

## Chapter 10 – Water & Energy

### Utilities- Power Supply, and Water/Sewer

The utilities sector- power supply, water/sewer and telecommunications- have improved steadily since large investments were made in the late 1980's and early 1990s. These investments were mainly from Compact derived capital funds and bond issues that used these funds. With the establishment of utility companies on Majuro and Ebeye, the government's involvement in these enterprises has been reduced though the government retains at least majority ownership of these enterprises. Year-to-year trends have shown growth in the provision of these services. However, there were years during times of drought or major equipment breakdown when services have stagnated or declined. Overall, the provision of such utilities has greatly contributed to the advancement of the RMI's living standards. The challenge is to expand these services to a larger percentage of the population at a reasonable cost. However, by doing so, the cost of the services increases given the cost of the currently available more advanced technology and the cost of reaching a broader segment of the population especially those resident in the outer islands. The utility companies have taken on their own financing and debt with the government as a guarantor. So far, the companies have been able to meet their debt obligations.

#### **Power Supply**

Most power supply is provided by diesel engine generated electricity in Majuro, Ebeye, Kili and Bikini. As of 1999, according to the RMI Census, 63.4 percent of power was from electricity, 31 percent from kerosene, and 5.2 percent from solar energy.

**Table 3: Electricity Usage, Generation and Cost**

	1990	1995	2001	2002	2003
<i>Majuro</i>					
# of Users	2,261	2,327	3,202	3,333	3,504
MegawattHours Generated	42,912	61,668	73,523	79,764	81,297
Cents per Kilowatt Hour	5.1	4.5	6.6	5.1	5.8
<i>Ebeye</i>					
# of Users			1,185	1,244	1,283
MegawattHours Generated			14,007	16,184	11,338
Cents per Kilowatt Hour			11.3	9.5	14.6
<i>Bikini and Kili</i>					
# of Users					155
MegawattHours Generated					3,738
Cents per Kilowatt Hour					20.5

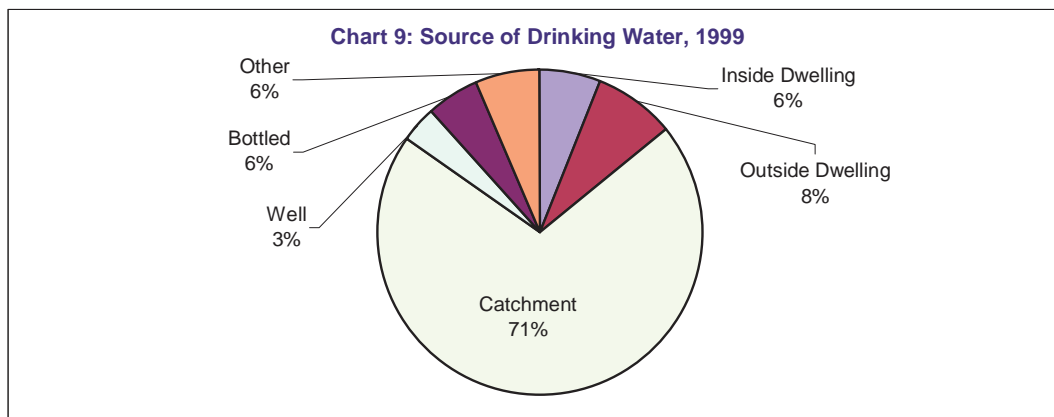
Electricity generation has been increasing significantly since 1990 with most of the increase in Majuro, the capital and major commercial and residential center. Usage in Ebeye has

fluctuated mainly because of plant breakdown and rehabilitation efforts. Usage in Ebeye is expected to increase in FY04.

When looking at the breakdown of electricity users, it is notable that commercial enterprise users have increased significantly in Majuro and Ebeye. In Majuro, the increase was by one-third during the period 1996-2003. In Ebeye, the increase was by 38 percent between 2001-2003. The number of government users has remained steady while residential use has also increased significantly in Majuro and Ebeye as well as the coming on line of production in Bikini and Kili.

The price per kilowatt-hour is totally dependent on the cost of imported diesel fuel. The price in Majuro has the benefit of being cross-subsidized by the fuel sales of the Marshall Electricity Company.

