

Table 7.2 Operating Time and Generated Energy per Unit in Monthly

Year	Mon.	Operating Time (hour)										Generated Energy	
		No.1		No.2		No.3		No.4		Total		(MWh)	(%)
		Hour	(%)	Hour	(%)	Hour	(%)	Hour	(%)	Hour	(%)		
1979	1	542	72.8	744	100.0	744	100.0	744	100.0	2,774	93.2	74,735	62.8
	2	346	51.5	358	53.3	671	99.9	590	87.8	1,965	73.1	56,220	52.3
	3	744	100.0	722	97.0	730	98.1	737	99.1	2,933	98.6	77,045	64.7
	4	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	82,652	71.7
	5	744	100.0	617	82.9	744	100.0	744	100.0	2,849	95.7	79,623	66.9
	6	720	100.0	720	100.0	484	67.2	489	67.9	2,413	83.8	53,525	46.5
	7	744	100.0	730	98.1	744	100.0	737	99.1	2,955	99.3	80,546	67.7
	8	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	85,126	71.5
	9	720	100.0	717	99.6	720	100.0	720	100.0	2,877	99.9	83,537	72.5
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	87,120	73.2
	11	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	86,168	74.8
	12	704	94.6	744	100.0	744	100.0	744	100.0	2,936	98.7	80,180	67.4
Total		8,192	93.5	8,280	94.5	8,509	97.1	8,433	96.3	33,414	95.4	926,477	66.1
1980	1	735	98.8	744	100.0	744	100.0	744	100.0	2,967	99.7	85,471	71.8
	2	696	100.0	696	100.0	696	100.0	696	100.0	2,784	100.0	77,346	69.5
	3	744	100.0	738	99.2	744	100.0	744	100.0	2,970	99.8	90,866	76.3
	4	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	82,778	71.9
	5	744	100.0	654	87.9	744	100.0	744	100.0	2,886	97.0	78,083	65.6
	6	610	84.7	657	91.3	720	100.0	707	98.2	2,694	93.5	85,102	73.9
	7	744	100.0	742	99.7	744	100.0	744	100.0	2,974	99.9	98,670	82.9
	8	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	99,675	83.7
	9	720	100.0	702	97.5	720	100.0	720	100.0	2,862	99.4	98,128	85.2
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	106,374	89.4
	11	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	104,308	90.5
	12	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	87,396	73.4
Total		8,665	98.6	8,605	98.0	8,784	100.0	8,771	99.9	34,825	99.1	1,094,197	77.9
1981	1	740	99.5	539	72.4	744	100.0	744	100.0	2,767	93.0	98,781	83.0
	2	668	99.4	668	99.4	526	78.3	672	100.0	2,534	94.3	85,258	79.3
	3	744	100.0	744	100.0	730	98.1	744	100.0	2,962	99.5	109,420	91.9
	4	632	87.8	629	87.4	629	87.4	629	87.4	2,519	87.5	88,263	76.6
	5	744	100.0	744	100.0	618	83.1	744	100.0	2,850	95.8	68,222	57.3
	6	717	99.6	717	99.5	668	92.8	498	69.2	2,599	90.3	67,828	58.9
	7	744	100.0	566	76.0	625	84.0	348	46.8	2,283	76.7	55,890	47.0
	8	744	100.0	735	98.8	596	80.1	744	100.0	2,819	94.7	81,463	68.4
	9	589	81.8	703	97.6	370	51.4	720	100.0	2,382	82.7	61,168	53.1
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	98,109	82.4
	11	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	100,922	87.6
	12	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	106,804	89.7
Total		8,530	97.4	8,252	94.2	7,714	88.1	8,051	91.9	32,548	92.9	1,022,128	72.9
1982	1	744	100.0	737	99.1	738	99.2	744	100.0	2,963	99.6	93,937	78.9
	2	672	100.0	672	100.0	635	94.5	672	100.0	2,651	98.6	83,976	78.1
	3	744	100.0	744	100.0	744	100.0	682	91.7	2,914	97.9	86,898	73.0
	4	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	103,796	90.1
	5	689	92.6	744	100.0	555	74.6	740	99.5	2,728	91.7	94,834	79.7
	6	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	104,628	90.8
	7	744	100.0	722	97.0	744	100.0	679	91.3	2,889	97.1	103,177	86.7
	8	480	64.5	581	78.1	744	100.0	744	100.0	2,549	85.7	92,911	78.1
	9	682	94.7	720	100.0	720	100.0	693	96.3	2,815	97.7	94,349	81.9
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	106,790	89.7
	11	679	94.3	581	80.7	679	94.3	658	91.4	2,597	90.2	84,018	72.9
	12	744	100.0	441	59.3	473	63.6	744	100.0	2,402	80.7	49,014	41.2
Total		8,362	95.5	8,126	92.8	8,216	93.8	8,540	97.5	33,244	94.9	1,098,328	78.4
1983	1	744	100.0	67	9.0	152	20.4	744	100.0	1,707	57.4	39,174	32.9
	2	672	100.0	7	1.0	59	8.8	672	100.0	1,410	52.5	23,830	22.2
	3	624	83.9	119	16.0	157	21.1	442	59.4	1,342	45.1	29,374	24.7
	4	719	99.9	461	64.0	262	36.4	18	2.5	1,460	50.7	29,168	25.3
	5	188	25.3	0	0.0	650	87.4	744	100.0	1,582	53.2	35,683	30.0
	6	387	53.8	82	11.4	720	100.0	720	100.0	1,909	66.3	69,635	60.4
	7	744	100.0	744	100.0	706	94.9	744	100.0	2,938	98.7	89,685	75.3
	8	744	100.0	707	95.0	707	95.0	712	95.7	2,870	96.4	95,520	80.2
	9	720	100.0	704	97.8	720	100.0	720	100.0	2,864	99.4	107,236	93.1
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	113,063	95.0
	11	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	106,829	92.7
	12	744	100.0	711	95.6	744	100.0	744	100.0	2,943	98.9	76,479	64.2
Total		7,750	88.5	5,066	57.8	6,341	72.4	7,724	88.2	26,881	76.7	815,676	58.2

