2) Technological improvements.

II. Consumers' Opinion
(No answers given to questionnaire.)

Consumer Survey Findings

Average monthly water consumption is 40.79 m^3 per family. Monthly water bill averages MK313.45 (US$50.72) compared to the monthly power bill of MK492.80 (US$79.73). About 83% of those surveyed said they have 24-hour water supply. Perception of water quality by the consumers is good (96%). About 74% of consumers filter their drinking water. Consumers say water pressure is high (65%) to adequate (31%). Only 5% have had any interruption in water supply in the month preceding the survey. Repair of leaks in distribution pipes are done less than 2 days after being reported to the utility. Overall consumer rating of the utility is good (92%).

Major Changes in the Water Utility

Average daily production increased by 74% and coverage increased to 80% from 30% in 1992. While number of service connections increased by 32%, the number of staff went down also by 32%. The staff/1,000 connections ratio improved from 12.2 to 6.3. Average tariff increased by 223% while unit production cost barely went up by 3.4%. Operating ratio further improved from 0.39 to 0.22. Accounts receivable also improved from 17.0 to 0.2 months. However, unaccounted-for-water went up from 33% to 60%.

City Profile MANDALAY

MANDALAY WATER SUPPLY

Population: 670,000 (1996)

Production/Distribution

Average Daily Production	91,000 m^3/d
Groundwater	85%
Surface Water	15%
Treatment Type	Chlorination
Treatment Capacity	
Storage	35,000 m^3
Service Area	67 sq km

Service Connections

House (5 persons/HC)	49,056
Public Tap (50 persons/PT)	56
Industrial	53
Commercial	248
Institutional	295
Other	Nil
Total	***49,708***

Service Indicators

Service Coverage [1]	80%
Water Availability [2]	24 hours/day
Per Capita Consumption	110 l/c/d
Average Tariff	US$1.201/$m^3$
Drinking Water [3]	Filtered

Efficiency Indicators

Unaccounted Water [4]	60%
Non-Revenue Water	60%
Unit Production Cost	US$0.102/$m^3$
Operating Ratio	0.22
Accounts Receivable	0.2 months
Staff/1,000 Connections	6.3

Notes:

[1] Estimate given by utility. Unserved residents use tubewell or river as source.

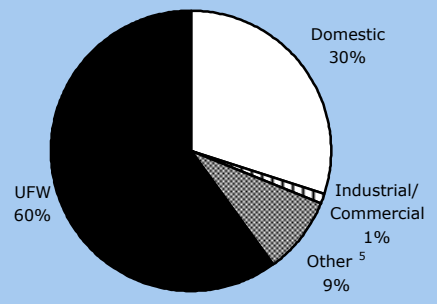
[2] About 95% of consumers get 24-hour water supply. During the year, 2,283 consumer complaints were registered.

[3] Hardly any bacteriological tests are taken annually.

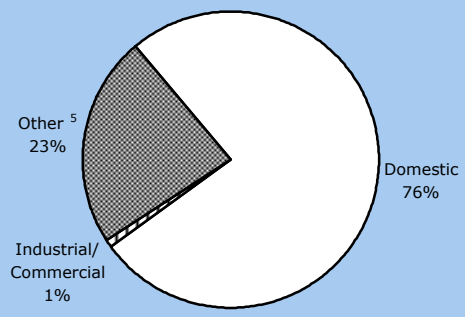
[4] In 1995-96, 285 leaks were repaired, 1,998 meters replaced or repaired.

[5] Other use and billing are those for institutional connections.

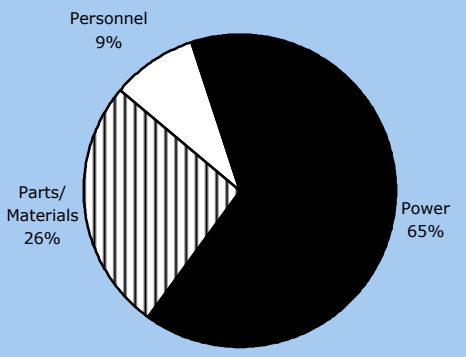
Data as of 1995-1996.



Annual Water Use
33,215,000 m^3



Annual Water Billing
US$15,711,111



Annual O&M Costs
US$3,402,423

MYANMAR *Utility Profile*

Water Utility

YANGON CITY DEVELOPMENT COMMITTEE (Water and Sanitation Department)

Address : City Hall, Yangon, Myanmar
Telephone : (95-1) 289 781
Fax : (95-1) 284 910
Head : U Zaw Win, Head of Water and Sanitation Department

The Water and Sanitation Department of the Yangon City Development Committee was formed in 1922 to be responsible for the water supply of Yangon, a city with a population of about 3,263,114 people. The government exercises control over the utility on the number, salaries and appointment of staff, tariffs and appointment of top management. The utility has a partly developed management information system. Its billing system is computerized. It has a development plan covering the period 1996-2000. No annual report is produced.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 96,950	
Staff	: 1,168	
Annual O&M Costs	: MK 66,020,000	: US$10,681,811
Annual Collections	: MK210,500,000	: US$34,058,182
Annual Billings	: MK215,440,000	: US$34,857,457
Annual Capital Expenditure	: MK109,000,000	: US$17,635,828
(Average over last 5 years)	Expenditure Per Connection	: US$181.91/connection
Source of Investment Funds	: 100% local government funds	

Tariff Structure

No tariff structure was given.

Notes:

1 Few domestic, commercial and industrial consumers pay on metered use; most pay on flat rate. Public tap users pay based on property tax. Billing is done monthly or quarterly and consumers pay at the water utility office or through bill collectors.
2 There were 1,262 new connections in 1995. Price of new connection is MK5,600 (US$906.06) payable in advance.
3 The water bill has no sewerage surcharge.
4 The seemingly high prices in US dollars are probably distorted by the disparity between the official exchange rate and the unofficial rate.

Priority Need of Utility

I. As seen by Management
1) Implement metering for the entire water supply system.
2) Reduce unaccounted-for-water.

II. Consumers' Opinion
1) Expand water supply lines.
2) More piped water connections.

Consumer Survey Findings

Average estimated monthly water consumption is 40.65 m^3 per family. The monthly water bill averages MK114.59 (US$18.54) compared to the monthly power bill of MK222.10 (US$35.94). About 66% of those surveyed said they have 24-hour water supply. Consumer perception of water quality is satisfactory (63%). About 63% of consumers either filter or boil their drinking water. Consumers say water pressure is adequate (58%) to high (12%). About 36% have had interruption in water supply in the month preceding the survey. Repair of leaks in distribution pipes are done in a day after being reported to the utility. Overall consumer rating of the utility is fair (66%) to good (10%).

Major Changes in the Water Utility (1992-1995)

The use of surface water increased from 80% in 1992 to 86% of the total production which remained about the same. Service coverage increased to 60% from 50%. Water availability improved to 12 hours/day from 8hours/day although per capita consumption is down to 67 l/c/d from 120 l/c/d. Average tariff increased by 174% while unit production cost went up by 193%. Operating ratio further improved from 0.34 to 0.27. The number of connections seemed to have decreased by 71% but this may reflect the real number of accounts rather than the number of households served by the utility. The number of staff also decreased by 33% but the staff/1,000 connections ratio increased from 5.3 to 12.0.

City Profile YANGON

YANGON WATER SUPPLY

Population: 3,263,114 (1995)

Production/Distribution

Average Daily Production [1]	386,750 m^3/d
Groundwater	14%
Surface Water	86%
Treatment Type	Chlorination
Treatment Capacity	159,160 m^3/d
Storage	141,050 m^3
Service Area [2]	238 sq km

Service Connections

House (20 persons/HC)	92,047
Public Tap (180 persons/PT)	2,140
Industrial	40
Commercial	2,723
Institutional	Nil
Other	Nil
Total	***96,950***

Service Indicators

Service Coverage [3]	60%
Water Availability [4]	12 hours/day
Per Capita Consumption [5]	67 l/c/d
Average Tariff [5]	US$0.456/$m^3$
Drinking Water [6]	Boiled/Filtered

Efficiency Indicators

Unaccounted Water [7]	60%
Non-Revenue Water	NA
Unit Production Cost	US$0.067/$m^3$
Operating Ratio	0.27
Accounts Receivable	(No data available)
Staff/1,000 Connections	12.0

Notes:

[1] Production is not metered.

[2] Total area of responsibility is 594 sq km.

[3] Other sources are tubewells, ponds and rain collectors.

[4] Only 60% of consumers get 24-hour supply. During the year, 150 consumer complaints were registered.

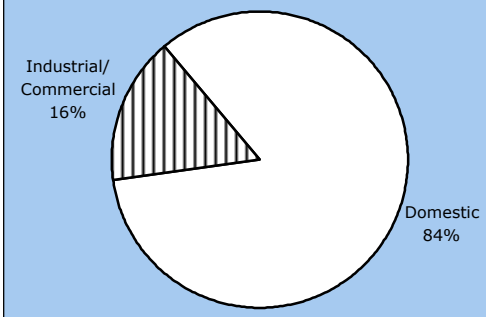
[5] Computed from consumer survey data in the absence of water consumption data.

[6] About 20 water samples out of 60 failed the bacteriological tests in 1995.

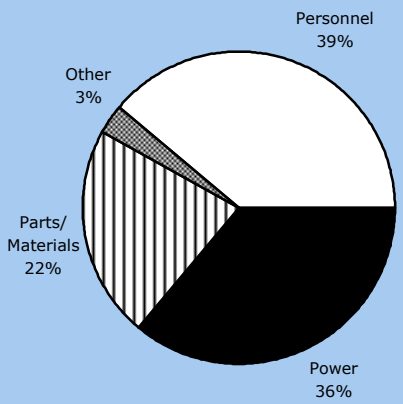
[7] This is 1992 data. Lack of production metering and very little consumption metering make it difficult to determine realistic UFW.

Data as of 1995.

Annual Water Use
141,163,750 m^3



Annual Water Billings
US$34,857,457



Annual O&M Costs
US$9,466,718

NEPAL *Utility Profile*

Water Utility

NEPAL WATER SUPPLY CORPORATION

Address : Tripureswor Marga, Kathmandu, Nepal
Telephone : (977-1) 253 656
Fax : (977-1) 223 484
Head : Min Bahadur Karki, Executive Chairman

The Nepal Water Supply Corporation (NWSC) is a government corporation set up in 1990 from what used to be the Water Supply and Sewerage Board. It is responsible for water supply and sewerage for Greater Kathmandu and 11 other towns. The government exercises control over NWSC on staff salaries and budget for development. Service to the urban poor is provided through public standposts on request of municipal governments. The utility has a partly developed management information system with an accounting system that is computerized. NWSC is currently following a development plan covering the period 1991 - 2005. It has a type-script annual report for government for 1995.

Mission Statement

"NWSC will provide an adequate supply of potable water and offer wastewater systems that will meet the environmental standards of Nepal. The management will aim to meet the needs of all customers in an efficient and effective manner at optimum cost."

General Data About Water Utility

Connections	: 138,962	
Staff	: 2,078	
Annual O&M Costs	: NRs232,070,000	: US$4,069,619
Annual Collections	: NRs254,030,000	: US$4,454,713
Annual Billings	: NRs269,890,000	: US$4,732,836
Annual Capital Expenditure	: NRs303,200,000	: US$5,316,966
(Average over last 5 years)	Expenditure Per Connection	: US$38.26/connection
Source of Investment Funds	: 61% externally-funded government grant; 11% national government grant 17% IDA Credits; 7% government loan; 4% internally generated reserves	

Tariff Structure

(Effective 1996)

METERED		HOUSEHOLD USE				COMMERCIAL and INDUSTRIAL				GOVERNMENT ENTERPRISES			
Tap	Minimum	Minimum Charge		Rate above minimum (/m^3)		Minimum Charge		Rate above minimum (/m^3)		Minimum Charge		Rate above minimum (/m^3)	
(Inch)	(m^3)	(NRs)	(US$)	(NRs)	(US$)	(NRs)	(US$)	(NRs)	(US$)	(NRs)	(US$	(NRs)	(US$)
½	8	23.10	0.40	-	-	27.55	0.48	-	-	25.40	0.45	-	-
	8 - 15	-	-	5.75	0.101	-	-	7.75	0.136	-	-	6.35	0.111
	15 - 30	-	-	6.80	0.119	-	-	8.50	0.149	-	-	7.50	0.132
	30 - 50	-	-	7.90	0.139	-	-	12.50	0.219	-	-	8.65	0.152
	50 -100	-	-	9.45	0.166	-	-	-	-	-	-	10.4	0.182
	Above 100	-	-	11.55	0.202	-	-	-	-	-	-	12.5	0.219
¾	27	420.00	7.37	15.10	0.265	420.00	7.37	18.90	0.331	462.00	8.10	16.6	0.292
1	50	808.50	14.18	17.10	0.300	735.00	12.89	19.35	0.339	808.50	14.1	17.1	0.300
1-1/2	140	2263.8	39.70	17.45	0.306	2058.0	36.09	19.85	0.348	2263.80	39.7	17.4	0.306
2	235	3799.9	66.64	17.90	0.314	3454.5	60.58	20.35	0.357	3799.95	66.6	17.9	0.314
3	700	11319.	198.4	18.35	0.322	10290.	180.4	20.90	0.367	11319.0	198.	18.3	0.322
4	1,400	22638.	396.9	18.85	0.331	20580.	360.8	21.40	0.375	22638.0	396.	18.8	0.331
NON-METERED		Non-metered connections are assessed monthly rates which range from NRs126 (US$2.21) to NRs55,566 (US$974.42) for ½' to 4" main taps or connections. Monthly rate for additional branch tap is about one-third of main connection rate. Rates vary slightly among the three categories above.											
PUBLIC TAP		For ½" size public tap, the monthly rate is NRs577.50 (US$10.13).											

Notes:

1 Consumers pay on metered use or on flat rate since not all connections are metered. Users of public taps do not pay as consumption is paid by the government. Billing is done monthly and consumers pay at the utility office.
2 Tariffs are set to raise sufficient revenue each year to meet operating costs, depreciation and financial obligations like debt servicing and working capital requirements.
3 There were 5,708 new connections installed in 1995. Price of new connection is NRs2,800 (US$49.10) payable in advance.
4 Sewerage surcharge of 50% is included in the water bill.

Priority Need of Utility

I. As seen by Management
1) Leakage and wastage control.
2) Management improvement.

II. Consumers' Opinion
1) Sufficient and regular water supply.
2) Improve water quality.

Consumer Survey Findings

In Kathmandu, average monthly water consumption is 11.2 m^3 per family. Monthly water bill averages NRs116.10 (US$2.04) compared to the monthly power bill of NRs902.20 (US$15.82). Only 13 % of those surveyed said they have 24-hour water supply. Perception of water quality is satisfactory (51%) to good (19%). However, 72% of consumers either boil or filter their drinking water. About 66% complain of low water pressure in their taps. Among the respondents to the survey, 15% experienced service interruption during the month preceding the survey. It takes almost 10 days for leak repairs to be done. Overall rating of the utility is fair (50%) to good (18%).

Major Changes in the Water Utility (1991-1995)

For Greater Kathmandu Water Supply, average daily production increased by 60% and treatment capacity went up by 167%. Number of connections also increased by 79%. Average tariff increased by 179% while unit production cost increased by 36%. Operating ratio improved to 0.72 from 1.60 in 1992. However, accounts receivable went up from 0.8 to 4.5 months. UFW was reduced from 45% to 40%. For the entire NWSC, total connections increased by 25%, number of staff decreased by 13% and staff/1,000 connections ratio improved from 21.2 to 15.0. The utility still relies heavily on government loans and grants to finance its capital improvements.

City Profile KATHMANDU

KATHMANDU WATER SUPPLY

Population: 935,000 (1995)

Production/Distribution

Average Daily Production [1]	107,000 m^3/d
Groundwater	25%
Surface Water	75%
Treatment Type	Conventional
Treatment Capacity	80,000 m^3/d
Storage	28,500 m^3
Service Area	50 sq km

Service Connections

House (7 persons/HC)	92,600
Public Tap (42 persons/PT)	1,328
Industrial	450
Commercial	760
Institutional	920
Other	Nil
Total	***96,058***

Service Indicators

Service Coverage [2]	81%
Water Availability [3]	6 hours/day
Per Capita Consumption	91 l/c/d
Average Tariff	US$0.141/$m^3$
Drinking Water [4]	Boiled/Filtered

Efficiency Indicators

Unaccounted Water [5]	40%
Non-Revenue Water	40%
Unit Production Cost	US$0.061/$m^3$
Operating Ratio	0.72
Accounts Receivable	4.5 months
Staff/1,000 Connections	15.0

Notes:

[1] Only 70% of water production is metered.

[2] Estimate given by NWSC. Other sources are tubewells, dug wells and ponds.

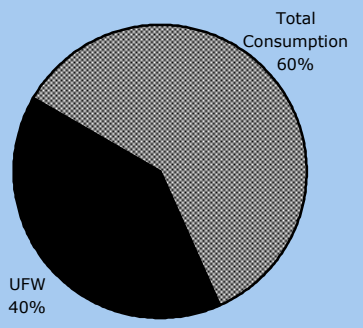
[3] About 5% of consumers get 24-hour water supply. In the fiscal year 1995-1996, about 9,492 consumer complaints were registered.

[4] During a one-year period, 62 water samples out of 270 tested failed the bacteriological tests.

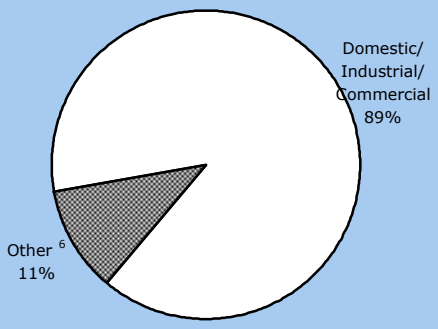
[5] In 1995-1996, 5,436 leaks were repaired and 3,910 meters were replaced or repaired.

[6] Other refers to billing for institutional use.

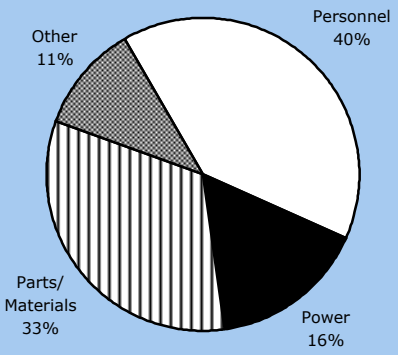
Data as of 1995-1996.



Annual Water Use
39,055,000 m^3



Annual Water Billings
US$3,316,388



Annual O&M Costs
US$2,387,374

PAKISTAN *Utility Profile*

Water Utility

FAISALABAD DEVELOPMENT AUTHORITY (Water and Sanitation Agency)

Address : P.O. Box 229, WASA, FDA, Faisalabad, Pakistan
Telephone : (92-41) 761 796
Fax : (92-41) 782 113
Head : Rashid Ahmad Chaudhry, Managing Director

The Water and Sanitation Agency (WASA) is a government agency formed under the Faisalabad Development Authority (FDA) in 1978. It is responsible for the water supply and sewerage of Faisalabad, which has a population of 1,800,000 people. While WASA was formed to be autonomous, the government still exercises control on staff salaries, tariffs, appointment of top management and budget for development. The utility is currently following its 1995-2015 development plan. Its billing system is computerized. No annual report is produced.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 80,034	
Staff	: 2,003	
Annual O&M Costs	: PRs 80,000,000	: US$1,967,424
Annual Collections	: PRs 39,318,436	: US$ 966,951
Annual Billings	: PRs 56,618,247	: US$1,392,401
Annual Capital Expenditure	: PRs100,000,000	: US$2,459,280
(Average over last 5 years)	Expenditure Per Connection	: US$30.73/connection
Source of Investment Funds	: 100% government loan	

Tariff Structure

(Effective September 1993)

METERED	Applicable Rate			Applicable Rate	
	PRs/1000 gallons	US$/m^3		PRs/1000 gallons	US$/m^3
Domestic	20.00	0.108	**Commercial/Industrial**	30.00	0.162

UNMETERED (Flat rate per month based on ferrule size.)					
Ferrule Size (inch)	PRs/month	US$/month	Ferrule Size (inch)	PRs/month	US$/month
¼	45	1.11	3	22,825	561.33
3/8	132	3.25	4	70,000	1,721.50
½	265	6.52	5	150,000	3,688.92
¾	660	16.23	6	300,000	7,377.84
1	1,510	37.13	7	500,000	12,296.40
1-1/2	4,070	100.09	8	1,000,000	24,592.80
2	8,710	214.20	9	1,200,000	29,511.37

Notes:
1 Industrial, commercial and institutional consumers pay on metered use. Domestic users pay on flat rate per month because of lack of metering. Consumers are billed quarterly and pay at banks.
2 Tariffs set are intended to meet O&M costs.
3 There were about 2,000 new connections in 1995. Price of new connection is PRs1,363 (US$33.52) for a ¼" house connection payable in advance.
4 The water bill has a 35% sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Water source development.
2) Optimal O&M and reduction of UFW.

II. Consumers' Opinion
1) Improve water quality.
2) Reliable supply of water.

Consumer Survey Findings

The average estimated monthly water consumption is 5.42 m^3 per family. Monthly water bill is PRs45 (US$1.11) compared to the monthly power bill of 835.58 (US$20.55). Only 8% said they have 24-hour water supply. Consumer perception of water quality is satisfactory (46%) to good (33%). About 79% drink water direct from the tap. It takes about 4.5 days for the utility to repair leaks in their pipes. Overall rating of the utility is good (48%) to fair (40%).

Major Changes in the Water Utility (1991-1995)

Not in the First Data Book.

City Profile FAISALABAD

FAISALABAD WATER SUPPLY

Population: 1,800,000 (1996)

Production/Distribution

Average Daily Production	160,000 m^3/d
Groundwater	98%
Surface Water	2%
Treatment Type	Chlorination/Slow Sand Filter
Treatment Capacity	5,000 m^3/d
Storage	50,000 m^3
Service Area [1]	70 sq km

Service Connections

House (7 persons/HC)	80,000
Public Tap (100 persons/PT)	1,000
Industrial	9
Commercial	21
Institutional	4
Other	Nil
Total [2]	***80,034***

Service Indicators

Service Coverage [3]	60%
Water Availability [4]	7 hours/day
Per Capita Consumption	170 l/c/d
Average Tariff	US$0.034/$m^3$
Drinking Water [5]	Tap

Efficiency Indicators

Unaccounted Water [6]	30%
Non-Revenue Water	78%
Unit Production Cost	US$0.034/$m^3$
Operating Ratio	1.41
Accounts Receivable	12 months
Staff/1,000 Connections	25.0

Notes:

[1] Total area of responsibility is 120 sq km.