### Water and Sewerage



Rainwater remains the dominant source of water for drinking throughout the Marshall Islands. In Majuro, public water is available from the airport catchment and a fresh water lens. In Ebeye, Bikini and Kili salt water is processed through reverse osmosis units. Salt water is also pumped and used for non-drinking purposes. The use of reverse osmosis units adds to the cost of the water and the units are sensitive to the harsh Marshall Islands environment. As an example, in May 2003 the reverse osmosis units broke down in Ebeye and the water supply was severely impacted until the units could be replaced.

**Table 4: Number of Households with Fresh and Salt Water**

	1997	2000	2001	2002	2003
<b>Majuro</b>					
Drinking Water	2,788	3,098	3,016	3,064	3,130
Salt Water	1,338	1,555	1,676	1,799	1,871
<i>Total</i>	4,126	4,653	4,692	4,863	5,001
<b>Ebeye</b>					
Drinking Water			1,245	1,275	1,326
Salt Water			1,146	1,266	1,310
<i>Total</i>			2,391	2,541	2,636
<b>Bikini</b>					
Drinking Water					11
Salt Water					11
<i>Total</i>					22
<b>Total Reported Households with Water</b>	4,126	4,653	7,083	7,404	7,659

The number of households with drinking water has steadily increased. The availability is due to more houses being hooked-up to public systems as well as more use of catchment units. As shown in Table 4, the number of households with drinking and fresh water has increased. It is estimated that the number is even greater given that all jurisdictions were not recorded in past years.

The water company also operates sewerage in Majuro. Sewerage services are maintained by the main utility company (KAJUR) in Ebeye. Major projects have increased the coverage of the system in both jurisdictions. However, user statistics are not available as of this time.

**Table 10.1 Households (%) by Type of Fuel Used for Lighting by Atolls in RMI: 1999**

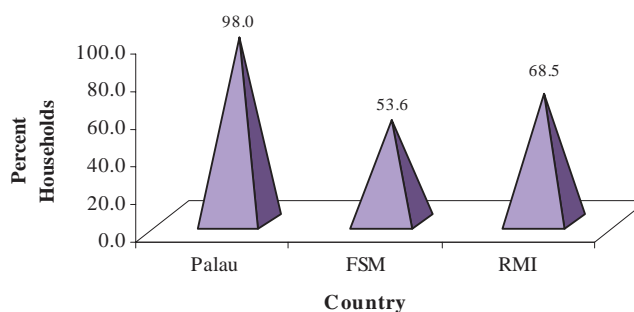
Atoll/Island	Use of Fuel for Lighting in Percentages			
	Electricity	Kerosene	Solar Energy	Others
RMI	63.4	31.0	5.2	0.4
Ailinglaplap	3.4	86.0	9.7	0.9
Ailuk	1.2	76.1	20.4	2.3
Arno	7.0	77.0	15.6	0.4
Aur	1.2	93.0	5.8	0.0
Ebon	0.0	93.4	6.6	0.0
Enewetak	42.2	56.9	0.0	0.9
Jabat	0.0	26.7	73.3	0.0
Jaluit	35.8	63.3	0.0	0.9
Kili	100.0	0.0	0.0	0.0
Kwajalein	89.9	9.7	0.0	0.4
Lae	0.0	87.5	12.5	0.0
Lib	0.0	100.0	0.0	0.0
Likiep	16.0	76.6	6.2	1.2
Majuro	88.3	11.0	0.3	0.4
Maloelap	13.0	76.1	10.9	0.0
Mejit	0.0	100.0	0.0	0.0
Mili	3.7	83.1	13.2	0.0
Namdrik	0.0	4.2	94.9	0.9
Namu	2.4	93.6	2.4	1.6
Ujae	1.5	86.6	11.9	0.0
Utrik	1.5	38.5	60.0	0.0
Wotho	0.0	72.2	27.8	0.0
Wotje	6.5	77.6	15.9	0.0

Source: Census, 1999

**Table 10.2 Percent Households With Electricity in Palau, FSM and RMI: 2000**

Country	% Households With Electricity
Palau	98.0
FSM	53.6
RMI	68.5

Source: Ben Graham, IPC Statistical Enhancement Program, US Census Bureau

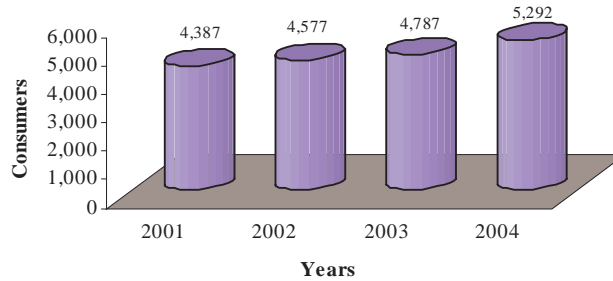
**Fig 10.1 Percent Households With Electricity in Palau, FSM and RMI: 2000**