Table 7.2 Operating Time and Generated Energy per Unit in Monthly

Year	Mon.	Operating Time (hour)										Generated Energy	
		No.1		No.2		No.3		No.4		Total		(MWh)	(%)
		Hour	(%)	Hour	(%)	Hour	(%)	Hour	(%)	Hour	(%)		
1984	1	744	100.0	743	99.9	744	100.0	744	100.0	2,975	100.0	88,145	74.0
	2	686	98.6	684	98.3	663	95.3	692	99.4	2,725	97.9	77,592	69.7
	3	647	86.9	742	99.7	744	100.0	744	100.0	2,877	96.7	80,864	67.9
	4	555	77.1	720	100.0	720	100.0	491	68.2	2,486	86.3	75,603	65.6
	5	439	59.0	744	100.0	744	100.0	720	96.8	2,647	88.9	91,781	77.1
	6	720	100.0	527	73.2	502	69.8	720	100.0	2,470	85.7	75,264	65.3
	7	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	113,910	95.7
	8	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	114,199	95.9
	9	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	110,294	95.7
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	114,604	96.3
	11	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	102,549	89.0
	12	744	100.0	743	99.9	744	100.0	744	100.0	2,975	100.0	100,466	84.4
Total		8,207	93.4	8,575	97.6	8,533	97.1	8,527	97.1	33,842	96.3	1,145,271	81.5
1985	1	744	100.0	744	100.0	645	86.7	645	86.7	2,778	93.4	97,377	81.8
	2	672	100.0	672	100.0	0	0.0	225	33.5	1,569	58.4	61,079	56.8
	3	728	97.9	744	100.0	544	73.1	744	100.0	2,761	92.8	93,573	78.6
	4	720	100.0	716	99.4	720	100.0	720	100.0	2,876	99.9	94,312	81.9
	5	744	100.0	744	100.0	744	100.0	461	62.0	2,693	90.5	101,030	84.9
	6	550	76.4	720	100.0	720	100.0	720	100.0	2,710	94.1	101,855	88.4
	7	658	88.4	741	99.6	744	100.0	744	100.0	2,887	97.0	101,617	85.4
	8	744	100.0	634	85.2	744	100.0	744	100.0	2,866	96.3	81,943	68.8
	9	431	59.8	720	100.0	720	100.0	639	88.7	2,509	87.1	57,113	49.6
	10	736	98.9	744	100.0	744	100.0	744	100.0	2,968	99.7	104,651	87.9
	11	716	99.4	720	100.0	720	100.0	720	100.0	2,876	99.9	82,468	71.6
	12	744	100.0	744	100.0	742	99.7	740	99.5	2,970	99.8	90,601	76.1
Total		8,187	93.5	8,643	98.7	7,787	88.9	7,846	89.6	32,463	92.6	1,067,619	76.2
1986	1	609	81.9	741	99.6	744	100.0	744	100.0	2,838	95.4	70,431	59.2
	2	672	100.0	672	100.0	672	100.0	672	100.0	2,688	100.0	60,776	56.5
	3	572	76.9	673	90.5	744	100.0	744	100.0	2,733	91.8	74,535	62.6
	4	700	97.3	609	84.6	575	79.8	662	92.0	2,546	88.4	69,547	60.4
	5	744	100.0	485	65.2	651	87.5	429	57.6	2,309	77.6	55,052	46.2
	6	577	80.1	176	24.4	298	41.4	500	69.4	1,551	53.9	32,853	28.5