[2] ST/PTs are not registered. Industrial, commercial and institutional connections are few since most establishments have their own tubewell due to high water table.

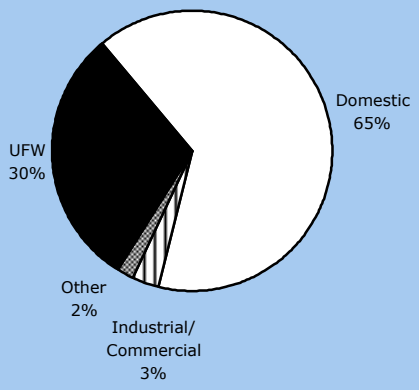
[3] Estimate given by utility. Most unserved residents rely on tubewells.

[4] Only 20% of consumers have 24-hour water supply. About 1,000 consumer complaints are registered annually.

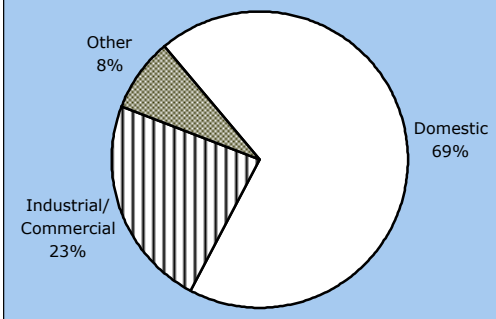
[5] About 50 water samples out of 700 tested failed the bacteriological tests.

[6] During the year, about 1,700 leaks were repaired; only two meters were reported replaced or repaired.

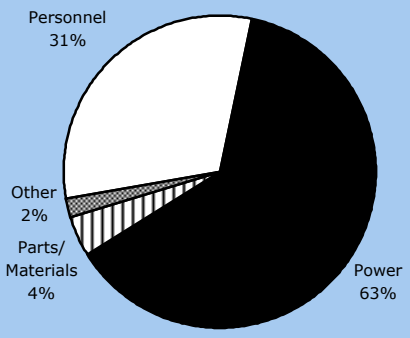
Data as of 1995-1996.



Annual Water Use
58,400,000 m^3



Annual Water Billings
US$1,392,401



Annual O&M Costs
US$1,967,424

PAKISTAN *Utility Profile*

Water Utility

KARACHI WATER AND SEWERAGE BOARD

Address : Annex Building, KDA Civic Center, Gulshan e Iqbal, Karachi, Pakistan
Telephone : (92-21) 494 7507
Fax : (92-21) 454 6020
Head : Brigadier Mansoor Ahmed, Managing Director

The Karachi Water and Sewerage Board (KWSB) is a semi-autonomous body formed in 1983 which manages the water supply and sewerage of Karachi, a city with a population of 11,500,000 people. The government exercises control over KWSB on staff salaries, tariffs and appointment of top management. The utility has a partly developed management information system (MIS). Billing, accounting, payroll and MIS are computerized. Development directions is guided by the 7th 5-year National Development Plan covering 1993-1998. A KWSB Basic Facts report for 1995-1996 is available in lieu of an annual report. It has proposals for major private sector participation in the future.

Mission Statement

"The KWSB is committed to: a) contribute to health and well-being of the citizens of Karachi by producing and supplying adequate potable water at least cost; b) improve sanitary conditions in the city through development and upkeep of efficient sewage collection network and adequate treatment facilities; c) provide an environment in which employees may develop professionally and attain their true potential; and, d) contribute as a responsible corporate citizen to collective goal of making Karachi a better place to reside and visit."

General Data About Water Utility

Connections	: 1,032,374	
Staff	: 8,679	
Annual O&M Costs	: PRs1,152,191,000	: US$28,335,608
Annual Collections	: PRs1,115,487,000	: US$27,432,954
Annual Billings[1]	: PRs2,797,180,000	: US$68,790,501
Annual Capital Expenditure	: PRs2,170,691,200	: US$53,383,385
(Average over last 5 years)	Expenditure Per Connection	: US$51.71/connection
Source of Investment Funds	: 74% externally-funded government grant; 25% national government grant; 1% internally generated reserves	

[1] Includes arrears of PRs1,623,967,000 (US$39,937,903).

Tariff Structure

(Effective July 1995)

Residential	**a) Connected with waterline -** Monthly rate ranging from PRs20 (US$0.49) to PRs1,775 (US$43.65) for residences with ground floor areas of 60 sq yd to 5,000 sq yd and above. Each additional floor in excess of 25% of covered ground floor area is charged 50% of ground floor rates. **b) Property not connected to waterline -** PRs16.00 (US$0.39)/month.
Flats	**a) Connected with waterline -** Monthly rate ranging from PRs26 (0.64) to PRs878 (21.59) for flats with covered areas of 500 sq ft to 5,000 sq ft and above. **b) Flats not connected to water line -** PRs26.00 (US$0.64)/month.
Commercial/Industrial	**a) Connected with waterline -** 55% of Net Annual Rental Value (NARV). **b) Not connected with water line -** 39% of NARV
Bulk Supply	**Domestic** - PRs26/1000 gallons (US$0.141/$m^3$) **Commercial/Industrial** - PRs43/1000 gallons (US$0.233)

Notes:
1 Domestic consumers pay on flat rate, metered industrial and bulk residential consumers on metered use, and most commercial and industrial consumers on property tax. However, most meters are not functioning or defective. Billing is monthly for metered consumers and yearly for all others. Consumers pay at banks.
2 There were 19,744 new connections in 1995. Price of new connection is PRs100 (US$2.46) for a ½" connection plus two years advance water charges and surcharges, and security deposit varying according to property size.
3 Sewerage charge is about 50% of water charges.

Priority Need of Utility

I. As seen by Management
1) Additional water to meet demand.
2) Distribution system strengthening.

II. Consumers' Opinion
1) Improve water quality.
2) Increase water supply and pressure.

Consumer Survey Findings

The average estimated monthly water consumption is 50.58 m^3 per family. Monthly water bill is PRs203.77 (US$5.01) compared to the monthly power bill of PRs2,585.86 (US$63.59). Only 3% said that they have 24-hour water supply. Perception of water quality is satisfactory (66%) to poor (28%). Most consumers (80%) either boil or filter their drinking water. Many (80%) complained of low water pressure in their tap. It takes an average of 6.6 days for the utility to fix reported leaks. Overall rating of the utility is fair (56%) to poor (43%).

Major Changes in the Water Utility (1991-1995)

While the number of connections barely increased, the number of staff decreased by 28%. The staff/1,000 connections ratio improved from 11.7 to 8.4. Average tariff increased by 214% while unit production cost went up by 89%. Operating ratio improved from 1.08 to 0.77. Water availability decreased to less than 4 hours/day. Capital investment is now almost totally dependent on government grants and loans with internally generated reserves representing only 1% of the total from 20% in 1992.

City Profile KARACHI

KARACHI WATER SUPPLY

Population: 11,500,000 (1996)

Production/Distribution

Average Daily Production [1]	1,648,820 m^3/d
Groundwater	2%
Surface Water	99%
Treatment Type	Conventional
Treatment Capacity	954,660 m^3/d
Storage	481,876 m^3
Service Area	500 sq km

Service Connections

House (7 persons/HC) [2]	830,366
Public Tap (100 persons/PT)	9,950
Industrial	5,364
Commercial	179,542
Institutional	2,085
Other	5,067
Total	***1,032,374***

Service Indicators

Service Coverage [3]	70%
Water Availability [4]	1-4 hours/day
Per Capita Consumption [5]	157 l/c/d
Average Tariff [6]	US$0.091/$m^3$
Drinking Water [7]	Boiled

Efficiency Indicators

Unaccounted Water [8]	30%
Non-Revenue Water	40%
Unit Production Cost	US$0.042/$m^3$
Operating Ratio	0.77
Accounts Receivable	16.8 months
Staff/1,000 Connections	8.4

Notes:

[1] Production is not metered. These are estimated volumes.

[2] Includes many acccounts not directly connected.

[3] Estimate given by KW&SB. Other water sources are tubewells and dug wells.

[4] Data is for alternate days. Less than 1% of consumers get 24-hour water supply. The utility receives an average of 30,000 consumer complaints annually.

[5] Computed using consumer survey data.

[6] Computed using total consumption derived from given UFW and production.

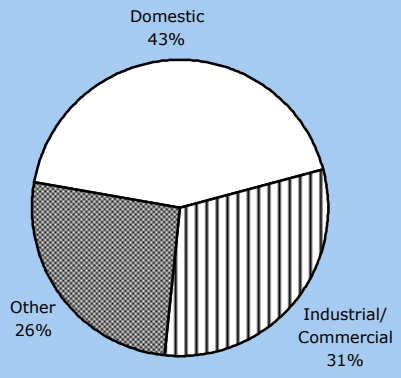
[7] Less than 5% of about 20,000 water samples failed the bacteriological tests.

[8] Estimate given by KW&SB. Almost total lack of metering makes it difficult to determine realistic consumption and UFW values. During the year, about 2,500 leaks were repaired and 197 meters replaced or repaired.

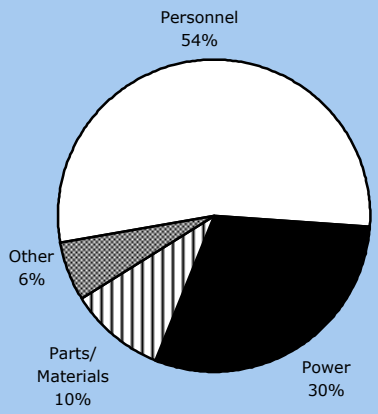
[9] Annual water bill includes arrears of PRs 1,623,967,000 (US$39,937.90). Arrears removed in computation of operating ratio and average tariff.

Data as of 1995-1996.

Annual Water Use
601,520,000 m^3



Annual Water Billings [9]
US$72,805,350



Annual O&M Costs
US$25,394,604

PAKISTAN *Utility Profile*

Water Utility

LAHORE DEVELOPMENT AUTHORITY (Water and Sanitation Agency)

Address : 4-A Gulberg V, Lahore, Pakistan
Telephone : (92-42) 575 9023, 575 6739
Fax : (92-42) 575 2960
Head : Bashir Ahmed Pannu, Managing Director

The Water and Sanitation Agency (WASA) was formed in 1967 as part of the Lahore Development Authority (LDA) and is responsible for the water supply and sewerage of the city of Lahore, which has a population of 3,880,000 people. It also serves a few other areas like Model Town, Government Officers' Residences, railway colonies and the Cantonment Board. The government exercises control on the number and salaries of staff, tariffs, appointment of top management, and budgets for O&M and development. The utility has a partly developed management information system. Only its billing system is computerized. WASA has a development plan for the period 1988-1997.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 371,693	
Staff	: 2,106	
Annual O&M Costs	: PRs425,765,000	: US$10,470,755
Annual Collections	: PRs360,600,000	: US$ 8,868,165
Annual Billings	: PRs451,600,000	: US$11,106,111
Annual Capital Expenditure (Average over last 5 years)	: PRs 56,342,800	: US$ 1,385,627
	Expenditure Per Connection	: US$3.73/connection
Source of Investment Funds	: 58% government loan; 17% internally generated reserves; 2% deposit works 13% externally-funded government grant; 10% national government grant	

Tariff Structure

(Effective December 1994)

METERED	**Domestic**		**Commercial/Industrial**	
Consumption/month (gallons)	PRs/1000 gallons	(US$/m^3)	PRs/1000 gallons	(US$/m^3)
0 - 5,000 (23 m^3)	7.35	0.040	13.65	0.074
5,001 - 20,000 (91m^3)	11.70	0.063	24.40	0.131
Above 20,000 (91m^3)	15.00	0.081	35.30	0.191
Above rates are subject to the following minimum per month corresponding to the size of meter: ½" - 5,000 gallons; ¾" - 20,000 gallons; 1" - 33,334 gallons				
UNMETERED				
Domestic: Monthly water rates are based on percentage of Annual Rental Value (ARV) of property and ranges from PRs33.50 (US$0.82) toPRs225.00 (US$5.53)/month for property ARVs of PRs400 (US$9.84) to PRs4,499 (US$110.64), respectively. Rate for properties with ARV above PRs4,499 is 60% of ARV.				
Religious and Charitable Institutions: Half of domestic rates.				

Notes:
1 All industrial and commercial consumers and about 21% of domestic consumers pay on metered use. Unmetered consumers pay based on ARV . Billing is quarterly and consumers pay at banks.
2 There were 11,570 new connections in 1996-1997. Price of new connection range from PRs300 (US$7.38) to PRs1,200 (US$29.51) for ferrule sizes of ¼" to ½" payable in advance.
3 Water bill includes sewerage charges of up to 60% of the water consumption bill.

Priority Need of Utility

I. As seen by Management
1) Introduce preventive maintenance of tubewells.
2) Make the distribution system more efficient.

II. Consumers' Opinion
1) Increase pressure.
2) Improve billing.

Consumer Survey Findings

Average monthly water consumption is 12,862 gallons (58.47m^3) per family. Monthly water bill averages PRs225.19 (US$5.54) compared to the monthly power bill of PRs1,093.30 (US$26.89). About 6% of those surveyed said they have 24-hour water supply. Consumer perception of water quality is satisfactory (71%) while 23% said it is poor. About 77% drink water from the tap. Service interruption during the month preceding the survey was experienced by 7% of the respondents. It takes about 1-1/2 days for the utility to undertake leak repairs after being reported to them. Overall rating of the utility is fair (87%).

Major Changes in the Water Utility (1991-1995)

The number of connections increased by 13% while the number of staff went up by 35%, increasing the staff/1,000 connections ratio from 4.8 to 5.7. Service coverage also increased from 51% to 84%. However, water availability to most consumers decreased from 20 to 17 hours/day. Unit production cost went up by 21%. Operating ratio improved from 0.81 to 0.71. The mix of capital investment sources remain the same with government providing about 81% of loans and grants.

City Profile LAHORE

LAHORE WATER SUPPLY

Population: 3,880,000 (1995)

Production/Distribution

Average Daily Production [1]	1,270,820 m^3/d
Groundwater	100%
Surface Water	Nil
Treatment Type	Chlorination
Treatment Capacity	---
Storage [2]	---
Service Area	165 sq km

Service Connections

House (9 persons/HC)	351,232
Public Tap (100 persons/PT)	882
Industrial	334
Commercial	16,235
Institutional	531
Other	2,479
Total	***371,693***

Service Indicators

Service Coverage [3]	84%
Water Availability [4]	17 hours/day
Per Capita Consumption [5]	213 l/c/d
Average Tariff	US$0.197/$m^3$
Drinking Water [6]	Tap

Efficiency Indicators

Unaccounted Water [7]	40%
Non-Revenue Water	---
Unit Production Cost	US$0.017/$m^3$
Operating Ratio	0.71
Accounts Receivable	7 months
Staff/1,000 Connections	5.7

Notes:

[1] Only 38% of production is metered. The volume is estimated.

[2] Water is pumped from the tubewells directly to the distribution grid.

[3] Other sources are tubewells with handpumps.

[4] None of the consumers get 24-hour supply. About 11,600 consumer complaints were registered.

[5] Computed using consumer survey data.

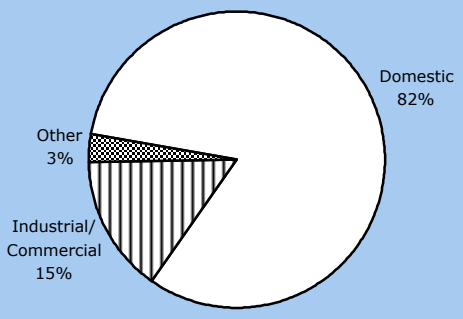
[6] Out of 4,294 water samples taken in 1996, 47 failed the bacteriological tests.

[7] Estimate given by utility; not supported by analysis. In 1996, about 11,472 leaks were repaired and 3,374 meters repaired or replaced.

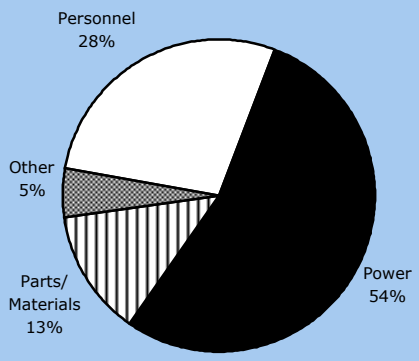
[8] Total consumption of 56,442,610 m^3 given may have been grossly underestimated with most meters either non-functional or erratic.

Data as of 1995-1996.

Annual Water Use [8]
463,849,300 m^3



Annual Water Billings
US$11,106,111



Annual O&M Costs
US$7,931,671

PAPUA NEW GUINEA *Utility Profile*

Water Utility

THE WATERBOARD

Address : P.O. Box 2779, Boroko, NCD, Papua New Guinea
Telephone : (675) 323 5700
Fax : (675) 323 6426
Head : Mr. Benson Gegeyo, Managing Director

The Waterboard is a government enterprise established in 1986 and is responsible for operating 11 water supply systems nationwide through their district offices. Its Lae District office is responsible for the water supply of Lae with a population of 90,000 people. The Waterboard is under government control only as far as tariff setting is concerned. The utility has a partly developed management information system. Billing and accounting is computerized. It has a 5-year development plan covering the period 1997-2002. It has available the 1991 intermediate format annual report.

Mission Statement

"To supply water related services in the context of the total water cycle to meet community needs in an environmentally sound manner."

General Data About Water Utility

Connections	: 18,326	
Staff	: 269	
Annual O&M Costs	: K11,088,688	: US$7,995,305
Annual Collections	: K10,990,001	: US$7,924,148
Annual Billings	: K 9,083,150	: US$6,549,247
Annual Capital Expenditure	: K 1,136,753	: US$ 819,636
(Average over last 5 years)	Expenditure Per Connection	: US$44.73/connection
Source of Investment Funds	: 100% national government grant	

Tariff Structure

(Effective January 1997)

Category	Water Rates per Cubic Meter	
METERED	(K/m^3)	(US$/$m^3$)
Residential *Minimum of K4.05(US$2.92)*		
0 - 15 m^3	Minimum	Minimum
15 - 30 m^3	0.58	0.418
Above 30 m^3	0.98	0.707
Non-Commercial /Government *Minimum of K20.00 (US$14.42)*	0.72	0.519
Commercial/Industrial/Shipping *Minimum of K20.00 (US$14.42)*	0.75	0.541
UNMETERED	(K/month)	(US$/month)
Private Connection	4.05/house	2.92/house
Public Standpipe	3.50/house	2.52/house

Notes:
1 All consumers pay on metered use. Consumers are billed monthly and pay at the utility office.
2 There were 75 new connections in 1995. Price of new connection is K100 (US$72.10) payable in advance.
3 There is a sewerage surcharge of 0.11 to 0.19% on the water bill.

Priority Need of Utility

I. As seen by Management
1) Reduce non-revenue water.
2) Increase sales.

II. Consumers' Opinion
1) Improve water quality, supply and pressure.
2) Improve maintenance.

Consumer Survey Findings

Average monthly water consumption is 22.75 m^3 per family. The monthly water bill averages K71.67 (US$51.68) compared to the average monthly power bill of K95.02 (US$68.51). About 94% said they have 24-hour service. Consumer perception of water quality is satisfactory (43%) to good (32%). About 81% drink water from the tap with the rest boiling or filtering their drinking water. Water service interruption was experienced by 45% during the month preceding the survey. Leak repairs are done about two weeks after these are reported to the utility. Overall consumer rating of the utility is fair (48%) to good (35%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile LAE

LAE WATER SUPPLY

Population: 90,000 (1995)

Production/Distribution

Average Daily Production	33,800 m^3/d
Groundwater	100%
Surface Water	Nil
Treatment Type	Chlorination
Treatment Capacity	62,000 m^3/d
Storage	3,000 m^3
Service Area [1]	50 sq km

Service Connections

House (5 persons/HC)		2,430
Public Tap		Nil
Industrial	)	209
Commercial	)	
Institutional [2]		54
Other		Nil
Total		***2,693***

Service Indicators

Service Coverage [3]	62%
Water Availability [4]	24 hours/day
Per Capita Consumption	146 l/c/d
Average Tariff	US$0.640/$m^3$
Drinking Water [5]	Tap

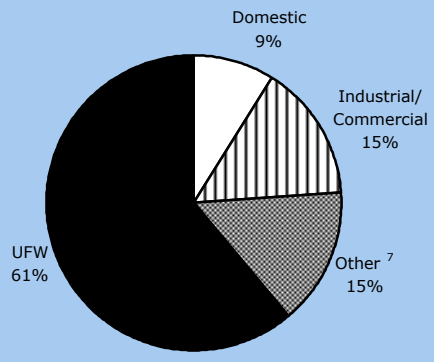
Efficiency Indicators

Unaccounted Water [6]	61%
Non-Revenue Water	61%
Unit Production Cost	US$0.097/$m^3$
Operating Ratio	0.39
Accounts Receivable	3.0 months
Staff/1,000 Connections	17.1

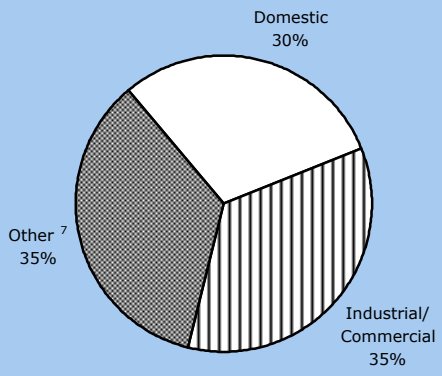
Notes:

[1] Total area of responsibility of the utility in Lae is 200 sq km.
[2] Institutional connections serve about 800 persons/connection.
[3] Other sources of water are tubewells and rain collectors.
[4] In 1995, about 1,100 consumer complaints were registered.
[5] During the year, all 12 water samples tested bacteriologically passed the test.
[6] About 1,600 leaks were repaired and 24 meters replaced or tested in 1995.
[7] Other use and billing are for bulk supply to institutional connections.
[8] Other cost is for transport expenses.