**Table 10.3 No. of Electricity Customers in Majuro & Ebeye: 2001 to 2004**

Year	Commercial	Government	Metered	Life Line	All Others	Total
2001	487	137	2,199	1,525	39	4,387
2002	451	110	2,513	1,479	24	4,577
2003	435	110	2,589	1,627	26	4,787
2004	479	112	2,994	1,683	24	5,292

NOTE: Ebeye electricity consumers are categorized under Commercial, Government & Metered only

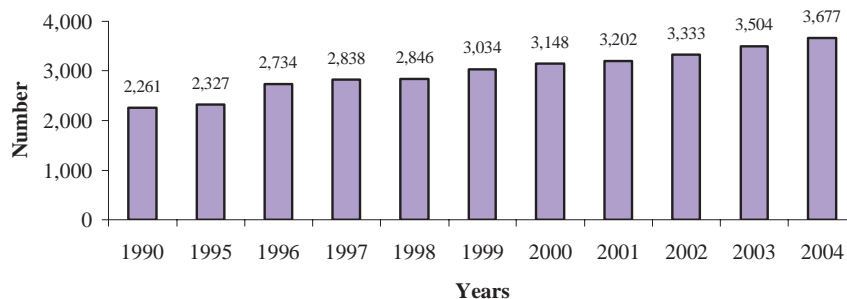
Source: Concerned Authorities

**Fig. 10.2 No. of Electricity Consumers, Majuro & Ebeye: 2001 - 2004****Table 10.4 No. of Electricity Customers in Majuro: 1990 to 2004**

Year	Commercial	Government	Metered	Life Line	All Others	Total
1990	...	...	...	...	...	2,261
1995	...	...	...	...	...	2,327
1996	193	80	955	1,481	25	2,734
1997	203	87	905	1,604	39	2,838
1998	222	73	961	1,554	36	2,846
1999	258	70	1,621	1,067	18	3,034
2000	272	82	1,174	1,585	35	3,148
2001	389	124	1,125	1,525	39	3,202
2002	322	97	1,411	1,479	24	3,333
2003	302	97	1,452	1,627	26	3,504
2004	334	99	1,537	1,683	24	3,677

... Breakup not available.

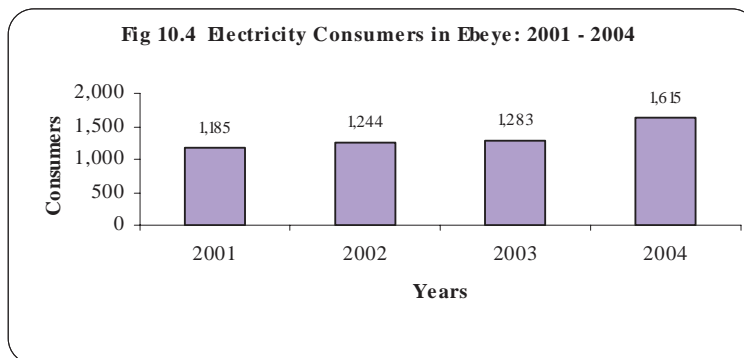
Source: Marshalls Energy Company

**Fig 10.3 City Consumers in Majuro: 1990 - 2004**

**Table 10.5 No. of Electricity Customers in Ebeye: 2001 to 2004**

Year	Commercial	Government	Metered	Total
2001	98	13	1,074	<b>1,185</b>
2002	129	13	1,102	<b>1,244</b>
2003	133	13	1,137	<b>1,283</b>
2004	145	13	1,457	<b>1,615</b>

Source: Kwajalein Atoll Joint Utility Resources

**Table 10.6 No. of Electricity Customers in Kili: 2003 - 2004**

Year	Commercial	Government	Metered	Life Line	All Others	Total
2003	2	7	133	*	2	144
2004	2	7	135	*	2	146