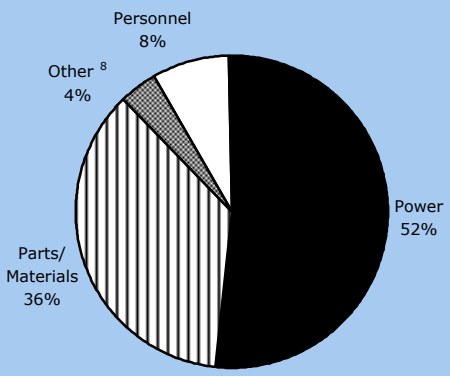
Data as of 1995.



Annual Water Use
12,337,000 m^3



Annual Water Billings
US$3,032,951



Annual O&M Costs
US$1,195,869

PHILIPPINES *Utility Profile*

Water Utility

METROPOLITAN CEBU WATER DISTRICT

Address : M. C. Briones - P. Burgos Streets, Cebu City, Philippines
Telephone : (63 32) 254-8434 to 39
Fax : (63 32) 254-5391
Head : Ms. Dulce M. Abanilla, General Manager

The Metropolitan Cebu Water District (MCWD) is a government corporation set up in 1974, although the original waterworks system started operating in 1911. It is responsible for water supply and sewerage of Cebu City and seven other surrounding towns and cities with a total population of 1,293,000 people. However, only 23% of this population is currently served by MCWD. The private sector is involved in source development and major pipe rehabilitation. Staff salaries, tariffs and budget for development is under government influence. MCWD has a partly developed MIS and produces a glossy covered annual report (1995). It is currently following its 1990-2005 development plan. The utility provides communal faucets for the urban poor with one faucet serving at least 25 households.

Mission Statement

"We are committed to provide adequate, potable and affordable water and an effective sewerage for Cebu. Because we are a public utility firm, full customer satisfaction is our index of success."

General Data About Water Utility

Connections	: 57,369	
Staff	: 532	
Annual O&M Costs [1]	: P377,948,000	: US$14,330,325
Annual Collections	: P397,403,100	: US$15,067,987
Annual Billings	: P428,233,400	: US$16,236,953
Annual Capital Expenditure	: P 99,795,760	: US$ 3,783,869
(Average over last 5 years)	Expenditure Per Connection	: US$65.96/connection
Source of Investment Funds	: 71% government loan; 29% internally generated reserves	

[1] Includes interest expenses on loans

Tariff Structure

(Effective January 1996)

SERVICE CHARGE	(For first 10 cubic meters or less)	
Meter Size	Regular	
(Inches)	(Peso)	(US$)
½	86.33	3.27
¾	140.00	5.31
1	274.17	10.40
1-1/2	700.00	26.54
2	1,738.34	65.91
3	3,126.67	118.55
4	6,353.34	240.89
6	9,374.14	355.43
COMMODITY CHARGE	(Per cubic meter)	
Consumption	Regular	
(m^3)	(P/m^3)	($US\$/m^3$)
1-10	(See service charge above)	
11-20	9.52	0.36
21-30	11.20	0.42
31-up	30.72	1.16

Notes:
1 All consumers pay on metered use. Discounts (5%) are given on current bills paid on or before due date. Consumers are billed monthly.
2 Tariffs are set to generate revenue to cover costs (O&M, administrative, revenue share, capital outlay, debt-service) and to increase Fund Reserve.
3 There were 5,109 new connections in 1995. Price of new connection is P2,100 (US$79.59) for ½ inch connection payable over 12 months. Commercial and industrial consumers pay upon application.
4 There is no sewerage charge on the water bill.

Priority Need of Utility

I. As seen by Management
1) Capital funding for large source development.
2) Autonomy from government bureaucracy.

II. Consumers' Opinion
1) Improved operation and maintenance.
2) Reliability and 24-hour supply.

Consumer Survey Findings

Average monthly consumption is about 30 m^3 per family. The water bill averages P393.12 (US$14.90) compared to the monthly power bill of P574.24 (US$21.77). Consumers perceive water quality to be good with 88% drinking directly from the tap. About 44% experienced water service interruption in the last month; it takes about 5 days for leaks to be repaired. Overall rating of the MCWD is good (87%).

Major Changes in the Water Utility (1991-1995)

The 37% increase in average daily production was accompanied by a 35% increase in service connections. However service coverage is still low at 23% (from 26%) while UFW remained constant at 38%. Staff per 1,000 connections ratio improved from 12.6 to 9.3. The water district has relied more on internally generated reserves for its capital expenditures from 10% in 1991 to 29% in the last five years. Average tariff increased by 79% while unit production cost increased by 53%.

City Profile CEBU

CEBU WATER SUPPLY

Population: 1,293,000 (1995)[1]

Production/Distribution

Average Daily Production	107,983 m^3/d
Groundwater	99%
Surface Water	1%
Treatment Type	Chlorination
Treatment Capacity	12,000 m^3/d
Storage	29,270 m^3
Service Area [2]	260 sq km

Service Connections

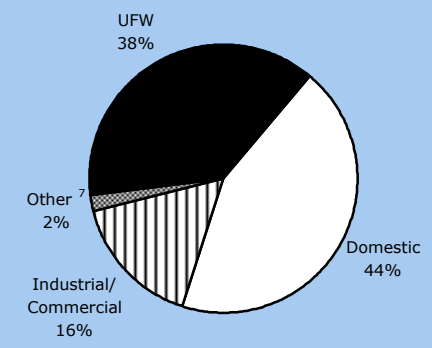
House (5.1 persons/HC)	53,072
Public Tap (128 persons/PT)	165
Industrial)	3,912
Commercial)	
Institutional	219
Other	1
Total	***57,369***

Service Indicators

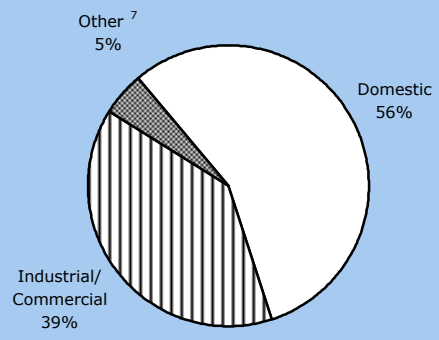
Service Coverage [3]	23%
Water Availability [4]	18 hours/day
Per Capita Consumption	173 l/c/d
Average Tariff	US$0.663/$m^3$
Drinking Water [5]	Tap

Efficiency Indicators

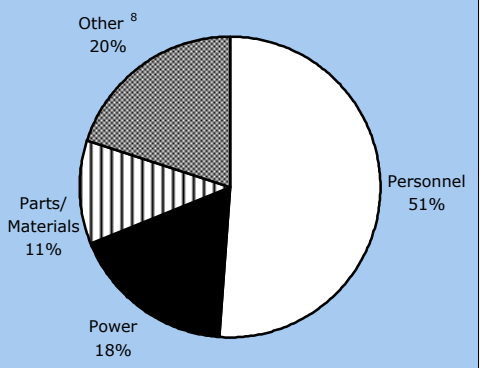
Unaccounted Water [6]	38%
Non-Revenue Water	38%
Unit Production Cost	US$0.225/$m^3$
Operating Ratio	0.55
Accounts Receivable	1.9 months
Staff/1,000 Connections	9.3



Annual Water Use
39,413,795 m^3



Annual Water Billings
US$16,230,799



Annual O&M Costs
US$8,880,818

Notes:

[1] The population is for three cities and five municipalities.

[2] Total area of responsibility is 677 sq. km.

[3] About 47% of the population get water from wells and 30% from water vendors. Water vending price is P110/m^3 (US$4.17/$m^3$).

[4] Only 23% of consumers have 24-hour water supply; about 31,475 consumer complaints were registered in 1995.

[5] About 1,136 water samples out of 8,372 failed to pass the bacteriological test in 1995.

[6] In 1995, about 23,300 leaks were repaired and 18,026 meters were replaced or repaired.

[7] Other use and billing refer to institutional connections.

[8] Other costs include maintenance expenses, transport, personnel social benefits, etc.

Data as of 1995 except connections (1996).

PHILIPPINES *Utility Profile*

Water Utility

DAVAO CITY WATER DISTRICT

Address : KM. 5, J. P. Laurel Avenue, Bajada, Davao City, Philippines
Telephone : (63 82) 221-1682
Fax : (63 82) 64-885
Head : Wilfredo A. Carbonquillo, General Manager

The Davao City Water District (DCWD) is a government corporation organized in 1973 operating what used to be known as the Sales Waterworks System that dates back to 1921. The water district is responsible for water supply of Davao City which has a total population of 970,765. DCWD is responsible for water production, distribution and source development. Billing and collection is done by the private sector while tariff setting is under government control. DCWD is currently following their 1995-2010 development plan and has a well developed management information system. A glossy covered annual report (1995) is available to the public. The water district provides water to the urban poor through 3/8 inch connections which have lower minimum monthly charge. One free public tap is provided for each barangay (village) where it has a deep well source.

Mission Statement

"We pledge to supply clean and potable water for all daily requirements at the most reasonable cost. In our quest to do so, we vanguard the preservation of the forests and mountains, a posture to balance the harmony of nature in pace with development.

We do deliver the best service and maintain a standard accepted in the industry and work harder to surpass every record. We believe in the need to do all these, for we have the best people in the world to serve, the people of Davao City."

General Data About Water Utility

Connections	: 96,994	
Staff	: 604	
Annual O&M Costs	: P205,954,000	: US$7,806,019
Annual Collections [1]	: P246,885,915	: US$9,357,410
Annual Billings	: P229,778,348	: US$8,709,003
Annual Capital Expenditure	: P 34,531,842	: US$1,308,818
(Average over last 5 years)	Expenditure Per Connection	: US$13.49/connection
Source of Investment Funds	: 45.6% internally generated reserves; 54.4% government loan	

[1] Collections include arrears from previous year

Tariff Structure

(Effective July 1992)

	Residential & Government		Commercial & Industrial	
MINIMUM CHARGE	(For first 10 cubic meters or less)			
Meter Size (Inches)	(Peso)	(US$)	(Peso)	(US$)
3/8	20.00	0.758		
½	50.00	1.895	50.00	1.895
¾	80.00	3.032	80.00	3.032
1	160.00	6.064	160.00	6.064
1-1/2	400.00	15.161	400.00	15.161
2	1,000.00	37.902	1,000.00	37.902
4	3,600.00	136.446	3,600.00	136.446
	Residential & Government		Commercial & Industrial	
COMMODITY CHARGE	(Per cubic meter in excess of 10 cubic meters)			
Consumption (m^3)	(Peso/m^3)	(US$/$m^3$)	(Peso/m^3)	(US$/$m^3$)
11-20	5.25	0.199	5.25	0.199
21-30	6.80	0.258	6.80	0.258
31-40	9.00	0.341	9.00	0.341
Over 40	12.00	0.455	15.00	0.569
BULK CHARGE	Bulk charge per cubic meter is P17.00 (US$0.644)			

Notes:
1 All consumers pay on metered use and are billed monthly. Consumers pay in selected banks or at the water utility office.
2 DCWD tariff structure aims for full cost recovery for O&M costs, debt service and reserves based on a target of 90% collection efficiency and 85% accounted-for-water. It also seeks to effect equitable cross-subsidies among income groups and among customer types.
3 Cost of new connection is ₱1,100 (US$41.69) for ½ " connection payable over 12 months. There were 8,779 new connections in 1995.
4 There is no sewerage charge on the water bill.

Priority Need of Utility

I. As seen by Management
1) Rehabilitation of water system
2) Financing for expansion

II. Consumers' Opinion
1) Improved operation and maintenance
2) More water and increased pressure

Consumer Survey Findings

Each family consumes about 33 m^3 and pays an average of P186.10 (US$7.05) per month compared to their average monthly power bill of P439.80 (US$16.67). About 77% claim to have 24-hour service; 58% consider water quality to be good with about 84% drinking water straight from the tap. 55% of the consumers experienced water interruption in the previous month; it takes less than 1-1/2 days for utility repairmen to fix reported leaks. Overall rating of the water utility is good (66%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile DAVAO

DAVAO WATER SUPPLY

Population: 970,765 (1995)

Production/Distribution

Average Daily Production	128,204 m^3/d
Groundwater	98%
Surface Water	2%
Treatment Type	Slow Sand Filter
Treatment Capacity [1]	2,816 m^3/d
Storage	31,763 m^3
Service Area [2]	200 sq km

Service Connections

House (5.5 persons/HC)	91,708
Public Tap [3]	
Industrial)	5,014
Commercial)	
Institutional	262
Other	10
Total	***96,994***

Service Indicators

Service Coverage [4]	52%
Water Availability [5]	24 hours/day
Per Capita Consumption	145 l/c/d
Average Tariff	US$0.271/$m^3$
Drinking Water [6]	Tap

Efficiency Indicators

Unaccounted Water [7]	31%
Non-Revenue Water	31%
Unit Production Cost	US$0.155/$m^3$
Operating Ratio	0.83
Accounts Receivable	0.5 months
Staff/1,000 Connections	6.2

Notes:

[1] Capacity is for low sand filter for surface water. Chlorination only for ground water.

[2] Service area is only 9% of DCWD's area of responsibility of 2,211 sq km.

[3] There are 37 public taps but most are not functioning, hence, are not billed.

[4] Unserved residents rely on tubewells and rain collectors.

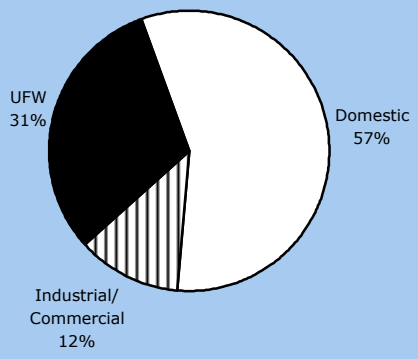
[5] About 99% of consumers have 24-hr supply. In 1995, about 12,488 consumer complaints were attended to.

[6] During the year, 191 water samples out of 4,104 failed the bacteriological tests.

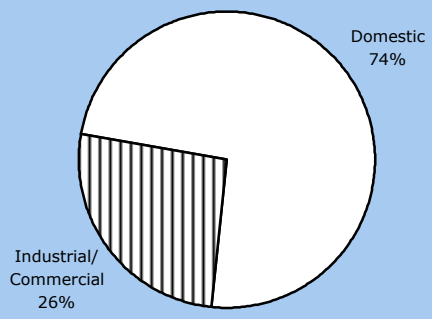
[7] In 1995, 11,582 leaks were repaired, 4,650 meters replaced and 5,025 more were repaired.

[8] Other costs include transport and travel expenses, insurance and other administrative costs.

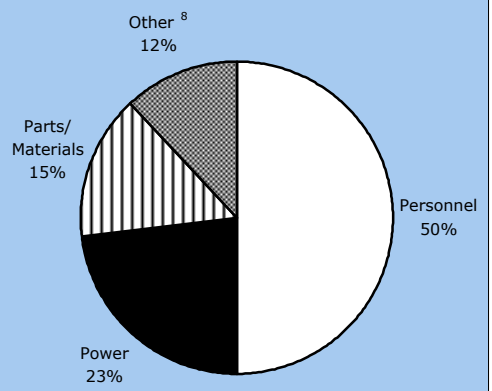
Data as of 1995 except for staff and connections (August 1996).



Annual Water Use
46,794,460 m^3



Annual Water Billings
US$8,709,003



Annual O&M Costs
US$7,241,259

PHILIPPINES *Utility Profile*

Water Utility

METROPOLITAN WATERWORKS AND SEWERAGE SYSTEM

Address : Katipunan Road, Balara, Quezon City, Metro Manila, Philippines
Telephone : (63 2) 920-5521
Fax : (63 2) 921-2887
Head : Reynaldo B. Vea, Administrator

The Metropolitan Waterworks and Sewerage System (MWSS) until recently was a government corporation organized in 1971 from what used to be Manila's waterworks authority that dates back to 1878. Starting August 1997, water distribution came under the control of two private corporations under separate 25-year concession agreements. The MWSS is responsible for 37 cities and municipalities in Metro Manila and adjoining areas of two provinces, with 10,610,000 people. The MWSS is currently following their 1993-1997 development plan and has a partly developed management information system. A glossy covered annual report (1994) is available to the public. MWSS provides water to the urban poor through public faucets in coordination with local governments.

Mission Statement

"To efficiently provide the people in the service area adequate supply of potable water and sanitary sewerage services at fair and affordable rates in a manner that ensures the conservation of the environment and the viability of the system as a world-class model water supply and sewerage utility."

General Data About Water Utility

Connections	: 779,380	
Staff	: 7,628	
Annual O&M Costs	: P1,697,860,000	: US$ 64,351,880
Annual Collections	: P3,636,000,000	: US$137,863,047
Annual Billings	: P3,786,000,000	: US$143,550,466
Annual Capital Expenditure	: P1,258,464,000	: US$ 47,716,084
(Average over last 5 years)	Expenditure Per Connection	: US$61.22/connection
Source of Investment Funds	: 34% commercial loan; 25% internally generated reserves; 18% local bonds; 19% national government grant/equity; 4% external grants/loans	

Tariff Structure

(Effective August 1996)

	Residential		Semi Business [5]	
Consumption	(Peso/conn.)	(US$/conn.)	(Peso/conn.)	(US$/conn.)
First 10 m^3	29.50	1.12	49.50	1.88
	(Peso/m^3)	(US$/$m^3$)	(Peso/m^3)	(US$/$m^3$)
Next 10 m^3	3.60	0.14	6.05	0.23
Next 20 m^3	6.85	0.26	7.45	0.28
Next 20 m^3	9.00	0.34	9.45	0.36
Next 20 m^3	10.50	0.40	11.00	0.42
Next 20 m^3	11.00	0.42	11.50	0.44
Next 50 m^3	12.00	0.45	12.00	0.45
Next 50 m^3	12.00	0.45	12.50	0.47
Over 200 m^3	12.50	0.47	13.00	0.49
	Business Group I [5]		Business Group II [5]	
Consumption	(Peso/conn.)	(US$/conn.)	(Peso/conn.)	(US$/conn.)
First 10 m^3	134.00	5.08	145.00	5.50
	(Peso/m^3)	(US$/$m^3$)	(Peso/m^3)	(US$/$m^3$)
Next 90 m^3	13.45	0.51	14.60	0.55
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Next 500 m^3	14.95	0.57	17.60	0.67
Over 10,000 m^3	15.00	0.57	17.70	0.67

Notes:
1 All consumers pay on metered use except some house connections (2%) and public taps (30%).
2 Tariff setting aims to generate sufficient revenue to sustain operations, pay debt service and partially finance expansion that considers consumers' capacity to pay.
3 All consumers are billed monthly. Sewerage charges equal to 60% of water bill are added for the sewered areas; unsewered areas are charged environmental charges equal to 10% of the water bill.
4 Cost of new connection starts at ₱2,500 (US$94.79) for 1" connection; fee can be paid all at the start or spread over 12 months.
5 Semi Business are small enterprise, Business Group I are mostly commercial, and Business Group II are mostly industrial connections.

Priority Need of Utility

I. As seen by Management
1) Rehabilitation of water system
2) Financing for expansion

II. Consumers' Opinion
1) Improved operation and maintenance
2) More water and increased pressure

Consumer Survey Findings

Each family consumes about 44 m^3 and pays an average of P337.80 (US$12.81) per month compared to their average monthly power bill of P1,095 (US$41.52). About 73% claim to have 24-hour service; 42% consider water quality to be good with about 50% drinking water straight from the tap. One-fourth of the consumers experienced water interruption in the previous month; it takes about a week for utility repairmen to fix reported leaks. Overall rating of the water utility is fair (56%) or good (34%).

Major Changes in the Water Utility (1990-1995)

In August 1997, two large Philippine corporations took over water distribution in the MWSS area of responsibility. Since 1990, water treatment capacity increased by 30%, production by 12% and the number of connections increased by 16%. Staff per 1000 connections ratio improved from 12.8 to 9.8.

City Profile MANILA

MANILA WATER SUPPLY

Population: 10,610,000 (1995)

Production/Distribution

Average Daily Production [1]	2,800,000 m^3/d
Groundwater	3%
Surface Water	97%
Treatment Type	Conventional
Treatment Capacity	4,000,000 m^3/d
Storage	352,000 m^3
Service Area [2]	1,274 sq km

Service Connections

House (5.6 persons/HC)	719,878
Public Tap (357 persons/PT)	1,698
Industrial	7,976
Commercial	47,864
Institutional	1,956
Other	8
Total	***779,380***

Service Indicators

Service Coverage [3]	67%
Water Availability [4]	17 hours/day
Per Capita Consumption	202 l/c/d
Average Tariff	US$0.232/$m^3$
Drinking Water [5]	Tap

Efficiency Indicators

Unaccounted Water [6]	44%
Non-Revenue Water	58%
Unit Production Cost	US$0.063/$m^3$
Operating Ratio	0.65
Accounts Receivable	6 months
Staff/1,000 Connections	9.8

Notes:

[1] About 97% of production is metered.

[2] The size of the utility's area of responsibility is 1,851 sq km.

[3] Most areas not served by MWSS depend on wells.

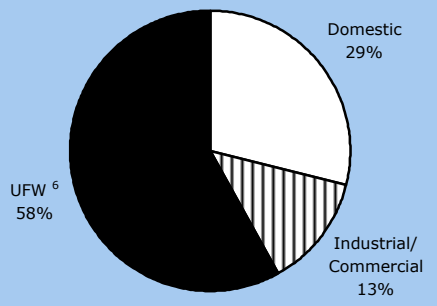
[4] About 50% of consumers receive 24-hour water supply. There were 31,640 consumer complaints in 1995.

[5] Of 3,000 water samples taken in 1995, 84 failed the bacteriological tests.

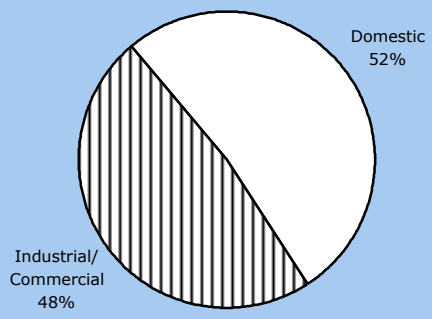
[6] Given consumption data based on billed consumption. Difference between computed UFW of 58% and estimated 44% are losses due to illegal connections. Approximately 58,518 leaks were repaired and 9,922 meters were replaced or repaired in 1995.

[7] Other costs include sundry expenses like janitorial services, security, communications, consultants and resource persons, honoraria, etc.

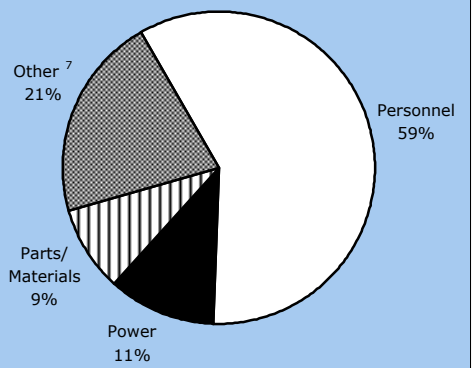
Data as of 1995.



Annual Water Use
1,022,000,000 m^3



Annual Water Billings
US$99,699,226



Annual O&M Costs
US$64,351,880

SINGAPORE *Utility Profile*

Water Utility

PUBLIC UTILITIES BOARD (Water Department)

Address : 111 Somerset Road #15-01 Singapore 238164, Republic of Singapore
Telephone : (65) 731-3500
Fax : (65) 235-9550
Head : Chan Yoon Kum, Director, Water Department

The Public Utilities Board (PUB) is a government authority which develops and manages water services for Singapore's 3 million people through its Water Department. It also assumed a new role as regulator of the recently privatized (1995) electricity and gas industries which used to be part of PUB's services since 1963. Billing and collection are performed by the Customer Accounts Division which has been privatized since 1995 under Power Supply Ltd. Tariffs and appointments to top management are under government control.

The PUB has a well developed management information system and it follows a rolling 10-year development plan. A glossy covered annual report (1995) is available to the public. The PUB provides training facilities and courses in water supply operations, especially to professionals from developing countries.

Mission Statement

"To provide an adequate and reliable supply of potable water at the most economic cost to sustain Singapore's economic growth and prosperity."

General Data About Water Utility

Connections	: 910,691	
Staff	: 1,865	
Annual O&M Costs	: S$222,000,000	: US$155,331,654
Annual Collections	: S$370,600,000	: US$259,305,905
Annual Billings	: S$370,600,000	: US$259,305,905
Annual Capital Expenditure	: S$ 76,400,000	: US$ 53,456,479
(Average over last 5 years)	Expenditure Per Connection	: US$58.70/connection
Source of Investment Funds	:100% internally generated reserves	

Tariff Structure

(Effective March 1993)

Category	Consumption	Rates	
	(m^3/month)	(S$/$m^3$)	(US$/$m^3$)
Domestic	1-20	0.56	0.39
	20-40	0.80	0.56
	Above 40	1.17	0.82
Non-domestic	Flat Rate	1.17	0.82
Shipping	Flat Rate	2.07	1.45

Notes:

1 All consumers pay on metered use and are billed monthly. Full metering has been practiced since before the 1970s.
2 PUB is required to ensure that its total revenues are sufficient to meet its total operating expenses, including interest and depreciation, and to meet a reasonable proportion of the cost of developing the water supply services. It also has to pay 20% of its net operating income to the government consolidated fund.
3 In 1995, 32,005 new connections were installed. Price for new connections range from S$500-S$1,400 (US$350-US$980) for 28-54 mm. connections.
4 The Ministry of Environment imposes a sewerage charge of S$0.10/$m^3$ (US$0.07) for domestic use and S$0.22/$m^3$ (US$0.15) for all other uses except shipping which has none.

Priority Need of Utility

I. As seen by Management
1) Secure adequate supply to meet long-term needs.
2) Demand management to keep consumption growth low.

II. Consumers' Opinion
1) Improve cleanliness and reduce chlorine.
2) Reduce or lower rates.

Consumer Survey Findings

Average monthly consumption is about 27.6 m^3 per family. The water bill averages S$17.49 (US$12.24) compared to the monthly power bill of S$64.36 (US$45.03). Of those interviewed, 100% have 24-hour service. Although 69% consider water quality to be good, 83% boil their drinking water as a matter of habit and to make it safer. Only 4% experienced water service interruption in the last month. Overall rating of the PUB is good (71%) to fair (29%).

Major Changes in the Water Utility (1991-1995)

Average daily production increased by 16% while the total connections increased by 14%. While unit production cost increased by 100%, average tariff increase was only 10%. Staff/1,000 connections ratio further improved from 2.4 to 2.0. UFW decreased from 8% to 6.2%. Capital expenditures were financed totally from internally generated reserves up from 77.5% five years ago.

City Profile SINGAPORE

SINGAPORE WATER SUPPLY

Population: 3,000,000 (1995)

Production/Distribution

Average Daily Production [1]	1,375,156 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type [2]	Conventional
Treatment Capacity	2,143,000 m^3/d
Storage	1,240,000 m^3
Service Area	640 sq km

Service Connections

House (3.9 persons/HC)	835,208
Public Tap	Nil
Industrial)	72,132
Commercial)	
Institutional	3,295
Other [5]	56
Total	***910,691***

Service Indicators

Service Coverage	100%
Water Availability	24 hours/day
Per Capita Consumption	183 l/c/d
Average Tariff	US$0.553/$m^3$
Drinking Water [3]	Boiled

Efficiency Indicators

Unaccounted Water [4]	6%
Non-Revenue Water	7%
Unit Production Cost	US$0.309/$m^3$
Operating Ratio	0.60
Accounts Receivable	1.1 months
Staff/1,000 Connections	2.0

Notes:

[1] All production is metered.

[2] Ozone is used in two treatment plants.

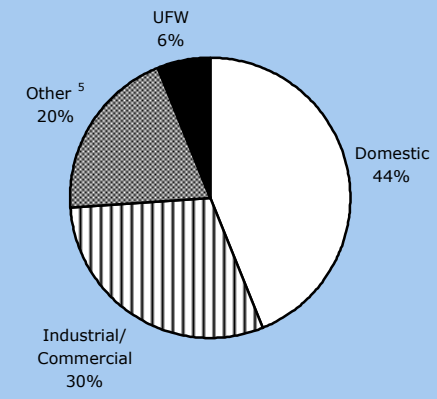
[3] Most consumers boil water before drinking as a matter of habit; of 18,654 water samples taken in 1995, 13 samples failed the bacteriological tests.

[4] In 1995, 976 leaks were repaired and about 100,000 meters replaced. Domestic meters are replaced o in 8 years while large meters are replaced once in 4 years.

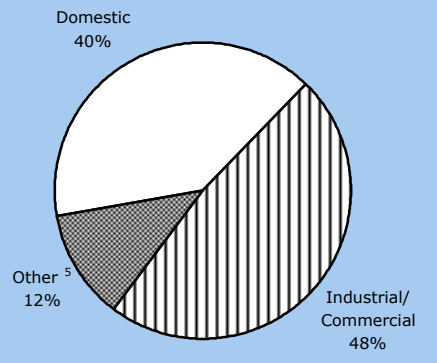
[5] Other includes use and billing for government and statutory boards and shipping.

[6] Other costs are depreciation, administration, support services, property tax and maintenance.

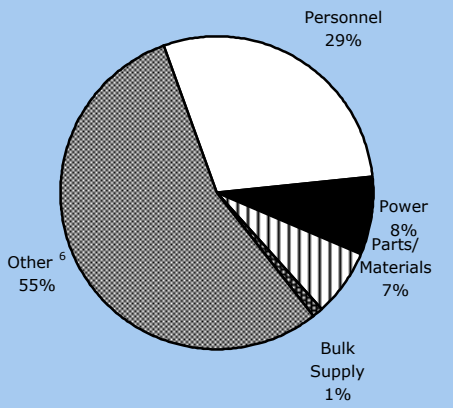
Data as of 1995.



Annual Water Use
501,931,940 m^3



Annual Water Billings
US$259,305,905



Annual O&M Costs
US$155,331,654

SOLOMON ISLANDS *Utility Profile*

Water Utility

SOLOMON ISLANDS WATER AUTHORITY

Address : P.O. Box 1407, Honiara, Solomon Islands
Telephone : (677) 23985, 21401
Fax : (677) 20723
Head : Donald Makini, General Manager

The Solomon Islands Water Authority (SIWA), a statutory body formed in February 1994, is responsible for the water supply of Honiara, the capital of Solomon Islands with a population of 46,931. This responsibility used to be with the Water Unit under the Ministry of Transport, Works and Utilities since 1985. SIWA is currently operating three other systems in 3 out of 9 provinces excluding Guadalcanal Province where Honiara is located. The private sector is involved in source development and management; AusAid is providing staff training. Government exercises control only on tariffs. SIWA has a partly developed management information system. It has a computerized billing system. The utility's current development plan covers the period 1996-2016. A type-script 1994 annual report for government is available.

Mission Statement

"To provide safe, sustainable and reliable water and wastewater services to Solomon Islands urban areas."

General Data About Water Utility

Connections	: 6,163	
Staff	: 66	
Annual O&M Costs	: SI$4,881,952	: US$1,329,834
Annual Collections	: SI$3,392,608	: US$ 924,139
Annual Billings	: SI$4,902,481	: US$1,335,426
Annual Capital Expenditure (Average over last 5 years)	: SI$ 105,532	: US$ 28,747
	Expenditure Per Connection	: US$4.66/connection
Source of Investment Funds	: 45% national government grant; 55% externally-funded government grant	

Tariff Structure

(Effective September 1995)

Category	Water Rates	
MONTHLY CONSUMPTION	(SI$/$m^3$)	(US$/$m^3$)
Domestic		
0 - 35 m^3	0.65	0.177
Over 35 m^3	1.30	0.354
Commercial	1.30	0.354
MONTHLY STANDING CHARGE	SI$6.20	US$1.69

Notes:

1 All consumers pay on metered use. Consumers are billed monthly and pay at banks or at the utility office.
2 Tariffs set aims to make SIWA commercially viable with a financial system that is accountable and transparent.
3 There were 450 new connections in 1995. Price of new connection is SI$350 (US$95.34) for ½" meter and SI$400 (US$108.96) for ¾" meter connections payable in advance.
4 The water bill has a 50% sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Institutional strengthening.
2) Infrastructure development.

II. Consumers' Opinion
1) Reliable water supply and new water source.
2) Improve water quality.

Consumer Survey Findings

The average monthly water consumption per family is 61.09 m^3. Monthly water bill averages SI$45.68 (US$12.44) compared to the monthly power bill of SI$83.86 (US$22.84). About 48% of the consumers claimed to have 24-hour water supply. Perception of water quality is satisfactory (40%) to good (17%). About 57% drink water from the tap while the rest either boil or filter their drinking water. Approximately 80% said they experienced water interruption in the month preceding the survey. Repair of leaks reported to the utility takes about 10 days to be made. Overall rating of the utility ranges from fair (54%) to good (21%).

Major Changes in the Water Utility (1991-1995)

For Honiara Water Supply, average daily production increased by 36%. The percentage of groundwater of the total production increased from 9% to 28%. Unit production cost increased by 45% while average tariff went up by 29%. Operating ratio improved from 1.54 to 1.26. UFW was reduced significantly from 55% to 38%. The utility itself was changed from a government department to an authority with more autonomy in its operations.

City Profile HONIARA

HONIARA WATER SUPPLY

Population: 46,931 (1995)

Production/Distribution

Average Daily Production	27,130 m^3/d
Groundwater	28%
Surface Water	72%
Treatment Type	Chlorination
Treatment Capacity	27,130 m^3/d
Storage	3,170 m^3
Service Area [1]	38 sq km

Service Connections

House (7 persons/HC)	4,585
Public Tap (20 persons/PT)	762
Industrial)	331
Commercial)	
Institutional	26
Other	
Total	***5,704***

Service Indicators

Service Coverage	100%
Water Availability [2]	23 hours/day
Per Capita Consumption	251 l/c/d
Average Tariff	US$0.148/$m^3$
Drinking Water [3]	Tap

Efficiency Indicators

Unaccounted Water [4]	38%
Non-Revenue Water	38%
Unit Production Cost	US$0.116/$m^3$
Operating Ratio	1.26
Accounts Receivable	5.4 months
Staff/1,000 Connections [5]	10.7

Notes:

[1] Honiara Water Supply is responsible for the Honiara Town Area of 41 sq km.

[2] Approximately 90% of consumers have 24-hour water supply. During the year, about 3,576 complaints were registered.

[3] In 1995, about 91 water samples out of 477 tested failed the bacteriological tests.

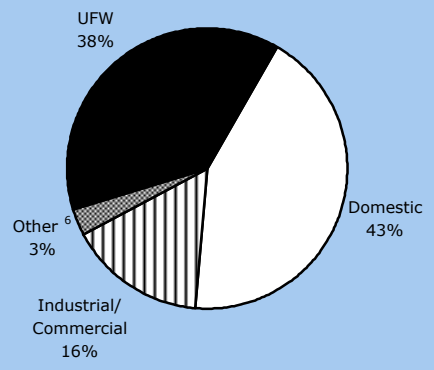
[4] About 1,084 leaks were repaired and 98 meters were replaced in 1996.

[5] This ratio is for the entire SIWA.

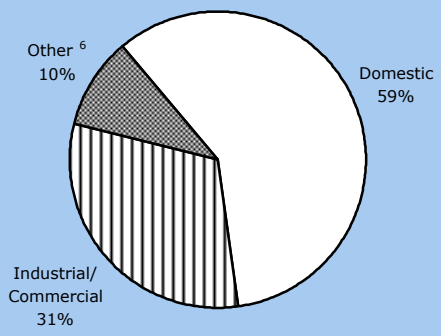
[6] Other use and billing refer to institutional connections.

[7] Other costs include maintenance equipment rental and compensation to landowners where groundwater is extracted.

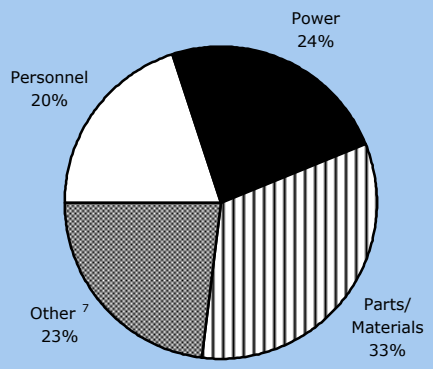
Data as of 1995 except leak repairs (1996).



Annual Water Use
9,902,450 m^3



Annual Water Billings
US$910,534



Annual O&M Costs
US$1,148,062

SRI LANKA *Utility Profile*

Water Utility

NATIONAL WATER SUPPLY AND DRAINAGE BOARD

Address : Galle Road, Ratmalana, Sri Lanka
Telephone : (94-1) 635 281, 635 247
Fax : (94-1) 636 449, 637 178
Head : Mr. P. M. R. Pathiraja, General Manager

The National Water Supply and Drainage Board (NWSDB) is a government corporation formed in 1975. It is a national authority tasked with handling and managing Sri Lanka's water supply, drainage and sewerage where local authorities are unable to do so. The private sector is involved in source development, billing and collection, payroll preparation, vehicle and equipment repair and maintenance, and security services. Government exercises control on number and salaries of staff, tariff, appointment of staff and top management, and budget for development. The utility has a partly developed management information system. Its billing and accounting systems are computerized. NWSDB is currently following its 1996-2000 Development Plan. A glossy covered 1995 annual report with key facts and figures, corporate plan, organization, staff, water supply operations, and financial performance was produced for government.

Mission Statement

"To be the premier organization in providing safe drinking water and sewerage facilities. To be a supporting agency in providing on-site sanitation. To be a facilitating and monitoring agent in collaboration with other related institutions."

General Data About Water Utility

Connections	: 323,259	
Staff	: 7,555	
Annual O&M Costs	: SLRs1,175,500,000	: US$20,128,425
Annual Collections	: SLRs1,457,000,000	: US$24,948,630
Annual Billings	: SLRs1,542,000,000	: US$26,404,110
Annual Capital Expenditure	: SLRs2,681,000,000	: US$45,907,534
(Average over last 5 years)	Expenditure Per Connection	: US$142.01/connection
Source of Investment Funds	: 57% externally-funded government grant; 43% national government grant	

Tariff Structure

(Effective 1994)

Service Charge (monthly)	SLRs	US$	UNMETERED Flat Rate (monthly)	SLRs	US$
Domestic	6.00	0.10	Domestic	150.00	2.57
Non-Domestic	20.00	0.34	Non-Domestic	1,500.00	25.68
METERED					
Category	SLRS/m^3	US$/$m^3$	Category	SLRS/m^3	US$/$m^3$
Domestic & Religious Institutions			Non-Domestic		
0 - 10 m^3	0.75	0.013	Gov't. Institutions	22.00	0.377
10 - 20 m^3	1.30	0.022	Commercial	22.00	0.377
20 - 30 m^3	4.80	0.082	Tourist Hotels	27.00	0.462
30 - 40 m^3	9.40	0.161	Industries	25.00	0.428
40 - 50 m^3	12.00	0.205	Shipping	80.00	1.370
Over 50 m^3	25.00	0.428	Bulk Billing		
			Without Electricity	3.40	0.058
Standposts	1.75	0.030	With Electricity	4.90	0.084

Notes:

1 Most consumers pay on metered use with 97% of house, industrial and commercial connections, and 92% of institutional connections metered. Consumers are billed monthly and pay at banks, the utility office or authorized collection centers.
2 Tariff setting aims to recover O&M costs and debt service or depreciation whichever is higher.
3 There were 32,232 new connections in 1995. Cost of new connection ranges from SLRs5,400 (US$92.47) to SLRs6,250 (US$107.02) for 12 mm to 20mm diameter connections payable in advance.
4 Sewerage charge is not included in the water bill.

Priority Need of Utility

I. As seen by Management
1) Unaccounted-for-water reduction.
2) Autonomy in management functions.

II. Consumers' Opinion
1) More water and increased pressure.
2) Quick repairs.

Consumer Survey Findings

Average monthly water consumption in Greater Colombo is 20.4 m^3. Monthly water bill averages SLRs46.40 (US$0.79) compared to the monthly power bill of SLRs404.60 (US$6.93). About 85% claim to enjoy 24-hour service. Water quality is perceived to be satisfactory (87%) to good (12%). About 45% drink water from the tap, the rest either boil or filter water. Leak repairs take about 3 days to be made. About 31% experienced service interruption in the month preceding the survey. Overall rating of the utility in Greater Colombo is fair (93%).

Major Changes in the Water Utility (1991-1995)

For Greater Colombo, the average daily production increased by 39% and treatment capacity also went up by 67%. The average tariff increased by 13% while the unit production cost went up by 96%. Operating ratio went up from 0.26 to 0.53. Accounts receivable improved from 10.2 to 3.2 months. Water availability also increased from 12 to 22 hours/day. Total connections in Greater Colombo increased by 25%. The distinction between UFW (35%) and NRW (51%) more accurately reflects the water losses. Staff/1,000 connections improved from 9.2 to 7.3.

City Profile COLOMBO

COLOMBO WATER SUPPLY

Population: 2,800,000 (1995)

Production/Distribution

Average Daily Production [1]	499,730 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	600,000 m^3/d
Storage	228,000 m^3
Service Area [2]	110 sq km

Service Connections

House (6 persons/HC)	145,637
Public Tap (150 persons/PT)	5,453
Industrial	551
Commercial	12,564
Institutional	1,753
Other	1,258
Total	***167,216***

Service Indicators

Service Coverage [3]	58%
Water Availability [4]	22 hours/day
Per Capita Consumption	165 l/c/d
Average Tariff	US$0.144/$m^3$
Drinking Water [5]	Boiled

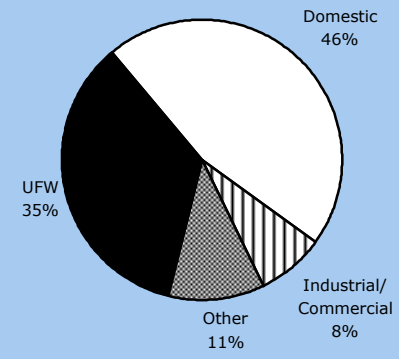
Efficiency Indicators

Unaccounted Water [6]	35%
Non-Revenue Water [7]	51%
Unit Production Cost	US$0.050/$m^3$
Operating Ratio	0.53
Accounts Receivable	3.2 months
Staff/1,000 Connections	7.3

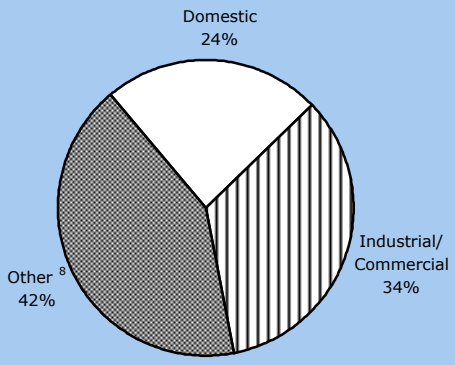
Notes:

[1] About 90% of total production is metered.
[2] Total area of responsibility in Greater Colombo is 730 sq km.
[3] People also use tubewells and dug wells.
[4] In 1995, about 25,200 consumer complaints were attended to.
[5] Approximately 655 water samples out of 6,203 failed the bacteriological tests during the year.
[6] During the year, about 6,000 leaks were repaired and 1,500 meters replaced or repaired.
[7] A large part of the difference between NRW and UFW are the unbilled consumption from standposts and tenement garden taps.
[8] The ratio for the utility is 23.4.
[9] Other use/billing is mostly for government institutions, shipping and hotels.

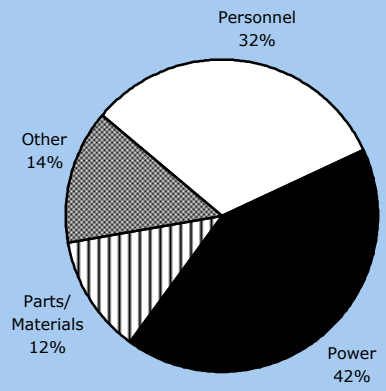
Data as of 1995.