\* Churches

NOTE: All entries listed have meters but readings have not been taken for years until last May (May 2004). Bikinians do not apy for any electricity on Kili

Source: KBE Local Government

**Table 10.7 No. of Electricity Customers in Bikini: 2003 - 2004**

Year	Commercial	Government	Metered	Life Line	All Others	Total
2003		6			5	11
2004		6			5	11

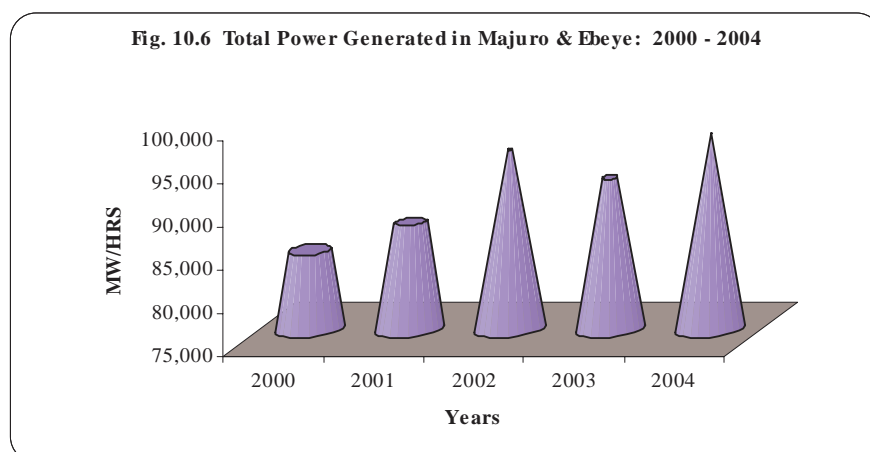
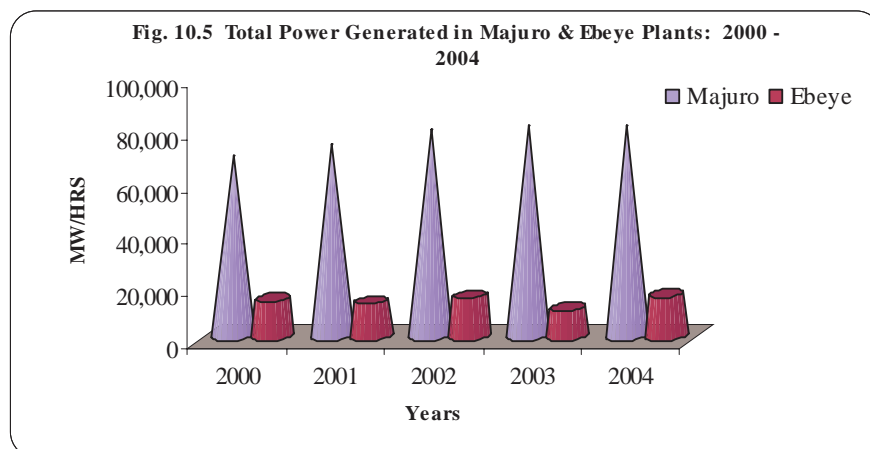
NOTE: Government includes BPD & Dive Program. All Others is the DOE Shops, Kitchen and Houses. All are metered.

Source: KBE Local Government

**Table 10.8 Power Generated in Majuro & Ebeye: 2000-2004**

Year	Majuro Total MW/HRS Generated	Ebeye Total MW/HRS Generated	Total
2000	69,244	14,999.3	84,243
2001	73,523	14,006.6	87,530
2002	79,764	16,183.6	95,948
2003	81,297	11,338	92,636
2004	80,986	16,744	97,730