Annual Water Use
182,401,450 m^3



Annual Water Billings
US$17,095,719



Annual O&M Costs
US$9,047,945

TAIPEI,CHINA *Utility Profile*

Water Utility

TAIPEI WATER DEPARTMENT

Address : 131 Changxing Street, Taipei,China
Telephone : (886-2) 735 2141
Fax : (886-2) 735 3185
Head : Lin, Wen-Yuan, Commissioner

The Taipei Water Department (TWD), a government enterprise formed in 1907, is responsible for the water supply of Taipei and suburban areas serving about 3,801,153 people. The private sector is involved in billing, collection and leak repair. TWD buys raw water from Feitsui Reservoir but is responsible for treatment and distribution. The government exercises control on the number and salaries of staff, tariff, appointment of top management, and budget for development. The utility has a well developed management information system. Its billing, accounting, personnel, materials control, pumping and treatment systems are computerized. TWD is following the Taipei Regional Water Supply Project with a first phase (1992- 2001) costing NT$21.9 billion and a second phase (2002-2111). It published a glossy covered annual report for 1995.

Mission Statement

"Sufficient quantity, excellent quality, satisfactory service at reasonable rates."

General Data About Water Utility

Connections	: 1,289,180	
Staff	: 1,465	
Annual O&M Costs	: NT$4,086,298,525	: US$146,989,156
Annual Collections	: NT$4,094,314,687	: US$147,277,507
Annual Billings	: NT$5,884,162,121	: US$211,660,508
Annual Capital Expenditure	: NT$2,210,200,000	: US$ 79,503,597
(Average over last 5 years)	Expenditure Per Connection	: US$61.67/connection
Source of Investment Funds	: 71.0% commercial loan; 18.2% internally generated reserves 10.8% government loan	

Tariff Structure

(Effective March 1994)

Minimum Water Fee Per Month			Water Rates per Cubic Meter		
Meter Size (mm)	NT$	US$	Consumption (m^3)	(NT$/$m^3$)	(US$/$m^3$)
13	17	0.61			
20	68	2.44	1 - 20	5.00	0.180
25	126	4.53			
40	374	13.45	21 - 60	5.20	0.187
50	680	24.46			
75	1,836	66.04	61 - 200	5.70	0.205
100	3,638	130.86			
150	10,098	363.24	201 - 1,000	6.50	0.234
200	20,060	721.58			
250	35,428	1,274.39	Over 1,000	7.60	0.273
Over 250	55,590	1,999.64			

Notes:
1 All consumers pay on metered use. Consumers are billed every 2 months and pay at post offices, banks and the utility office.
2 Tariffs set are meant to recover all costs and to earn a reasonable profit.
3 In 1995, there were 32,545 new connections installed. Price of new connection is NT$30,000 (US$1,079.14) for a PVC pipe connection and NT$45,000 (US$1,618.70) for a stainless steel pipe connection payable in advance.
4 Sewerage surcharge is 4 - 20% of the water bill. There is also a 63% environmental surcharge in the water bill.

Priority Need of Utility

I. As seen by Management
1) Sufficient water supply.
2) Stable and reliable water quality.

II. Consumers' Opinion
1) Leak prevention and repair.
2) Better water quality.

Consumer Survey Findings

The average monthly water consumption per family is 26.12 m^3. Monthly water bill averages NT$212.54 (US$7.65) compared to the average monthly power bill of NT$1,174.50 (US$42.25). All respondents said they have 24-hour water supply. Water quality is perceived to be satisfactory (88%). However, all respondents either boil or filter their drinking water. Only 4% said that they experienced any water interruption during the month preceding the survey. Leak repairs take less than 2 days to be made after being reported to the utility. Overall rating of TWD is good (42.5%) to fair (42.5%).

Major Changes in the Water Utility (1991-1995)

Major changes in Taipei Water Supply are in average daily production and treatment capacity which went up by 48% and 33%, respectively. Average tariff increased by 78% while unit production cost went up by 216%. Operating ratio increased slightly from 0.64 in 1990 to 0.69. Accounts receivable went up from 0.3 to 1.7 months. There were very slight changes in number of service connections (down by 1.5%), UFW (up from 24% to 26%) and staff/1,000 connections ratio (improved to 1.1 from 1.2). The tariff structure changed in 1994 when TWD did away with consumer classification and now has a single tariff structure for all consumers.

City Profile TAIPEI

TAIPEI WATER SUPPLY

Population: 3,801,153 (1995)

Production/Distribution

Average Daily Production [1]	2,740,000 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Conventional
Treatment Capacity	3,000,000 m^3/d
Storage	210,000 m^3
Service Area [2]	190 sq km

Service Connections

House (3.28 persons/HC)	---
Public Tap	---
Industrial	---
Commercial	---
Institutional	---
Other	---
Total [3]	***1,171,343***

Service Indicators

Service Coverage [4]	99%
Water Availability [5]	24 hours/day
Per Capita Consumption	262 l/c/d
Average Tariff	US$0.388/$m^3$
Drinking Water [6]	Boiled

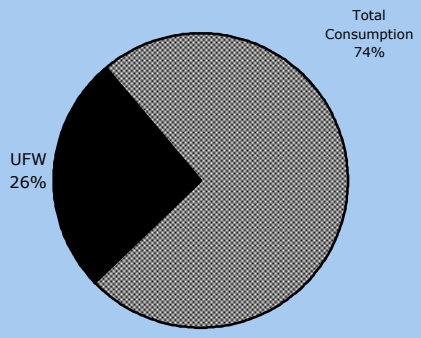
Efficiency Indicators

Unaccounted Water [7]	26%
Non-Revenue Water	37%
Unit Production Cost	US$0.201/$m^3$
Operating Ratio	0.69
Accounts Receivable	1.7 months
Staff/1,000 Connections	1.1

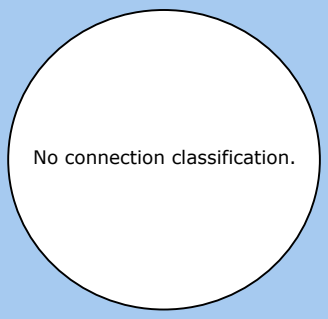
Notes:

[1] Actual daily production in 1995 was 2,003,709 cu. m./day.
[2] Total area of responsibility is 400 sq km.
[3] TWD stopped classifying connections in 1996.
[4] Other residents in area of responsibility rely on mountain springs.
[5] In 1995, about 390 consumer complaints were registered.
[6] During the year, 41 water samples out of 4,960 tested failed the bacteriological tests.
[7] About 30,623 leaks were repaired and 44,049 meters were replaced or repaired during the year.
[8] Other costs include interests, depreciation, maintenance and rent.

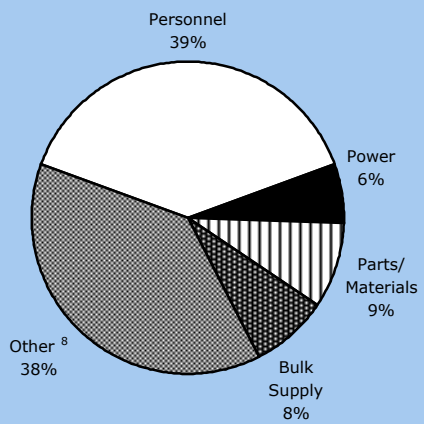
Data as of 1995.



Annual Water Use
731,353,785 m^3



Annual Water Billings [3]
US$211,660,508



Annual O&M Costs
US$146,989,156

THAILAND *Utility Profile*

Water Utility

METROPOLITAN WATERWORKS AUTHORITY

Address : 18/137 Prachachuen Road, Don Muang District, Bangkok 10210, Thailand
Telephone : (66-2) 504 0123
Fax : (66-2) 503 9493
Head : Mrs. Chuanpit Dhamasiri, Governor

The Metropolitan Waterworks Authority (MWA) is a government enterprise set up in August 1967 which is responsible for the water supply of Bangkok and two nearby provinces with a total population of 7,300,000 people. The private sector is involved in water production for the waterworks system that dates back to 1914. Staff salaries, tariffs and budget for development are under government control. The urban poor are provided with house connections with payment of connection fees spread over 12 months.

The MWA has a partly developed management information system (MIS). Its Billing, accounting, payroll, pumping and treatment systems and MIS are all computerized. A glossy covered annual report for 1995 is available. MWA is currently following their 1996-2001 Development Plan which is part of the updated Master Plan (1987-2017) with 8 future investment projects each aiming to increase production capacity by 400,000 cu m/day to serve 14.1 million people or 91% of the people in its area of responsibility.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 1,241,380	
Staff	: 5,736	
Annual O&M Costs	: B 5,990,434,640	: US$243,019,661
Annual Collections	: B 7,516,837,958	: US$304,942,716
Annual Billings	: B 6,771,420,000	: US$274,702,637
Annual Capital Expenditure	: B10,000,000,000	: US$405,679,513
(Average over last 5 years)	Expenditure Per Connection	: US$326.80/connection
Source of Investment Funds	: 70% internally generated reserves; 30% commercial loan	

Tariff Structure

(Effective October 1995)

RESIDENTIAL			COMMERCIAL/Government			INDUSTRIAL		
Vol - m^3	(B/m^3)	(US/m^3)	Vol -m^3	(B/m^3)	(US/m^3)	Vol -m^3	(B/m^3)	(US/m^3)
0-30	4.00 with B20 minimum	0.162 0.811 minimum	0-10	Package 50.00	Package 2.028	Rates for first 200 m^3 same as Commercial.	- See Comm'l	- See Comm'l
31-40	5.53	0.224	11-20	6.20	0.251	-	-	-
41-50	5.85	0.237	21-30	6.45	0.262	-	-	-
51-60	6.18	0.251	31-40	8.71	0.353	201-2,000	11.18	0.454
61-70	6.50	0.264	41-50	9.04	0.367	2,001-4,000	10.92	0.443
71-80	6.83	0.277	51-60	9.36	0.380	4,001-6,000	10.40	0.422
81-90	8.00	0.325	61-80	9.69	0.393	6,001-10,000	9.75	0.396
91-100	8.32	0.338	81-100	10.01	0.406	10,001-20,000	9.10	0.369
101-120	8.65	0.351	101-120	10.34	0.419	20,001-30,000	8.45	0.343
121-160	8.97	0.364	121-160	10.66	0.432	30,001-40,000	7.80	0.316
161-200	9.30	0.377	161-200	10.99	0.446	40,001-50,000	7.15	0.290
Over 200	9.95	0.404	Over 200	11.31	0.459	Over 50,000	6.50	0.264

Notes:

1 All consumers pay on metered use. Customers are billed monthly and pay at banks, the utility offices, automated teller machines or to bill collectors.
2 MWA sets tariffs that will cover the utility's costs while considering customers' affordability.
3 There were 66,547 new connections in 1995. Cost of new connection ranges from B7,000 (US$283.98) to B10,700 (US$434.08) for ½" to 1" diameter connections payable in advance.

Water bill has no sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Reduction of unaccounted water.
2) Service area expansion.

II. Consumers' Opinion
1) Improve water quality.
2) Improve water pressure.

Consumer Survey Findings

Average monthly water consumption is 34.6 m^3 per family. The average monthly water bill is B257.60 (US$10.45) compared to the monthly power bill of B931.00 (US$37.77). About 80% said they have 24-hour water supply. Perception of water quality among those surveyed is satisfactory (72%) to good (17%). About 80% boil or filter their water before drinking. There are about 58% who complain of low water pressure on their taps. About 43% claim to have experienced service interruption in the month preceding the survey. It takes about a week before repairs on reported leaks are completed. Overall rating of MWA by the respondents range from fair (74%) to good (15%).

Major Changes in the Water Utility (1991-1995)

Average daily production increased by 34% while treatment capacity increased by 250% as a result of the increase in the average annual capital investment from B1.1 billion to B10 billion. Total number of connections increased by 21% with the service coverage reaching 82% from 79% in 1991. Average tariff increased by 25% and unit production cost went up by 135%. Accounts receivable improved from 3.1 to 2 months; Staff/1,000 connections also improved from 5.5 to 4.6. However, UFW increased to 38% from 31%. Investments are now funded from internally generated reserves and commercial loans without foreign loans which was 48% of total funding in 1991.

City Profile BANGKOK

BANGKOK WATER SUPPLY

Population: 7,300,000 (1995)

Production/Distribution

Average Daily Production	3,849,863 m^3/d
Groundwater	5%
Surface Water	95%
Treatment Type	Conventional
Treatment Capacity	3,662,657 m^3/d
Storage	510,000 m^3
Service Area [1]	893 sq km

Service Connections

House (5 persons/HC)	917,527
Public Tap	Nil
Industrial	157
Commercial	315,078
Institutional	7,579
Other	1,039
Total	***1,241,380***

Service Indicators

Service Coverage [2]	82%
Water Availability [3]	24 hours/day
Per Capita Consumption	265 l/c/d
Average Tariff	US$0.313/$m^3$
Drinking Water [4]	Boiled/Filtered

Efficiency Indicators

Unaccounted Water [5]	38%
Non-Revenue Water	38%
Unit Production Cost	US$0.173/$m^3$
Operating Ratio	0.89
Accounts Receivable	2 months
Staff/1,000 Connections	4.6

Notes:

[1] Total area of responsibility is 3,080 sq km.

[2] Other sources include wells, ponds and rainwater.

[3] In 1996, MWA attended to 18,648 consumer complaints.

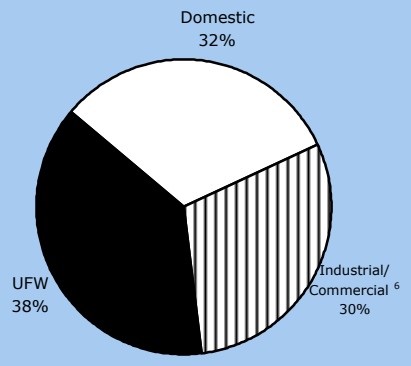
[4] About 276 water samples out of 7,663 tested in 1995 failed the bacteriological tests.

[5] There were 119,805 leaks repaired and 121,558 meters replaced or repaired in 1996.

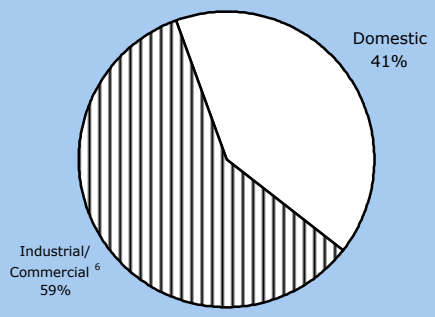
[6] Industrial/commercial use and billing include those for institutional connections.

[7] Other costs include loan amortization, depreciation and interest payments.

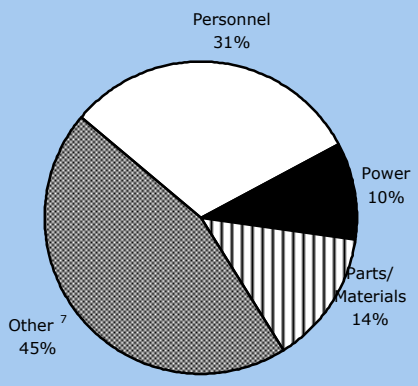
Data as of 1994-1995 except for leaks, complaints and meters replaced or repaired (1996).



Annual Water Use
1,405,199,995 m^3



Annual Water Billings
US$272,267,748



Annual O&M Costs
US$243,019,661

THAILAND *Utility Profile*

Water Utility

PROVINCIAL WATERWORKS AUTHORITY

Address : 72 Chaengwattana 1 Road, Donmuang, Bangkok 10210, Thailand
Telephone : (66-2) 551 1020
Fax : (66-2) 552 1547
Head : Mr. Thanya Harnpol, Governor

The Provincial Waterworks Authority (PWA) is a government corporation set up in 1979, which manages the water supply of about 223 local water utilities throughout Thailand outside Bangkok. The Chiangmai Water Supply is under the PWA Regional Office No.9 which is responsible for 24 other waterworks. The private sector is involved in billing and collection, production, leak repair, security and cleanliness. Government exercises control on staff salaries, tariff, appointment of top management, and budgets for O&M and development. The utility has a partly developed management information system. The billing and accounting systems are computerized. PWA is currently following its 1997-2001 Development Plan. A glossy covered annual report for 1994 is available.

Mission Statement

"To conduct surveys, seek sources of water and acquire water for treatment; to produce, deliver, distribute water throughout the country, except for the Bangkok Metropolitan area and Samut Prakan Province; and, to undertake other business related to the water supply business."

General Data About Water Utility

Connections	: 1,194,742	
Staff	: 6,547	
Annual O&M Costs	: B2,995,286,847	: US$121,512,651
Annual Collections	: B3,000,364,905	: US$121,718,657
Annual Billings	: B3,159,922,694	: US$128,191,590
Annual Capital Expenditure	: B4,068,422,000	: US$165,047,546
(Average over last 5 years)	Expenditure Per Connection	: US$138.14/connection
Source of Investment Funds	: 42% internally generated reserves; 7% commercial loan 26% national government grant; 25% local bonds	

Tariff Structure

(Effective March 1993 - Chiangmai)

Volume	Residence & Others		Government Agencies		Industrial (Outside)	
m^3/month	Baht/ m^3	US$/ m^3	Baht/ m^3	US$/ m^3	Baht/ m^3	US$/ m^3
Minimum	15.00	0.609	30.00	1.217	50.00	2.028
0-10	3.75	0.152	5.00	0.203	6.00	0.243
11-20	4.50	0.183	6.00	0.243	7.00	0.284
21-30	6.50	0.264	7.25	0.294	9.00	0.365
31-50	8.50	0.345	8.50	0.345	12.50	0.507
51-80	9.00	0.365	9.00	0.365	13.75	0.558
81-100	9.50	0.385	9.50	0.385	14.75	0.598
101-300	10.00	0.406	10.00	0.406	16.75	0.680
301-1,000	10.25	0.416	10.25	0.416	17.75	0.720
1,001-2,000	10.50	0.426	10.50	0.426	16.75	0.680
2,001-3,000	10.75	0.436	10.75	0.436	16.50	0.669
Over 3,001	11.00	0.446	11.00	0.446	15.50	0.629

INDUSTRIAL (Inside Industrial Estate)

Vol (m^3)	B/m^3	US$/$m^3$	Vol (m^3)	B/m^3	US$/$m^3$	Vol (m^3)	B/m^3	US$/$m^3$
Min.	50.00	2.028	61-80	9.69	0.393	4,001-6,000	10.40	0.422
0-10	5.00	0.203	81-100	10.01	0.406	6,001-10,000	9.75	0.396
11-20	6.20	0.252	101-120	10.34	0.419	10,001-20,000	9.10	0.369
21-30	6.45	0.262	121-160	10.66	0.432	20,001-30,000	8.45	0.343
31-40	8.71	0.353	161-200	10.99	0.446	30,001-40,000	7.80	0.316
41-50	9.04	0.367	201-2,000	11.18	0.454	40,001-50,000	7.15	0.290
51-60	9.36	0.380	2,001-	10.92	0.443	Over 50,001	6.50	0.264

Notes:

1 All consumers pay on metered use. Consumers are billed monthly and pay at banks, the utility offices or to bill collectors.
2 Tariffs set are to reflect real cost in each locality to ensure that PWA has sufficient revenue to cover its expenditures. Hence, waterworks in some areas, like Chonburi, have tariff structure different from others.
3 There were 2,666 new connections in 1995 in Chiangmai. Cost of new connection ranges from B2,050 (US$83.16) to B30,025 (US$1,218.05) for ½ " to 6" diameter connections payable in advance.
4 There is no sewerage charge since sewerage is not PWA's responsibility.

Priority Need of Utility

I. As seen by Management
1) Funds for improvement and expansion of waterworks systems.
2) Human resources management.

II. Consumers' Opinion
1) Higher water pressure.
2) Improve water quality.

Consumer Survey Findings

In Chiangmai, the average monthly water consumption per family is 26.16 m^3. Monthly water bill averages B132.39 (US$5.37) compared to the average monthly power bill of B488.83 (US$19.83). About 74% said they have 24-hour water supply. More than half (55%) perceived water quality to be poor with only 4% drinking water from the tap without boiling or filtering. About 50% thinks the water pressure is low. Only 12% of those surveyed had service interruption in the month preceding the survey and it takes less than two days for reported leaks to be repaired. Overall rating of the utility in Chiangmai is fair(76%).

Major Changes in the Water Utility (1991-1995)

Coverage increased to 65% from 39% in Chiangmai. Accounts receivable was largely reduced from 22.3 months to 1.2 months. Average tariff decreased by 36% in 1991 with billings including large arrears. Unit production cost also went down by 54%. Operating ratio improved from 0.74 down to 0.49. For PWA, local bonds is a new source of capital investment funds although it still relies on internally generated reserves, commercial loans and government grant. (For more utility changes, see discussions in the Chonburi profile.)

City Profile CHIANGMAI

CHIANGMAI WATER SUPPLY

Population: 195,600 (1995)

Production/Distribution

Average Daily Production	46,500 m^3/d
Groundwater	5%
Surface Water	95%
Treatment Type	Chlorination/Rapid Sand Filter
Treatment Capacity	53,760 m^3/d
Storage	16,100 m^3
Service Area	92 sq km

Service Connections

House (4.5 persons/HC)	28,177
Public Tap [1]	1
Industrial	3,261
Commercial	3,335
Institutional	295
Other	Nil
Total	***35,069***

Service Indicators

Service Coverage [2]	65%
Water Availability [3]	20 hours/day
Per Capita Consumption	135 l/c/d
Average Tariff	US$0.299/$m^3$
Drinking Water [4]	Filtered

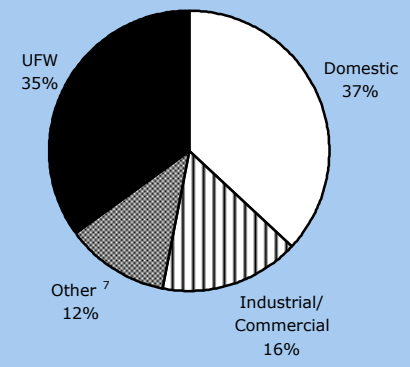
Efficiency Indicators

Unaccounted Water [5]	35%
Non-Revenue Water	38%
Unit Production Cost	US$0.096/$m^3$
Operating Ratio	0.49 [7]
Accounts Receivable	1.2 months
Staff/1,000 Connections [6]	5.5

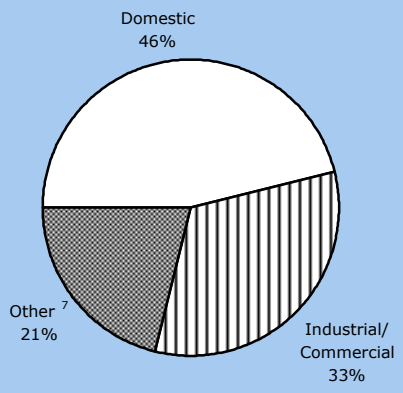
Notes:

[1] This is where water used for construction and for fire fighting are drawn by water tankers.
[2] Other sources are wells and rainwater.
[3] About 70% of consumers get 24-hour water supply.
[4] During the year, 13 water samples out of 127 tested failed the bacteriological tests.
[5] In 1994-1995, about 4,013 leaks were repaired and 1,758 meters were replaced or repaired.
[6] Ratio for the entire PWA is 5.5.
[7] Other use and billing refer to institutional connections.
[8] O&M costs do not include loan amortization, interest and depreciation.

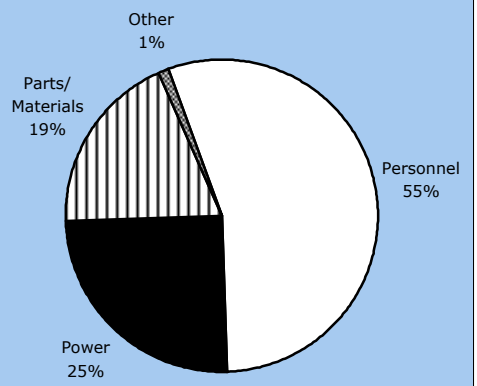
Data as of 1994-1995.



Annual Water Use
16,972,500 m^3



Annual Water Billings
US$3,316,430



Annual O&M Costs [8]
US$1,631,643

THAILAND *Utility Profile*

Water Utility

PROVINCIAL WATERWORKS AUTHORITY

Address : 72 Chaengwattana 1 Road, Donmuang, Bangkok 10210, Thailand
Telephone : (66-2) 551 1020
Fax : (66-2) 552 1547
Head : Mr. Thanya Harnpol, Governor

The Provincial Waterworks Authority (PWA) is a government corporation set up in 1979, which manages the water supply of about 223 local water utilities throughout Thailand outside Bangkok. The Chonburi Water Supply is under the PWA Regional Office No.1 which is responsible for 16 other waterworks. The private sector is involved in billing and collection, production, leak repair, security and cleanliness. Government exercises control on staff salaries, tariff, appointment of top management, and budgets for O&M and development. The utility has a partly developed management information system. The billing and accounting systems are computerized. PWA is currently following its 1997-2001 Development Plan. A glossy covered annual report for 1994 is available.

Mission Statement

"To conduct surveys, seek sources of water and acquire water for treatment; to produce, deliver, distribute water throughout the country, except for the Bangkok Metropolitan area and Samut Prakan Province; and, to undertake other business related to the water supply business."

General Data About Water Utility

Connections	: 1,194,742	
Staff	: 6,547	
Annual O&M Costs	: B2,995,286,847	: US$121,512,651
Annual Collections	: B3,000,364,905	: US$121,718,657
Annual Billings	: B3,159,922,694	: US$128,191,590
Annual Capital Expenditure	: B4,068,422,000	: US$165,047,546
(Average over last 5 years)	Expenditure Per Connection	: US$138.14/connection
Source of Investment Funds	: 42% internally generated reserves; 7% commercial loan 26% national government grant: 25% local bonds	

Tariff Structure

(Effective February 1995 - Chonburi)

Volume	Residence & Others		Government Agencies		Industrial (Outside)	
m^3/month	Baht/ m^3	US$/ m^3	Baht/ m^3	US$/ m^3	Baht/ m^3	US$/ m^3
Minimum	25.00	1.014	45.00	1.826	70.00	2.840
0-10	6.25	0.254	7.50	0.304	8.50	0.345
11-20	7.00	0.284	8.50	0.345	9.50	0.385
21-30	9.00	0.365	9.75	0.396	11.50	0.467
31-50	11.00	0.446	11.00	0.446	15.00	0.609
51-80	11.50	0.467	11.50	0.467	16.25	0.659
81-100	12.00	0.487	12.00	0.487	17.27	0.701
101-300	12.50	0.507	12.50	0.507	19.25	0.781
301-1,000	12.75	0.517	12.75	0.517	20.25	0.822
1,001-2,000	13.00	0.527	13.00	0.527	19.25	0.781
2,001-3,000	13.25	0.538	13.25	0.538	19.00	0.771
Over 3,001	13.50	0.548	13.50	0.548	18.00	0.730

INDUSTRIAL (Inside Industrial Estate)

Vol (m^3)	B/m^3	US$/$m^3$	Vol (m^3)	B/m^3	US$/$m^3$	Vol (m^3)	B/m^3	US$/$m^3$
Min.	75.00	3.043	61-80	12.25	0.497	4,001-6,000	13.00	0.527
0-10	7.50	0.304	81-100	12.50	0.507	6,001-10,000	12.25	0.497
11-20	8.25	0.335	101-120	13.00	0.527	10,001-20,000	11.75	0.477
21-30	9.00	0.365	121-160	13.25	0.538	20,001-30,000	11.00	0.446
31-40	11.25	0.456	161-200	13.50	0.548	30,001-40,000	10.50	0.426
41-50	11.50	0.467	201-2,000	13.75	0.558	40,001-50,000	9.75	0.396
51-60	12.00	0.487	2,001-4,000	13.50	0.548	Over 50,001	9.00	0.365

Notes:

1 All consumers pay on metered use. Consumers are billed monthly and pay at banks, the utility offices or to bill collectors.
2 Tariffs set are to reflect real cost in each locality to ensure that PWA has sufficient revenue to cover its expenditures. Hence, waterworks in some areas, like Chonburi, have tariff structure different from others.
3 There were 3,805 new connections in 1995 in Chonburi. Cost of new connection ranges from B2,050 (US$83.16) to B30,025 (US$1,218.05) for ½" to 6" diameter connections payable in advance.
4 There is no sewerage charge since sewerage is not PWA's responsibility.

Priority Need of Utility

I. As seen by Management
1) Funds for improvement and expansion of waterworks systems.
2) Human resources management.

II. Consumers' Opinion
1) Higher water pressure.
2) Improve water quality.

Consumer Survey Findings

For Chonburi, the average monthly water consumption is 19.01m^3 per family. The monthly water bill averages B179.68 (US$7.29) compared to the monthly power bill of B662.41 (US$26.87). About 47% claimed 24-hour water supply; average water availability is 13 hours/day. Perception of water quality ranges from good (31%) to satisfactory (24%). About 55% boil, filter or do both to their drinking water. More than half (53%) said water pressure is low. About 33% had service interruption the month preceding the survey. It takes about 4 days for leak repairs to be made. Overall utility rating is fair (63%).

Major Changes in the Water Utility

For PWA, the total connections increased by 58% while the staff increased by only 12.5% improving the staff/1,000 connections from 7.7 to 5.5. Annual O&M costs increased by 115% while annual collections went up by 65%. The level of annual capital expenditure also increased by 195%. Local bonds is a new source of capital investment funds, although PWA still relies on internally generated reserves, commercial loans and government grant.

City Profile CHONBURI

CHONBURI WATER SUPPLY

Population: 224,700 (1995)

Production/Distribution

Average Daily Production	81,500 m^3/d
Groundwater	Nil
Surface Water	100%
Treatment Type	Chlorination/Rapid Sand Filter
Treatment Capacity	96,000 m^3/d
Storage	39,000 m^3
Service Area	75 sq km

Service Connections

House (4.5 persons/HC)	39,841
Public Tap [1]	1
Industrial	30
Commercial	3,018
Institutional	4,126
Other	Nil
Total	***47,016***

Service Indicators

Service Coverage [2]	89%
Water Availability [3]	16 hours/day
Per Capita Consumption	145 l/c/d
Average Tariff	US$0.461/$m^3$
Drinking Water [4]	Boiled/Filtered

Efficiency Indicators

Unaccounted Water [5]	37%
Non-Revenue Water	38%
Unit Production Cost	US$0.098/$m^3$
Operating Ratio	0.34
Accounts Receivable	1.6 months
Staff/1,000 Connections [6]	5.5

Notes:

[1] This is where water used for construction and for fire fighting are drawn by water tankers.

[2] Estimate given by water utility. Other sources are tubewells and rain water.

[3] Only 50% of consumers get 24-hour water supply. About 1,458 consumer complaints were registered in 1995.

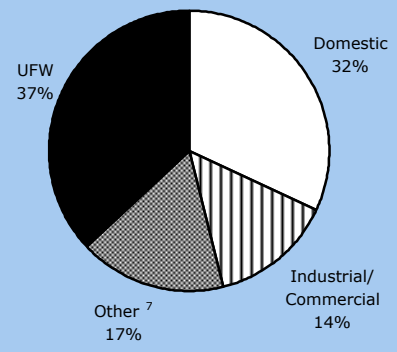
[4] During the year, two water samples out of 12 tested failed the bacteriological tests.

[5] In 1994-95, about 4,021 leaks were repaired and 551 meters were replaced or repaired.

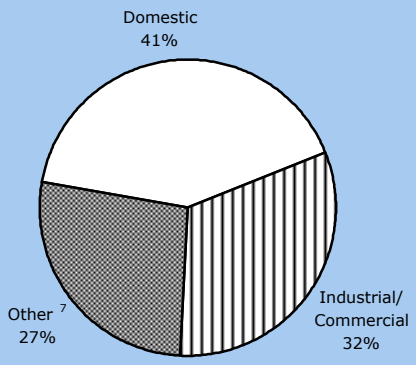
[6] Ratio for the entire PWA is 5.5.

[7] Other use and billing refer to institutional connections.

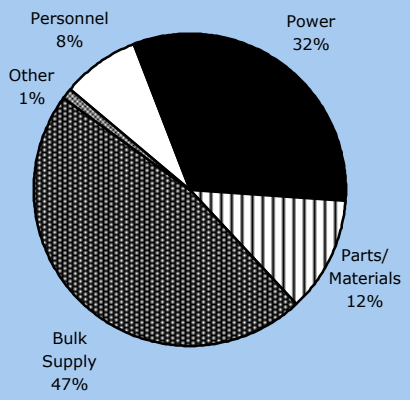
Data as of 1994-1995.



Annual Water Use
29,747,500 m^3



Annual Water Billings
US$8,580,133



Annual O&M Costs
US$2,910,661

TONGA *Utility Profile*

Water Utility

TONGA WATER BOARD

Address : P. O. Box 92, Nuku'alofa, Tonga
Telephone : (676) 23299
Fax : (676) 23518
Head : Saimone P. Helu, Manager

The Tonga Water Board (TWB), a statutory body established in 1966, is responsible for water supply throughout the Kingdom of Tonga. In practice, it exercises powers in urban areas of four major islands including the capital, Nuku'alofa, which has a population of 36,500 people. While there is no private sector involvement in the utility, the Board seems to be autonomous with government hardly exercising any control or influence in its operations or decision-making.

A glossy covered annual report for 1995 is available. TWB has a partly developed management information system. Its accounting system is computerized. It is the Board's policy to provide safe and reliable water to the urban poor at the lowest cost possible allowing them to pay water connection fees spread over 12 months.

Mission Statement

"Productivity based, customer focus, quality driven and humane employees to secure a sustainable "commercial" future of the Tonga Water Board."

General Data About Water Utility

Connections	: 8,453	
Staff	: 135	
Annual O&M Costs	: T$1,150,450	: US$927,408
Annual Collections	: T$1,051,197	: US$847,398
Annual Billings	: T$ 984,000	: US$793,229
Annual Capital Expenditure	: T$ 184,018	: US$148,342
(Average over last 5 years)	Expenditure Per Connection	: US$17.55/connection
Source of Investment Funds	: 78% internally generated reserves; 17% commercial loan 5% government loan	

Tariff Structure

(Effective 1992)

Water Usage	Charge		
(Gallons)	(T$/1,000 gallons)	(T$/$m^3$)	(US$/$m^3$)
0 -1,000	2.40	0.528	0.426
1,001 - 5,000	3.00	0.660	0.532
5,001 - 10,000	3.50	0.770	0.621
Over 10,000	4.00	0.880	0.709

Notes:

1 The above rates are for Nuku'alofa with different rates for the other islands. There is a proposed new uniform rate for Nuku'alofa which is T$1.12/$m^3$ (US$0.903/$m^3$) with a minimum charge of T$5.10 (US$4.11) for consumption of less than 1,000 gallons (4,546 liters).
2 All consumers pay on metered use. Billing is monthly and consumers pay at post offices or at the utility office.
3 About 50 new connections were installed in 1995. Cost of new connection is T$35.00 (US$28.21) payable in advance. Poor consumers may pay over a period of 12 months.
4 There is no sewerage surcharge in the water bill.

Priority Need of Utility

I. As seen by Management
1) Safe and reliable water supply.
2) Efficient work performance.

II. Consumers' Opinion
1) Reduce chemical/improve water quality.
2) Increase water supply and pressure.

Consumer Survey Findings

The average monthly water consumption is 21.8 m^3 per family. Monthly water bill averages T$16.80 (US$13.54) compared to the average monthly power bill of T$52.37 (US$42.22). About 57% claimed to have 24-hour water supply. Perception of water quality is good (28%) to satisfactory (24%) with some complaints on taste and hardness. About 70% drink water from the tap with many of them also boiling their water. Approximately 37% experienced service interruption in the month preceding the survey and 42% complained of low pressure. Leak repairs take an average of 6 days. Overall rating of the utility is fair (45%) to good (36%).

Major Changes in the Water Utility (1991-1995)

For Nuku'alofa, average tariff increased by 32% while unit production cost went up by 5%. Operating ratio improved from 0.86 to 0.80. Average daily production increased by 16% while number of connections went up by 33%. UFW increased from 25% to 42%. Accounts receivable improved from 3.8 to 1.5 months. The utility is increasingly using internally generated reserves for its capital investment needs from 41% to 78% out of the total. It no longer gets contributions from consumers and it is now using commercial and government loans for funding capital improvements.

Town Profile NUKU'ALOFA

NUKU'ALOFA WATER SUPPLY

Population: 36,500 (1995)

Production/Distribution

Average Daily Production	5,600 m^3/d
Groundwater	100%
Surface Water	Nil
Treatment Type	Chlorination
Treatment Capacity	NA
Storage	3,094 m^3
Service Area [1]	30 sq km

Service Connections

House (6 persons/HC)	6,060
Public Tap (4 persons/PT)	45
Industrial	46
Commercial	30
Institutional	215
Other	Nil
Total	***6,396***

Service Indicators

Service Coverage	100%
Water Availability [2]	21 hours/day
Per Capita Consumption	78 l/c/d
Average Tariff	US$0.630/$m^3$
Drinking Water [3]	Tap

Efficiency Indicators

Unaccounted Water [4]	42%
Non-Revenue Water	45%
Unit Production Cost	US$0.294/$m^3$
Operating Ratio	0.80
Accounts Receivable	1.5 months
Staff/1,000 Connections [5]	16.0

Notes:

[1] Total area of responsibility is 35 sq km.

[2] About 87% of consumers get 24-hour water supply. In 1995, 3,735 consumer complaints were attended to.

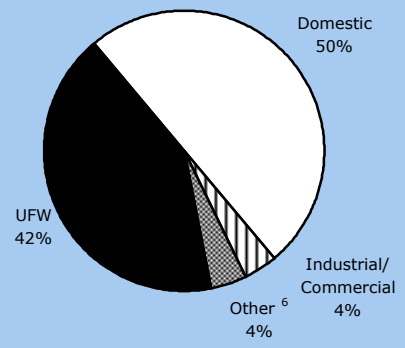
[3] Four water samples out of 12 tested failed the bacteriological tests in 1995.

[4] During the year, 3,476 leaks were repaired and 2,278 meters were replaced or repaired.

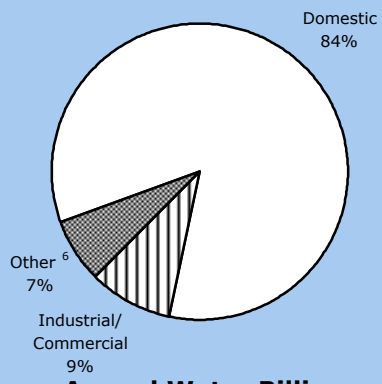
[5] This ratio is for the entire Board.

[6] Other use and billing refer to institutional use.

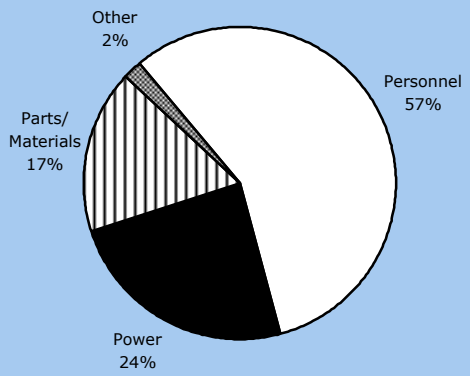
Data as of 1995.



Annual Water Use
2,044,000 m^3



Annual Water Billings
US$748,501



Annual O&M Costs
US$601,243

UZBEKISTAN *Utility Profile*

Water Utility

TASHKENT VODOCANAL

Address : Chekhova Str.#2, Tashkent, Uzbekistan
Telephone : (7-3712) 566 028, 450 567
Fax : (7-3712) 337 835, 450 249
Head : Zakirkhodja Salikhodjayev, Director

The Tashkent Vodocanal is a government enterprise formed in 1931. It is under the Tashkent City Community Services Department and is responsible for the water supply and sewerage of the city with a population of 1,924,690 people. The government maintains control over the utility on the number and salaries of staff, appointment of top management and budget for development. The urban poor are provided with piped water connection under the "Makhallya Programme." The utility has a partly developed management information system. Its billing and accounting systems are computerized. The vodocanal's development follows the development plan for 1997-2000. A type-script 1996 annual report for the government is available.

Mission Statement

"Provide uninterrupted and 24-hour good quality water supply to the City of Tashkent by leak reduction, source development, distribution system expansion, eliminating use of drinking water for garden irrigation, and expansion of sewerage system."

General Data About Water Utility

Connections	: 143,310	
Staff	: 2,560	
Annual O&M Costs	: Sum 871,445,000	: US$14,330,620
Annual Collections	: Sum1,010,837,800	: US$16,622,888
Annual Billings	: Sum1,022,888,800	: US$16,821,062
Annual Capital Expenditure	: Sum 5,792,601	: US$ 95,257
(Average over last 5 years)	Expenditure Per Connection	: US$0.66/connection
Source of Investment Funds	: 100% internally generated reserves	

Tariff Structure

(Effective April 1997)

Category	Water Rates per Cubic Meter	
	(Sum/m^3)	(US$/$m^3$)
Domestic	0.37	0.006
Institutional	2.00	0.033
Commercial	5.50	0.090
Industrial	5.50	0.090

Notes:

1 Almost all consumers pay on flat rate based on established per capita consumption. Only industrial connections pay on metered use since these are the only connections metered. Consumers are billed monthly and pay at banks, post offices or at the utility office.
2 Tariffs set aims for profitability that will cover the company's social needs and expansion of production and distribution.
3 There were 655 new connections in 1996. Price of new connection is Sum10,000 (US$164.45) payable in advance.
4 Sewerage charge is 49% to 75% of the water bill.

Priority Need of Utility

I. As seen by Management
1) Improve cash flow through better revenue collection.
2) Supply of replacement parts, and funds for power, fuel, chemical and transport.

II. Consumers' Opinion
1) Increase water pressure.
2) Improve water quality.

Consumer Survey Findings

The average estimated monthly water consumption is 25.13 m^3 per family. Monthly water bill is Sum19.10 (US$0.31) compared to the monthly power bill of Sum174.74 (US$2.87). About 56% said they have 24-hour water supply. Consumers perceive water quality to be good (70%) to satisfactory (27%). About 54% drink water from the tap while the rest boil their water. About 70% of those surveyed complained of low water pressure while 51% said they experienced service interruption during the month preceding the survey. It takes less than 2 days for the utility to repair water leaks from the time they are reported. Overall rating of the utility by the consumers is fair (83%).

Major Changes in the Water Utility

Not in the First Data Book.

City Profile TASHKENT

TASHKENT WATER SUPPLY

Population: 1,924,690 (1996)

Production/Distribution

Average Daily Production	2,457,300 m^3/d
Groundwater	26%
Surface Water	74%
Treatment Type	Chlorination/Slow Sand Filter
Treatment Capacity	2,261,000 m^3/d
Storage	117,000 m^3
Service Area	363 sq km

Service Connections

House (6 persons/HC)	119,538
Public Tap (100 persons/PT)	4,629
Industrial	1,515
Commercial	2,321
Institutional	3,395
Other [1]	11,912
Total	***143,310***

Service Indicators

Service Coverage [2]	98%
Water Availability [3]	24 hours/day
Per Capita Consumption	109 l/c/d
Average Tariff	US$0.022/$m^3$
Drinking Water [4]	Tap

Efficiency Indicators

Unaccounted Water [5]	14%
Non-Revenue Water	63%
Unit Production Cost	US$0.016/$m^3$
Operating Ratio	0.85
Accounts Receivable	6.3 months
Staff/1,000 Connections	17.9

Notes:

[1] Other connections are bulk supply to residential areas.

[2] Other sources of water are tubewells and rivers.

[3] About 160 consumer complaints were attended to in 1996.

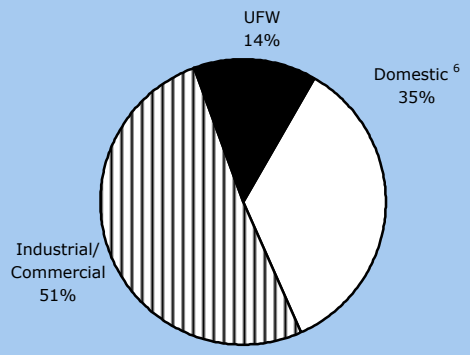
[4] All 3,959 water samples tested for bacteriological tests during the year passed the test.

[5] The lack of meters in residential connections makes it difficult to accurately determine consumption and UFW. In 1996, about 6,917 leaks were repaired and 161 meters replaced or repaired.

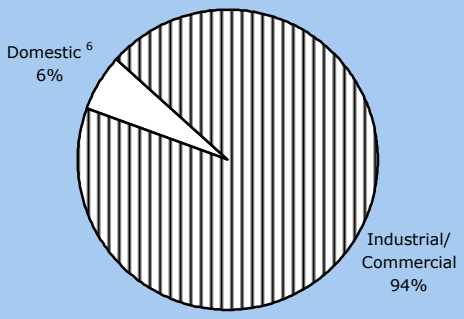
[6] Water use and billing for bulk connections to residential areas and institutional connections are included under domestic.