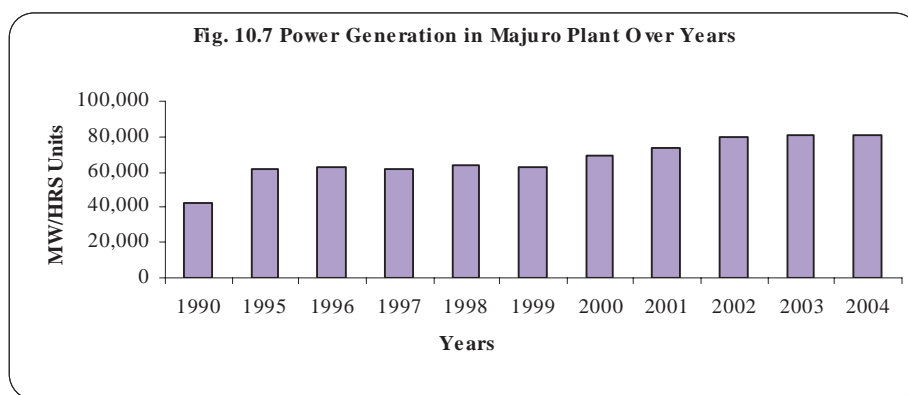
Source: Concerned Authorities



**Table 10.9 Power Generated and Cost Per KW/H in Majuro: 1990-2004**

Year	Total MW/HRS Generated	Average Cost Per KW/HR (Cents)
1990	42,912	5.1
1995	61,668	4.5
1996	62,620	5.1
1997	62,116	5.1
1998	64,110	4.0
1999	62,931	4.0
2000	69,244	5.9
2001	73,523	6.6
2002	79,764	5.1
2003	81,297	5.8
2004	80,986	7.6

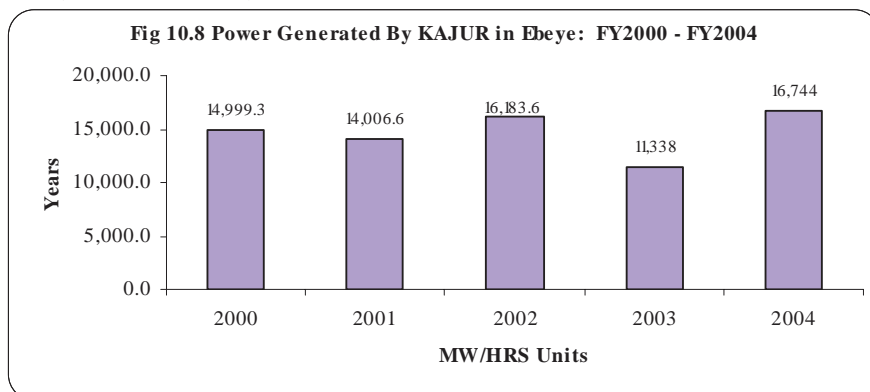
Source: Marshalls Energy Company



**Table 10.10 Electricity Generation (MW/HRS), Cost on Fuel (US Dollars and Cost Per KW/HRS) in Ebeye Power Generation Plant: FY2000 - FY2004**

Fiscal Year	Total Power Generated (MW/HRS)	Cost on Fuel (US Dollars)	Average Cost Per KW/HRS (US Cents)
2000	14,999.3	1,315,781	8.8
2001	14,006.6	1,576,082	11.3
2002	16,183.6	1,535,216	9.5
2003	11,338	1,657,801	14.6
2004	16,744	2,211,165	14.0

Source: Kwajalein Atoll Joint Utility Resources



**Table 10.11 Power Generated and Cost Per KW/H in Kili & Bikini: 2003-2004**

Year	Kili		Bikini	
	Total MW/HRS Generated	Average Cost Per KW/HR (Cents)	Total MW/HRS Generated	Average Cost Per KW/HR (Cents)
2003	3,210	11	528	30
2004	3,064	16	536	31

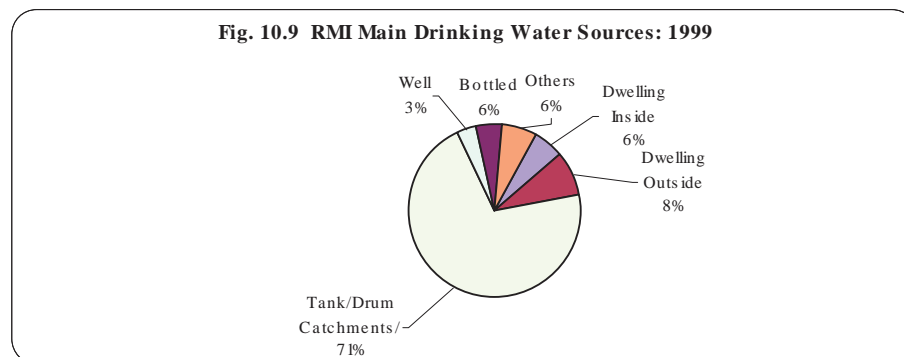
NOTE: Year 2003 Average Cost Per KWHR includes only costs on Fuel and Charter (to deliver fuel). Costs on labor to operate plants as well as maintenance/repair are not included since information for year 2003 or earlier is not available. In 2004, however, Average Cost per KWHR is inclusive of costs on labor and maintenance/repair. This is the case for both Kili and Bikini.