[7] Other costs include employees' social benefits like pension, health insurance and leave benefits.

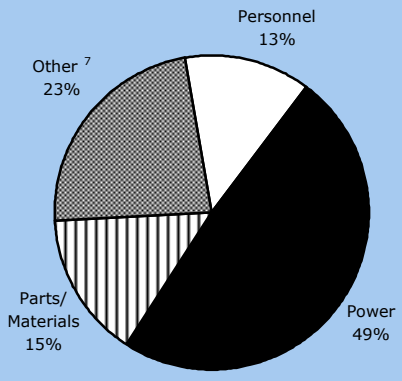
Data as of 1996.



Annual Water Use
896,914,500 m^3



Annual Water Billings
US$16,897,096



Annual O&M Costs
US$14,330,620

VANUATU *Utility Profile*

Water Utility

UNION ELECTRIQUE DU VANUATU, LTD. (UNELCO)

Address : P.O. Box 26, Port Vila, Vanuatu
Telephone : (678) 22211
Fax : (678) 25011
Head : Mr. Jean Francois Barbeau, General Manager

Since 1994, responsibility for the provision of water supply to Port Vila has been vested in Union Electrique du Vanuatu Limited (UNELCO) under a 40-year management concession contract. Prior to privatization, the Public Works Department was responsible for the city's population which is now about 26,000 people. UNELCO is responsible for production, distribution and source development as well as capital investment for extensions, renewals and upgrading of the system. UNELCO's management information system is well developed with billing, accounting, pumping and treatment systems now computerized. Its present development plan covers the period 1994 - 2014. An intermediate format annual report for 1995 is available. The French Government is providing a 25-year concessional loan to UNELCO to fund the first 3 years of its capital program.

Mission Statement

No Mission Statement.

General Data About Water Utility

Connections	: 3,974	
Staff	: 20	
Annual O&M Costs	: Vt159,154,688	: US$1,388,179
Annual Collections	: Vt141,768,302	: US$1,236,531
Annual Billings	: Vt141,768,302	: US$1,236,531
Annual Capital Expenditure	: Vt 46,666,667	: US$ 407,036
(Average over last 3 years)	Expenditure/connection	: US$102.42/connection
Source of Investment Funds	: 100% internally generated reserves	

Tariff Structure

(Effective January 1997)

Service Charge		
Meter Size (mm)	(Vt/quarter)	(US$/quarter)
For less than 25	275	2.40
15	550	4.80
20	880	7.68
25	2,220	19.36
30	5,550	48.41
40	7,770	67.77
Over 40	11,100	96.82
Consumption Charge		
Consumption (m^3/quarter)	(Vt/m^3)	(US$/$m^3$)
0 - 50	44.42	0.387
51 - 100	57.75	0.504
101 - 200	62.19	0.542
Over 200	66.63	0.581

Notes:
1 All consumers pay on metered use. Consumers are billed quarterly and pay at banks or at the utility office.
2 Tariff setting is based on considerations and formula specified in the concession contract between UNELCO and the government.
3 There were 99 new connections installed in 1995-96. New connections cost from Vt 17,370 (US$151.50) to Vt54,450 (US$474.92) for meter sizes of 15 mm to 50 mm payable in advance.
4 Water bill do not include sewerage charges.

Priority Need of Utility

I. As seen by Management
1) Quality of service.
2) Economic viability.

II. Consumers' Opinion
1) Improve water quality.
2) Reduce water rates.

Consumer Survey Findings

Average monthly water consumption is 53.19 m^3 per family. The monthly water bill averages Vt2,556 (US$22.29) compared to the monthly power bill of Vt5,063 (US$44.16). About 76% of those surveyed claimed to have 24-hour supply. Perception on water quality ranges from satisfactory (28%) to good (26%). About 61% take water for drinking straight from the tap. Only 15% said they experienced service interruption in the month preceding the survey. It takes less than 2 days for leak repairs to be made by the utility. Overall rating of the utility is good (31%) to fair (29%).

Major Changes in the Water Utility (1990-1996)

The number of connections for Port Vila increased by 45%. Although the average tariff increased by only 8%, unit production cost went up by 261% resulting in the operating ratio going up from 0.43 in 1990 to 1.12. UFW decreased from 42% down to 26% allowing the utility to even reduce its average daily production and still serve the needs of the additional consumers that connected to the Port Vila Water Supply System. A new tariff system was also introduced by UNELCO replacing the single uniform rate to one based on meter and consumption charges.

Town Profile PORT VILA

PORT VILA WATER SUPPLY

Population: 26,000 (1996) [1]

Production/Distribution

Average Daily Production	9,400 m^3/d
Groundwater	100%
Surface Water	Nil
Treatment Type	Chlorination
Treatment Capacity	
Storage	7,700 m^3
Service Area	21 sq km

Service Connections

House	---
Public Tap	---
Industrial	---
Commercial	---
Institutional	---
Other	---
Total [2]	***3,974***

Service Indicators

Service Coverage [3]	98%
Water Availability [4]	24 hours/day
Per Capita Consumption [5]	273 l/c/d
Average Tariff	US$0.488/$m^3$
Drinking Water [6]	Tap

Efficiency Indicators

Unaccounted Water [7]	26%
Non-Revenue Water	26%
Unit Production Cost	US$0.405/$m^3$
Operating Ratio	1.12
Accounts Receivable	Nil
Staff/1,000 Connections	5.0

Notes:

[1] Estimated since there is no accurate population figure.

[2] Users were classified according to consumption ranges since UNELCO took over in 1994.

[3] Other sources are rainwater.

[4] Only 10 consumer complaints were registered during the year.

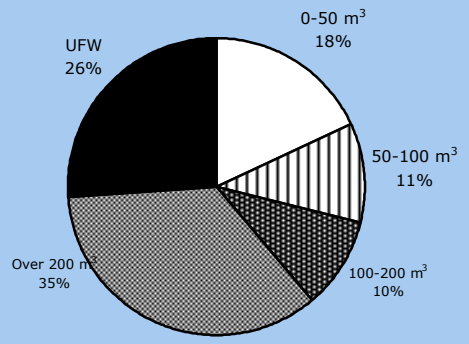
[5] Computed using total consumption.

[6] All 324 water samples passed the bacteriological tests.

[7] About 12 leaks were repaired and 15 meters were replaced or repaired in 1995-1996.

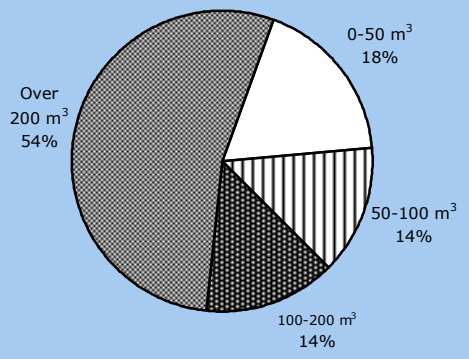
[8] Other costs include cost of major upgrading of the system amounting to Vt40,950,610 (US$357,179).

Data as of 1995-1996.



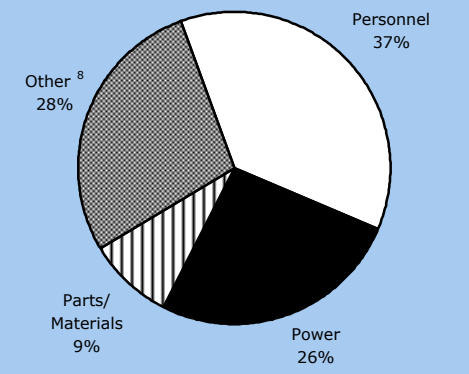
Annual Water Use [2]

3,431,000 m^3



Annual Water Billings [2]

US$1,236,531



Annual O&M Costs

US$1,388,179

VIET NAM, SOCIALIST REPUBLIC OF *Utility Profile*

Water Utility

HANOI WATER BUSINESS COMPANY

Address : 44 Yen Phu Road, Hanoi, Viet Nam
Telephone : (84-4) 829 2478
Fax : (84-4) 829 4069
Head : Bui Van Mat, Director General

The Hanoi Water Business Company (HWBC) is a government enterprise under the city's Department of Communication, Transport and Public Works set up in 1954 after being under the French colony since 1854. It is responsible for the water supply of Hanoi City and its 5 urban districts and 2 suburban districts with a population of 1,654,085 people. The government exercises control on the utility's staff salaries, tariffs, appointment of top management, budgets for O&M and development and disconnection for non-payment of water bills. The utility's billing system is computerized. It is currently following its 1996-2000 Development Plan. A present JICA study is preparing development plans for the periods 2000-2005 and 2005-2010. An intermediate format annual report for 1995 is available. The company supplies water to the urban poor by public taps paid by the local government.

Mission Statement

"To provide potable water which is safe and adequate to Hanoi City."

General Data About Water Utility

Connections	: 123,710	
Staff	: 1,645	
Annual O&M Costs	: D48,905,700,000	: US$4,400,369
Annual Collections	: D59,210,632,800	: US$5,327,572
Annual Billings	: D62,113,779,000	: US$5,588,787
Annual Capital Expenditure	: D 2,667,360,000	: US$ 240,000
(Average over last 5 years)	Expenditure Per Connection	: US$1.94/connection
Source of Investment Funds	: 70% externally-funded government grant; 30% government loan	

Tariff Structure

(Effective 1 August 1996)

Category	Water Rates per Cubic Meter	
	(D/m^3)	(US$/$m^3$)
Residences	1,200	0.108
Production Units and Government Institutions	2,400	0.216
Business, Services, Foreign Offices & Foreigners	5,500	0.495

Notes:
1 Only about half of commercial, industrial and institutional connections and 24% of house connections are metered. Non-metered consumers pay a flat rate based on a fixed monthly per capita consumption.
2 Consumers are billed monthly and can pay through banks or the utility offices.
3 The utility is aiming for a step-by-step increase in tariff until the year 2002 for it to meet actual expenses.
4 There were 3,761 new connections installed in 1995. Cost of new connection is D850,000 (US$76.48) payable in advance.
5 The water bill has a 10% sewerage surcharge on water sales.

Priority Need of Utility

I. As seen by Management
1) Reduce unaccounted-for-water to 50% by the year 2000.
2) Institution building and development for the water sector.

II. Consumers' Opinion
1) Increase water pressure.
2) Improve service.

Consumer Survey Findings

Average estimated monthly water consumption is 11.9 m^3 per family. The monthly water bill averages D12,438 (US$1.12) compared to the monthly power bill of D62,520 (US$5.63). Water availability to those surveyed is about 19 hours/day. About 85% perceive water quality to be satisfactory although all respondents boil water before drinking. More than half (55%) complain of low water pressure. Leak repairs are undertaken on the average about 9 days after reporting. Overall rating of the utility is fair (73%).

Major Changes in the Water Utility (1991-1995)

Average daily production increased by 12.5% with treatment capacity also increasing by 15.5%. However, these did not match the 115% increase in number of connections resulting in low pressures and reduced per capita consumption of 45 l/c/d from 157 l/c/d in 1991. Service coverage increased to 76% from 69% as well as water availability from 12 to 18 hours/day. Average tariff increased by 250% while production cost increased by 176%. Staff/1,000 connections ratio improved to 13.3 from 28.8. UFW also increased from 53% to 63%. The utility still relies heavily on externally-funded grants.

City Profile HANOI

HANOI WATER SUPPLY

Population: 1,654,085 (1995)

Production/Distribution

Average Daily Production [1]	360,000 m^3/d
Groundwater	100%
Surface Water	Nil
Treatment Type	Conventional
Treatment Capacity	393,000 m^3/d
Storage	55,000 m^3
Service Area [2]	7 sq km

Service Connections

House (9.9 persons/HC)	118,288
Public Tap (115 persons/PT) [3]	699
Industrial	3,802
Commercial	921
Institutional [4]	---
Other	Nil
Total	***123,710***

Service Indicators

Service Coverage [5]	76%
Water Availability [6]	18 hours/day
Per Capita Consumption	45 l/c/d
Average Tariff	US$0.113/$m^3$
Drinking Water [7]	Boiled

Efficiency Indicators

Unaccounted Water [8]	63%
Non-Revenue Water [9]	71%
Unit Production Cost	US$0.033/$m^3$
Operating Ratio	0.79
Accounts Receivable	0.03 months
Staff/1,000 Connections	13.3

Notes:

1 About 91% of production is metered.

2 Total area of responsibility of HWBC is 25 sq km excluding the rural areas of the city.

3 HWBC is replacing public taps with house connections at the rate of 30 HCs/PT.

4 Included under industrial connections.

5 Residents not served by the utility rely on wells, ponds and rainwater.

6 Approximately 80% of consumers have 24-hour water supply. About 1,095 consumer complaints were registered in 1995.

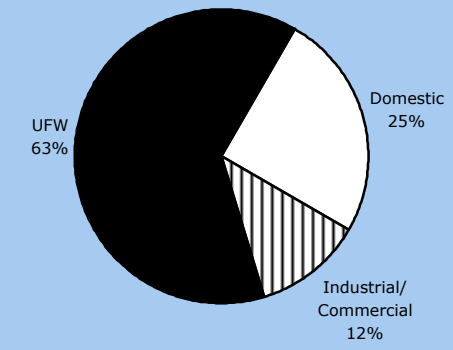
7 During the year, 237 water samples of 1,167 tested failed the bacteriological tests.

8 In 1995, about 320 leaks were repaired and 300 meters were replaced or repaired.

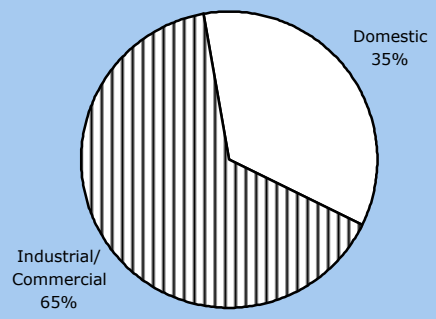
9 A large part of NRW is from PT/SP consumption not paid by the local government.

10 Other costs include transport and road restoration expenses.

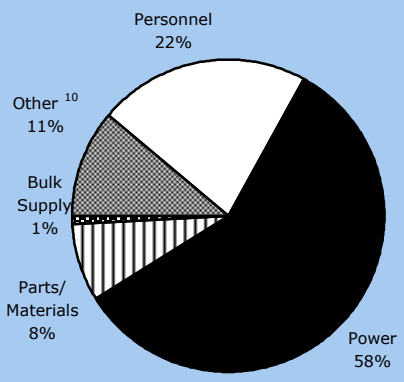
Data as of 1995.



Annual Water Use
131,400,000 m^3



Annual Water Billings
US$5,588,787



Annual O&M Costs
US$4,400,367

VIET NAM, SOCIALIST REPUBLIC OF *Utility Profile*

Water Utility

HO CHI MINH CITY WATER SUPPLY COMPANY

Address : No.1, Cong Truong Quoc Te, District 3, Ho Chi Minh City, Viet Nam
Telephone : (84-8) 829 1974, 829 1090
Fax : (84-8) 824 1644
Head : Mr. Vo Van Duong, Director

The Ho Chi Minh City Water Supply Company (WSC) is a government enterprise formed in 1966 under the city's Department of Communication, Transport and Public Works. It manages the water supply system of Ho Chi Minh City including Bien Hoa Industrial Zone and Thuan An District of Song Be Province with a total population of 4,731,000 people. The private sector is involved in source development and water production. WSC buys treated groundwater from Hoc Mon WTP. The urban poor are supplied with water through water tankers and public taps. WSC has a partly developed management information system. Payroll, billing, accounting, personnel and flow measurement at Thu Duc WTP are computerized. The utility is currently following its 1996-2010 Development Plan. A type-script annual report for government for 1995 is available.

Mission Statement

"Ho Chi Minh City Water Supply Company is a special techno-economical unit for the supply of water to meet the water demand for industrial and domestic uses of the people in Ho Chi Minh City and in Bien Hoa industrial zone."

General Data About Water Utility

Connections	: 248,454	
Staff	: 1,590	
Annual O&M Costs	: D242,929,316,264	: US$21,857,955
Annual Collections	: D269,491,278,524	: US$24,247,911
Annual Billings	: D248,197,399,638	: US$22,331,960
Annual Capital Expenditure	: D 56,823,797,678	: US$ 5,112,812
(Average over last 5 years)	Expenditure Per Connection	: US$20.58/connection
Source of Investment Funds	: 90% national government grant; 10% internally generated reserves	

Tariff Structure

(Effective 1 August 1996)

Category	Water Rates per Cubic Meter	
Water Tariff in Local Currency	(D/m^3)	(US$/$m^3$)
Domestic		
0 - 4 m^3/capita/month	1,300	0.117
Over 4 m^3/capita/month	2,100	0.189
Industrial (Production)	3,100	0.279
Business and Service		
0 - 8 m^3/month	5,200	0.468
Over 8 m^3/month	8,700	0.783
Water Tariff in Foreign Currency		(US$/$m^3$)
Foreign agencies	-	0.55
Industries w/foreign capital	-	0.35
Business w/foreign capital		
0 - 8 m^3/month	-	0.55
Over 8 m^3/month	-	0.85
Water supplied to ships	-	0.85
Foreign residents	-	0.55

Notes:
1 All consumers pay on metered use. They are billed monthly and pay at designated banks, at the utility office or to bill collectors.
2 Tariff setting aims at full cost recovery with profit including sufficient counterpart funds for project loans and contingencies for cost escalation and reserves for long term development.
3 There were 6,016 new connections in 1995. Cost of new connections range from D500,000 (US$44.99) to D700,000 (US$62.98) payable in advance.
4 Water bill has no sewerage surcharge.

Priority Need of Utility

I. As seen by Management
1) Improve the physical facilities.
2) Improve the workers' expertise and skill to meet technical requirements.

II. Consumers' Opinion
1) Need for stronger water pressure.
2) Expand to villages with more connections.

Consumer Survey Findings

Average monthly water consumption per family is 39.5 m^3. Water bills average D64,110 (US$5.77) per month compared to the monthly power bill of D197,640 (US$17.87). About 71% said they have 24-hour water supply. Consumer perception of water quality is good (69%) to satisfactory (12%). However, 71% either boil or filter their drinking water. About 21% experienced service interruption during the month preceding the survey. Leak repairs are made 4 days after reporting to the utility. Overall rating of WSC ranges from fair (52%) to good (33%).

Major Changes in the Water Utility (1991-1995)

The number of connections increased by 10%, the number of staff by 53%, causing the staff/1,000 connections ratio to increase from 4.6 to 6.4. Average tariff increased by 188% but unit production cost also increased by 410%. Accounts receivable increased from 0.9 to 3.4 months. UFW decreased significantly from 41% to 34%. The use of national government grant to fund capital improvements almost doubled while internally generated reserves went down from 49% of the total in 1991 to just 10%.

HO CHI MINH CITY

Population: 4,731,000 (1995)

Production/Distribution

Average Daily Production [1]	730,000 m^3/d
Groundwater	11%
Surface Water	89%
Treatment Type	Conventional
Treatment Capacity	700,000 m^3/d
Storage	260,000 m^3
Service Area [2]	153 sq km

Service Connections

House (10 persons/HC)	236,433
Public Tap (1,270 persons/PT)	3
Industrial	3,537
Commercial	1,770
Institutional	4,160
Other [3]	2,551
Total	***248,454***

Service Indicators

Service Coverage [4]	52%
Water Availability [5]	24 hours/day
Per Capita Consumption	136 l/c/d
Average Tariff	US$0.131/$m^3$
Drinking Water [6]	Boiled

Efficiency Indicators

Unaccounted Water [7]	34%
Non-Revenue Water	34%
Unit Production Cost	US$0.083/$m^3$
Operating Ratio	0.96
Accounts Receivable	3.4 months
Staff/1,000 Connections	6.4

Notes:

[1] Actual daily production in 1995 was about 706,130 m^3/d.

[2] Total area of responsibility is 2,069 sq km.

[3] Mostly bulk supply connections to residential areas.

[4] Residents not served by the utility rely mostly on tubewells.

[5] About 96% of residents have 24-hour water supply. Only 18 consumer complaints were registered in 1995.

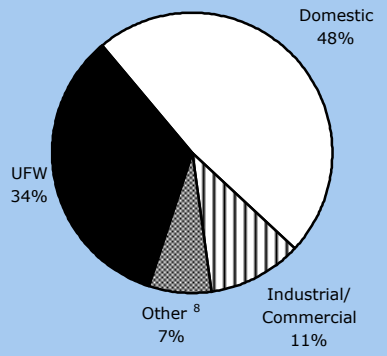
[6] All 480 water samples tested passed the bacteriological tests.

[7] In 1995, about 9,932 leaks were repaired and 56,215 meters were replaced or repaired.

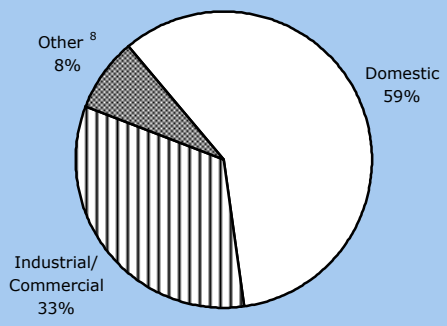
[8] Other use and billing refer to institutional connections.

[9] Other costs include depreciation, overhead, major repairs, production cost and taxes.

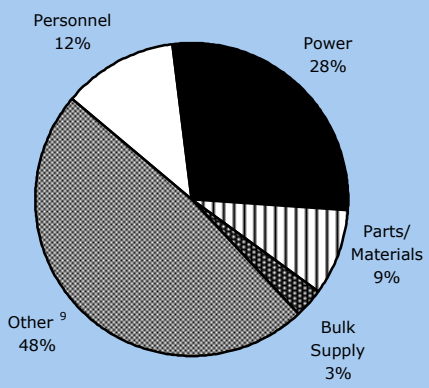
Data as of 1995.