Source: KBE Local Government

**Table 10.12 Households (%) by Main Source of Drinking Water by Atolls in RMI: 1999**

Atoll/Island	Drinking Water Facility in Percentage(%)					
	Public Piped Water		Rain/ Catchments/ Tank/Drum	Well	Bottled	Others
	Inside Dwelling	Outside Dwelling				
RMI	6.2	8.0	70.6	3.4	5.5	6.3
Ailinglaplap	0.4	0.0	98.3	1.3	0.0	0.0
Ailuk	0.0	0.0	59.1	39.8	0.0	1.1
Arno	0.0	0.0	98.4	1.6	0.0	0.0
Aur	0.0	0.0	52.3	33.8	0.0	14.0
Ebon	0.0	0.0	91.0	0.0	0.0	9.0
Enewetak	17.4	3.7	78.9	0.0	0.0	0.0
Jabat	0.0	0.0	100.0	0.0	0.0	0.0
Jaluit	1.7	1.8	90.8	0.0	4.8	0.9
Kili	21.1	3.3	75.6	0.0	0.0	0.0
Kwajalein	14.1	28.5	31.9	0.1	5.1	20.3
Lae	0.0	0.0	62.5	37.5	0.0	0.0
Lib	0.0	0.0	100.0	0.0	0.0	0.0
Likiep	0.0	0.0	95.1	3.7	1.2	0.0
Majuro	6.2	5.3	75.4	1.1	9.1	2.9
Maloelap	0.0	0.0	67.4	30.4	0.0	2.2
Mejit	0.0	0.0	98.3	1.7	0.0	0.0
Mili	0.0	0.0	86.8	2.2	0.0	11.0
Namdrik	0.0	0.0	93.2	1.7	0.0	5.1
Namu	0.0	0.0	85.8	7.1	0.0	7.1
Ujae	0.0	0.0	97.0	1.5	0.0	1.5
Utrik	0.0	0.0	67.7	32.3	0.0	0.0
Wotho	0.0	0.0	100.0	0.0	0.0	0.0
Wotje	0.0	0.0	66.7	21.0	0.0	12.3

Source: 1999 RMI Census Report



**Table 10.13 Drinking Water Supply to Majuro by Area and Month in Million Gallons: 2003-2004**

Month	2003			2004		
	Total Majuro	Airport to Rita	Airport to Laura	Total Majuro	Airport to Rita	Airport to Laura
Jan	21,345,177	15,692,377	5,652,800	17,407,702	17,000,702	407,000
Feb	17,061,355	13,345,155	3,716,200	16,999,661	16,839,761	159,900
March	18,690,208	16,088,508	2,601,700	16,205,814	16,045,914	159,900
April	16,678,933	13,660,811	3,018,122	20,230,418	20,070,518	159,900
May	22,292,506	21,085,506	1,207,000	14,612,933	14,439,933	173,000
June	18,548,267	16,418,767	2,129,500	18,283,606	18,124,106	159,500
July	21,049,308	19,522,308	1,527,000	14,907,984	14,853,744	54,240
August	17,638,233	16,043,333	1,594,900	20,795,465	20,249,665	545,800
September	23,202,968	22,295,268	907,700	17,264,032	17,040,132	223,900
October	22,244,826	21,812,426	432,400	12,955,080	12,677,580	277,500
November	16,318,709	15,656,809	661,900	15,512,807	15,190,507	322,300
December	17,769,838	15,416,438	2,353,400	15,745,702	15,461,902	283,800
<b>Total</b>	<b>232,840,328</b>	<b>207,037,706</b>	<b>25,802,622</b>	<b>200,921,204</b>	<b>197,994,464</b>	<b>2,926,740</b>

... Due to mechanical problems, the quantity of water in June and August could not be recorded

Source: Majuro Water and Sewer Company

**Table 10.14 Number of Households Having Fresh Water and Salt Water Supply in Majuro: 1997-2004**

Year	Total	Drinking Water	Salt Water
1997	4,126	2,788	1,338
1998	4,079	2,733	1,346
1999	4,181	2,818	1,363
2000	4,653	3,098	1,555
2001	4,692	3,016	1,676
2002	4,863	3,064	1,799
2003	5,001	3,130	1,871
2004	7,050	5,122	1,928

Water Rates: Govt. :Drinking water = 0.5 C per gallon; Residence: Airport to Rita = 0.06 C per gallon;

Airport to Laura = 0.5 C per gallon

Salt water and Sewer = \$10 flat rate p.m

Source: Water Supply and Sewer Company

**Table 10.15 Drinking Water Supply to Ebeye by Month in Million Gallons: 2003-2004**

Month	2003	2004
Jan	3,254,894	3,599,851
Feb	3,030,086	3,372,360
March	3,690,524	2,111,875
April	712,798	3,954,252
May	...	3,507,149
June	2,447,960	4,450,200
July	3,278,197	4,499,150
August	2,939,836	4,436,085
September	2,263,099	3,652,880
October	2,674,805	4,194,427
November	3,514,485	3,952,800
December	2,769,298	4,385,820
<b>Grand Total</b>	<b>27,297,785</b>	<b>46,116,849</b>

... Both Reverse Osmosis Units Broke Down

Source: Kwajalein Atoll Joint Utility Resources

**Table 10.16 Number of Households Having Fresh Water and Salt Water Supply in Ebeye: 2001 - 2004**

Year	Total	Drinking Water	Salt Water
2001	<b>2,391</b>	1,245	1,146
2002	<b>2,541</b>	1,275	1,266
2003	<b>2,636</b>	1,326	1,310
2004	<b>2,885</b>	1,470	1,415

Source: Kwajalein Atoll Joint Utility

**Table 10.17 Number of Households Having Fresh Water and Salt Water Supply in Bikini: 2003-2004**

Year	Total	Drinking Water	Salt Water
2003	11	11	11
2004	11	11	11

NOTE: Includes all buildings on Bikini Island

Source: KBE Local Government

**Table 10.18 Households(%) by Kind of Toilet Facility by Atolls in RMI: 1999**

Atoll/Island	Kind of Toilet Facility in Percentage						
	Flush Toilet		Water Sealed		Pit Latrine	Others	None
	Inside	Outside	Inside	Outside			
RMI	38.7	22.9	4.2	8.9	5.7	0.9	18.7
Ailinglaplap	3.0	10.4	3.5	46.1	0.9	0.9	35.2
Ailuk	5.7	8.1	2.3	27.6	0.0	1.1	55.2
Arno	4.5	9.6	23.0	4.9	7.0	1.2	49.8
Aur	0.0	40.6	1.2	9.3	5.9	0.0	43.0
Ebon	5.7	32.0	1.6	12.3	0.8	0.8	46.3
Enewetak	11.0	29.4	0.0	3.7	28.4	0.9	26.6
Jabat	0.0	0.0	13.3	73.3	0.0	0.0	13.4
Jaluit	15.8	9.2	6.6	4.8	0.4	0.0	63.2
Kili	96.7	3.3	0.0	0.0	0.0	0.0	0.0
Kwajalein	68.4	22.1	0.3	1.7	3.9	1.2	2.4
Lae	0.0	0.0	3.1	12.5	0.0	3.1	81.3
Lib	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Likiep	4.9	4.9	0.0	0.0	87.8	0.0	0.0
Majuro	48.2	30.8	3.2	7.2	1.1	0.9	8.6
Maloelap	2.2	10.3	5.8	12.4	7.3	0.7	61.3
Mejit	1.7	50.0	8.3	13.3	25.0	1.7	0.0
Mili	2.2	1.5	5.1	1.5	11.0	0.7	78.0
Namdrik	0.8	0.8	13.6	48.4	0.8	0.0	35.6
Namu	0.0	0.8	2.4	3.1	44.1	2.4	47.2
Ujae	3.0	35.8	1.5	31.3	10.4	0.0	17.9
Utrik	6.2	0.0	4.6	7.7	12.3	0.0	69.2
Wotho	0.0	0.0	33.3	33.3	0.0	0.0	33.4
Wotje	3.7	2.8	30.9	14.0	30.8	1.9	15.9

Source: 1999 RMI Census Report