Annual Water Use
257,736,355 m^3



Annual Water Billings
US$22,257,735



Annual O&M Costs
US$21,318,096

WESTERN SAMOA *Utility Profile*

Water Utility

WESTERN SAMOA WATER AUTHORITY

Address : P. O. Box 245, Apia, Western Samoa
Telephone : (685) 20409
Fax : (685) 21298
Head : Latu Sauile Toga Kupa, General Manager

The Western Samoa Water Authority (WSWA) is a government enterprise formed in 1994 and is responsible for 41 waterworks systems including the Apia urban area which used to be under the Water Division of the Public Works Department since 1962. Apia Water Supply distributes water to the city's population of 46,050 people. Water production is under the Watershed Management Division of the Ministry of Agriculture. Private sector is involved in its financial operations with government exercising control on staff salaries, tariffs, appointment of top management, and budgets for O&M and development. Only metering is for 31% of commercial connections in Apia.

Mission Statement

"To form a partnership with its customers, the people of Western Samoa, in an effort to provide reliable, safe and economical water services in a manner that is efficient, fair, progressive and environmentally, socially and spiritually responsible."

General Data About Water Utility

Connections	: 15,762	
Staff	: 249	
Annual O&M Costs	: WS$5,270,000	: US$2,091,353
Annual Collections [1]	: WS$ 562,489	: US$ 223,219
Annual Billings	: (Data not available)	
Annual Capital Expenditure	: WS$1,595,075	: US$ 632,991
(Average over last 5 years)	Expenditure Per Connection	: US$40.16/connection
Source of Investment Funds	: 100% national government grant	

[1] Data is for Apia only

Tariff Structure

(Effective 1993)

UNMETERED WATER	**Annual Rate**	
Category	(WS$/annum)	(US$/annum)
Domestic	48	19.05
Farms (cattle, poultry, piggery, small crops)	96	38.10
Others	192	76.19
METERED WATER (WS$1=100 sene)	**Annual Rate**	
Category/Consumption	(sene/m^3)	(US$/$m^3$)
Domestic/Institutions[1]		
First 2.5 m^3/day	5	0.020
Second 2.5 m^3/day	10	0.040
Over 5.0 m^3/day	15	0.060
Minimum Charge = WS$48 (US$19.05) per annum		
Farms (cattle, poultry, piggery, small crops)		
First 2.5 m/day	10	0.040
Second 2.5 m^3/day	15	0.060
Over 5.0 m^3/day	20	0.080
Minimum Charge = WS$96 (US$38.10) per annum		
Others		
First 2.5 m^3/day	20	0.080
Second 2.5 m^3/day	25	0.100
Over 5.0 m^3/day	30	0.120
Minimum Charge = WS$192 (US$76.19) per annum		

Notes:

1 Institutions refer to day care centers, schools/universities, hospitals, home for the elderly and seminaries/convents.
2 Almost all pay the minimum annual flat rate since the only metered connections are 31% of the commercial connections. Consumers are billed annually and pay at the utility office.
3 About 574 new connections were installed in 1995. Cost of new connection ranges from WS$70 (US$27.78) to WS$300 (US$119.05) for 15 mm to 25 mm diameter connections payable in advance.
4 There are no sewerage charges in the water bill.

Priority Need of Utility

I. As seen by Management
1) Customer service satisfaction.
2) Cost recovery.

II. Consumers' Opinion
1) Improve quality of water
2) Reliability, more water and higher pressure.

Consumer Survey Findings

The estimated monthly water bill averages WS$36.48 (US$14.48) compared to the monthly power bill of WS$93.35 (US$37.05). About 64% said they have 24-hour service. Perception on water quality is satisfactory (49%) to good (22%) with 47% of the respondents drinking water from the tap while the rest either boil or filter their water. About 60% experienced service interruption in the month preceding the survey. It takes an average of 3 days for reported leaks to be repaired by the utility. Overall rating of WSWA is fair (53%) to good (24%).

Major Changes in the Water Utility (1991-1995)

Unit production cost for Apia increased by 71%. UFW also increased from 15% in 1992 to 50% in 1996. The number of connections and staff for the entire WSWA both increased slightly while retaining its staff/1,000 connections ratio to about 15.8. Most data available are for the entire WSWA making it difficult for any meaningful comparison with data for Apia Water Supply in 1992. The WSWA started improvements in its billing and collection in 1996 with the hiring of billing staff.

Town Profile APIA

APIA WATER SUPPLY

Population: 46,050 (1995)

Production/Distribution

Average Daily Production	31,000 m^3/d
Groundwater	1%
Surface Water	99%
Treatment Type	Slow Sand Filter
Treatment Capacity	16,900 m^3/d
Storage	12,450 m^3
Service Area	29 sq km

Service Connections

House (7 persons/HC)	6,580
Public Tap	NA
Industrial)	
Commercial)	638
Institutional)	
Other	
Total	***7,218***

Service Indicators

Service Coverage	100%
Water Availability [1]	24 hours/day
Per Capita Consumption [2]	337 l/c/d
Average Tariff	US$0.048/$m^3$
Drinking Water [3]	Tap

Efficiency Indicators

Unaccounted Water [4]	50%
Non-Revenue Water	No data available
Unit Production Cost	US$0.144/$m^3$
Operating Ratio [5]	7.73
Accounts Receivable	No data available
Staff/1,000 Connections [6]	15.8

Notes:

[1] About 3,878 consumer complaints were registered during the year.

[2] High consumption due to lack of metering except for about one-third of commercial connections.

[3] While 186 water samples were tested during the year, no data was available on the bacteriological test results.

[4] Most UFW occur within private properties due to lack of metering. About 107 leaks were repaired and 330 meters were replaced or repaired during the year.

[5] No data on Apia O&M costs are available. This is for entire WSWA.

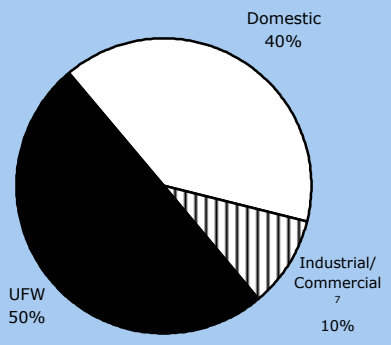
[6] This ratio is for the entire WSWA.

[7] Industrial/commercial use includes institutional use.

[8] Annual collection used in absence of billing data.

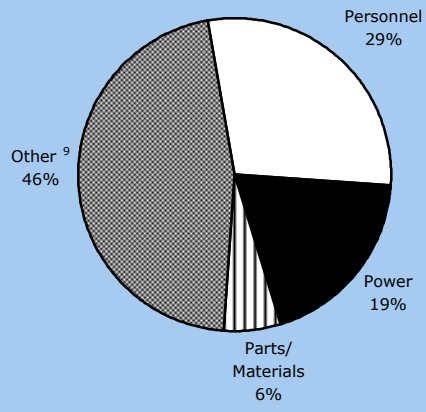
[9] This is for the entire WSWA's 41 waterworks including Apia water supply. Other costs include transport, administrative and training expenses.

Data as of 1995-1996.



Annual Water Use
11,315,000 m^3

Annual Water Billings [8]
US$270,439



Annual O&M Costs [9]
US$2,091,353

APPENDIX 1

WATER UTILITY QUESTIONNAIRE

PART A - GENERAL

Date: _____

1.00 Country: 1.01 City :

1.02 Name of Water Utility Serving the City :

1.03 Address :

1.04 Telephone Number(s) : Fax Number(s) :

1.05 Head of the Water Utility: Name : _____
Title : _____

1.06 Year Utility was Formed :

1.07 Is the Water Utility :

- □ Part of Government Department?
- □ Government Corporation/Enterprise?
- □ Other ? _____

1.08 Is there Private Sector Involvement in the Water Utility? □ Yes □ No

If Yes, in what aspect(s)?
- □ Source Development
- □ Production
- □ Distribution
- □ Management
- □ Billing & Collection
- □ Leak Repair
- □ Other _____

1.09 Government Influence : Which of the following are subject to Government influence or control?

- □ Number of staff
- □ Appointment of Top Management
- □ Staff salaries
- □ Budget for O&M
- □ Tariffs
- □ Budget for Development
- □ Appointment of Staff
- □ Disconnection for non-payment

1.10 Water Utility Responsibility: □ For City alone □ City & other towns/cities □ State/Region □ National authority

1.11 Utility is responsible for □ Production □ Distribution □ Source Development

1.12 Water Utility Connections Total : _____

1.13 Water Utility Staff Operations : _____
Development : _____
Total : _____

1.14 Staff Classification: Professional : _____
Skilled : _____
Unskilled : _____

1.15 Latest Annual Report Available: □ 1995 □ 1994
□ 1993 □ None

1.16 Nature of Annual Report: □ Glossy brochure for public
□ Type-script for Government
□ Intermediate format

1.17 Average Annual Salary of Five Highest Paid Full-Time Management Personnel:
_____

1.18 Management Information System : □ Well developed
□ Partly developed
□ Non-existent

1.19 Is there a Development Plan? □ Yes □ No

If Yes, indicate period covered. Year _____ to Year _____

1.20 Does the Utility Have a Mission Statement? □ Yes □ No
If Yes, please provide the mission statement.

1.21 Annual Water Utility Operations Cost : _____

1.22 Annual Water Utility Collections: _____

1.23 Annual Water Utility Billings/Sales: _____

1.24 Top 2 Priority Needs of Utility : _____
(As seen by management) _____

1.25 Total Capital Expenditure in the Last 5 years : _____

Funded by:

□ internally generated reserves	____ %
□ government loan	____ %
□ commercial loan	____ %
□ government grant/equity, national	____ %
□ government grant/equity, external	____ %
□ local bonds	____ %
□ other _____	____ %
	100 %

1.26 Major Projects Started After 1990:

Project Title	Year		Cost (local currency)	No. of Beneficiaries	Increase in Production (cu.m./day)	Type/Nature of Project*
	Start	End				

* Type of Project can be Rehabilitation, New Scheme, Expansion or a Combination.

PART B - CITY SPECIFIC

2.00 PRODUCTION

2.01 Proportion of Water Production from:

(1) Surface water _____ %
(2) Groundwater _____ %
(3) Other sources _____ _____ %

2.02 Is the development of the city's water supply sources part of an overall water resources development strategy? □ Yes □ No

If Yes, briefly state the strategy. _____
_____
_____

2.03 Is all production metered? □ Yes □ No
(ex treatment plant) If No, what proportion is metered? _____ %

2.04 Estimated Total Production Volume _____ cu m/day
(ex treatment plant or equivalent)

2.05 Do you buy bulk water for distribution? Raw Water □ Yes □ No
Treated Water □ Yes □ No

2.06 Total Capacity of Treatment Plants _____ cu m/day

2.07 Proportion of Water Production Receiving Full Treatment _____ %
2.08 Proportion of Water Production Receiving Chlorination Only _____ %
2.09 Proportion of Water Production Receiving No Treatment _____ %

2.10 Main Treatment Process □ Conventional
□ Slow Sand Filter
□ Desalination
□ Chlorination
□ Other _____

2.11 Chlorination by □ Gas ____ %
□ Powder ____ %

2.12 Treated Water Storage Capacity _____ cu m

2.13 Distribution Network

Material	Size Range (mm. dia.)	Age Range (years)	Material	Size Range (mm. dia.)	Age Range (years)
PVC			Steel		
HDPE			Asb.Cement		
PB			Fiberglass		
G.I.			Cast Iron		
Ductile Iron			Others		

3.00 CONSUMER SERVICE

3.10 Service Area in City

3.11 Size of Utility's Area of Responsibility _____ sq.km.
3.12 Size of Utility's Present Service Area _____ sq.km.

3.20 Population in City

3.21 Population of Utility's Area of Responsibility _____

3.30 Population Served

3.31 Population Served by the Utility _____ %

3.32 Population Served by Other Sources of Water in Utility's Area of Responsibility:

3.1	Tube Wells	_____ %
3.2	Dug Wells	_____ %
3.3	Ponds	_____ %
3.4	Rain Collectors	_____ %
3.5	Others _____	_____ %
	Total:	100 %

3.38 Does the water utility have a policy for providing water supply to the urban poor?
☐ Yes ☐ No

If Yes, briefly state the policy. _____
_____
_____

3.40 Service Connections

3.41 Number of House Connections HC _____

Average number of people per HC _____

3.42 Number of Public Taps (PT)/Standpipes (SP) _____

Average number of people per PT/SP _____

3.43 Number of Industrial Connections _____

3.44 Number of Commercial Connections _____

3.45 Number of Institutional Connections _____

3.46 Bulk Supply Connections to Residential Areas _____
(Residential High Rise Buildings and Subdivisions)

Number of People Served by the Connections _____

3.47 Number of Fire Hydrants _____

3.48 Number of Other Connections _____

3.50 Proportion of Connections Metered?

House Connections	_____ %	Institutional Connections	_____ %
Public Taps/Standpipes	_____ %	Bulk Supply (Residential)	_____ %
Industrial Connections	_____ %	Fire Hydrants	_____ %
Commercial Connections	_____ %	Others _____	_____ %

4.00 WATER CONSUMPTION (Annual : For the period _____)

	Metered (cu.m.)	Estimated (cu.m.)	Total (cu.m.)
4.01 Total for all HC	_____	_____	_____
4.02 Total for all SP/PT	_____	_____	_____
4.03 Total for all industrial use	_____	_____	_____
4.04 Total for all commercial use	_____	_____	_____
4.05 Total for all institutional use	_____	_____	_____
4.06 Total for all bulk supply (res.)	_____	_____	_____
4.07 Total for all other use	_____	_____	_____
4.08 Grand Total	_____	_____	_____

5.00 WATER BILLING (Annual: For the period _____)

	(Local Currency)
5.01 Total for all HC	_____
5.02 Total for all SP/PT	_____
5.03 Total for all industrial use	_____
5.04 Total for all commercial use	_____
5.05 Total for all institutional use	_____
5.06 Total for all bulk supply (residential)	_____
5.07 Total for all other use	_____
5.08 Grand Total	_____

6.00 COST RECOVERY (Annual: For the period _____)

	(Local Currency)
6.01 Annual Collection for all HC	_____
6.02 Annual Collection for all SP/PT	_____
6.03 Annual Collection for all industrial use	_____
6.04 Annual Collection for all commercial use	_____
6.05 Annual Collection for all institutional use	_____
6.06 Annual Collection for all bulk supply (res'l)	_____
6.07 Annual Collection for all other use	_____
6.08 Grand Total	_____

6.10 Current Accounts Receivable
(expressed in number of months equivalent of average sales) _____ months

6.15 Financial Objectives: Does the water utility have financial objectives to guide its tariff setting? □ Yes □ No

If Yes, briefly state these objectives. _____
_____

6.20 Basis for Billing for Water

	HC	SP/PT	Industrial	Commercial	Institutional	Bulk (Residential)
Consumers Pay on Metered Use	□	□	□	□	□	□
Consumers Pay on Flat Rate	□	□	□	□	□	□
Consumers Pay per Property Tax	□	□	□	□	□	□
Consumers Do Not Pay	□	□	□	□	□	□

6.25 How frequent are consumers billed?

□ Monthly □ Every 2 months □ Quarterly □ Others _____

6.30 Methods of Payment

Water bills are paid through
□ Bill Collector
□ Bank
□ Post Office
□ Water Utility Office
□ Automated Teller Machine
□ Others _____

6.40 New House Connections

6.41 Number of New Connections installed in 1995 _____

6.42 Number of Applications Outstanding _____ as of _____
(Please indicate date)

6.43 Price of New Connection _____

6.44 Method of Payment (for new connection)
□ All at start
□ Over 12 months or less
□ Over more than 12 months

6.45 Average waiting time for a new connection _____

6.50 Tariff vs. Consumption Pattern

6.51 When were the last 2 tariff increases made? _____
_____

6.52 Choose 100 representative metered domestic consumers and give the total of their billed consumption (cubic meters) and the corresponding total bill amount (local currency) for each of the 3 months before and the 3 months after the latest tariff increase.

		Total Consumption (cu. m.)	Total Bill/Sales (local curr.)
Months Before Tariff Increase:	(1)	_____	_____
	(2)	_____	_____
	(3)	_____	_____
Months After Tariff Increase:	(1)	_____	_____
	(2)	_____	_____
	(3)	_____	_____

6.60 Sewerage

6.61 Does water bill have sewerage surcharge? □ Yes How much? _____ %
□ No

6.62 Does water bill have environmental surcharge? □ Yes How much? _____ %
□ No

7.00 WATER SERVICE

7.10 Water Availability - Reliability for Consumers

7.11 Proportion of consumers with 24 hours supply _____ %

7.12 Average number of hours per day of water availability to most people _____ hours

7.20 Estimated Unaccounted for Water _____ %

7.21 Estimated Non-Revenue Water _____ %

7.40 Number of Leaks Repaired (Annual: Period _____) _____

7.50 Number of Consumer Complaints (Annual) _____

7.60 Number of Meters Replaced or Repaired (Annual) _____

7.70 Number of Bacteriological Tests Taken (Annual) _____

7.71 Number of Bacteriological Tests Failed (Annual) _____

8.00 OPERATIONS AND MAINTENANCE COST FOR CITY (ANNUAL)

8.01	Purchase of Bulk Supply	_____
8.02	Personnel	_____
8.03	Power/Fuel	_____
8.04	Chemicals	_____
8.05	Replacement parts (meters, valves, pipes, pumps, etc.)	_____
	Other Materials	_____
8.06	Transport	_____
8.07	Other (Explain) _____	_____
	Total O&M Cost for City =	_____

9.00 MAINTENANCE EXPENSES (Annual) _____

(Estimate from 8.00 above those expenses specifically for Maintenance.)

10.00 AUTOMATION/COMPUTERIZATION

10.01 What aspects of the water utility's operation are computerized or automated?

□ None □ Billing □ Accounting □ Pumping □ Treatment
□ Others _____

PLEASE FORWARD COMPLETED QUESTIONNAIRE PLUS:

1) Copy of Latest Annual Report
2) Copy of Current Tariff Structure *
3) Summary of Development Plan
4) 100 Consumer Survey Questionnaires

* Give details of when introduced and the mechanism adopted for tariff adjustments.

BY AIRMAIL TO:

Manager
Water Supply, Urban Development and Housing Division (West)
Asian Development Bank
P. O. Box 789, 0980 Manila, Philippines

This Questionnaire was completed by:

Name : _____
Designation : _____
Address : _____
Fax/Telex : _____

Sources of Information in the Water Utility:

Name : _____
Designation : _____
Unit/Dep't. : _____

Name : _____
Designation : _____
Unit/Dep't. : _____

Name : _____
Designation : _____
Unit/Dep't. : _____

Name : _____
Designation : _____
Unit/Dep't. : _____

APPENDIX 2

WATER UTILITY CONSUMER SURVEY QUESTIONNAIRE

1. What is your household's main source of water for: (*You may check more than one source for each use.)*

Sources / **Uses**	House Tap	Public Tap	Water Vendors	Bottled Water	Rain Jar	Tube Well	Pond	Others
1.1 Drinking								
1.2 Cooking								
1.3 Bathing								
1.4 Laundry								
1.5 Dish Washing								

1.6 Others *(Specify)*
a) _____
b) _____

2. How much water from each source (Column 1) in Table 1 below does your household use each month?
(Please fill in Column 2 below. Specify number of cubic meters or number of containers/month.)
For containers: Capacity per container: _____

3. How much on the average do you pay for water per month?
(Please fill in Column 3 below. Indicate expense per source used.)

Table 1 - Monthly Water Consumption and Expense

Col. 1: **Source**	Col. 2: **Monthly Consumption**	Col. 3: **Average Monthly Expense**
1. House Tap/House Connection		
2. Public Tap		
3. Water Vendors		
4. Bottled Water		
5. Rain Catchment		
6. Tubewell		
7. Pond		
8. Other (specify)		
Total:		***Total:***

4. How much on the average does your household pay for electricity per month? _____

5. Is water from the water utility available 24 hours a day? Yes No

If No, how many hours a day on the average is water available? _____ hours

6. What do you think of the quality of water coming from the taps? Good Satisfactory Poor

   If Poor, why? Due to: Color Taste Hardness Other reason _____

7. Do you drink water from the tap? Direct
   After: Boiling Filtering Both

8. What do you think of water pressure from the taps you are using?

   High Adequate Low

9. Has there been any interruption in water supply from your tap in the last month? Yes No

10. In case of breakdowns or leaks in the pipe mains your tap is connected to, how long does it take the water utility to send a repairman to fix the defects? _____ days

11. How would you rate the water utility?

    Good Fair Poor

12. In your opinion, what is the most important improvement the water utility should do?

    _____

APPENDIX 3

SUGGESTED EVALUATION CRITERIA FOR UTILITIES

Consumer Satisfaction		**40%**
Coverage	10%	
Water Availability	10%	
Service Level	10%	
New Connection Fee	10%	
Water Resources Management		**20%**
Water Production/Population	5%	
UFW/Metering	10%	
Consumption	5%	
Financial Resource Management		**20%**
Grant Financing	5%	
Operating Ratio	10%	
Accounts Receivable	5%	
Human Resource Management		**10%**
Staff/1,000 Connections	5%	
Management Salaries	5%	
Accountability		**10%**
Annual Report	10%	
Total	**100%**	**100%**

Notes

Coverage (House Connections)		**10%**
100%	10%	
>50%	5%	
<50%	0%	
Water Availability		**10%**
24 hours	10%	
>12 hours	5%	
<12 hours	0%	
Service Level		**10%**
(a) No public Taps	5%	
Public Taps	0%	
(b) 100-200 l/c/d	5%	
<100l/c/d or>200 l/c/d	0%	

New Connection Fee		**10%**
Reasonable Cost	5%	
High Cost	0%	
Installments to Pay	5%	
Total Fee upfront	0%	
Water Production/Population		**5%**
<0.5 m3/day/person	5%	
>0.5 m3/day/person	0%	
UFW/Metering		**10%**
Full Metering	5%	
Partial Metering	0%	
UFW < 25%	5%	
UFW > 25%	0%	
Consumption		**5%**
<200 l/c/d	5%	
>200 l/c/d	0%	
Grant Financing		**5%**
Nil	5%	
Any	0%	
Operating Ratio		**10%**
<0.75	10%	
0.75 - 1.00	5%	
> 1.00	0%	
Accounts Receivable		**5%**
<3 months	5%	
>3 months	0%	
Staff/1,000 Connections		**5%**
<10	5%	
>10	0%	
Management Salaries		**5%**
Above Government Level	5%	
Government Level	0%	
Accountability		**10%**
Annual Report Available to Public	5%	
Annual Report Unavailable	0%	
Timely Report (within 12 months)	5%	
Reporting after 12 months	0%	