	7	631	84.8	247	33.2	701	94.2	381	51.2	1,960	65.9	38,975	32.7
	8	744	100.0	744	100.0	725	97.4	744	100.0	2,957	99.4	93,069	78.2
	9	705	97.9	720	100.0	698	96.9	720	100.0	2,843	98.7	88,260	76.6
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	116,869	98.2
	11	705	97.9	696	96.7	720	100.0	684	95.0	2,805	97.4	89,230	77.5
	12	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	112,854	94.8
Total		8,147	93.0	7,251	82.8	8,016	91.5	7,768	88.7	31,182	89.0	902,451	64.4
1987	1	737	99.1	740	99.5	744	100.0	744	100.0	2,965	99.6	97,088	81.6
	2	672	100.0	672	100.0	672	100.0	672	100.0	2,688	100.0	92,046	85.6
	3	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	101,576	85.3
	4	720	100.0	718	99.7	720	100.0	720	100.0	2,878	99.9	96,959	84.2
	5	277	37.2	302	40.6	682	91.7	659	88.6	1,920	64.5	61,442	51.6
	6	716	99.4	582	80.8	664	92.2	713	99.0	2,675	92.9	70,000	60.8
	7	489	65.7	582	78.2	744	100.0	603	81.1	2,417	81.2	52,292	43.9
	8	600	80.6	744	100.0	565	75.9	744	100.0	2,653	89.1	74,211	62.3
	9	531	73.8	720	100.0	720	100.0	457	63.5	2,428	84.3	80,385	69.8
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	102,375	86.0
	11	706	98.1	720	100.0	669	92.9	703	97.6	2,798	97.1	89,050	77.3
	12	744	100.0	744	100.0	744	100.0	737	99.1	2,969	99.8	81,022	68.1
Total		7,680	87.7	8,012	91.5	8,412	96.0	8,240	94.1	32,343	92.3	998,446	71.2
1988	1	744	100.0	744	100.0	712	95.7	744	100.0	2,944	98.9	76,198	64.0
	2	683	98.1	696	100.0	681	97.8	696	100.0	2,756	99.0	56,134	50.4
	3	730	98.1	723	97.2	672	90.3	672	90.3	2,797	94.0	60,587	50.9
	4	555	77.1	371	51.5	278	38.6	644	89.4	1,848	64.2	33,613	29.2
	5	252	33.9	504	67.7	44	5.9	744	100.0	1,544	51.9	25,357	21.3
	6	381	52.9	720	100.0	69	9.6	720	100.0	1,890	65.6	35,206	30.6
	7	707	95.0	744	100.0	656	88.2	744	100.0	2,851	95.8	83,685	70.3
	8	744	100.0	744	100.0	744	100.0	553	74.3	2,785	93.6	91,652	77.0
	9	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	96,121	83.4
	10	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	99,368	83.5
	11	720	100.0	720	100.0	678	94.2	671	93.2	2,789	96.8	84,057	73.0
	12	738	99.2	744	100.0	744	100.0	744	100.0	2,970	99.8	97,970	82.3
Total		7,718	87.9	8,174	93.1	6,742	76.8	8,396	95.6	31,030	88.3	839,948	59.8

Table 7.2 Operating Time and Generated Energy per Unit in Monthly

Year	Mon.	Operating Time (hour)										Generated Energy	
		No.1		No.2		No.3		No.4		Total		(MWh)	(%)
		Hour	(%)	Hour	(%)	Hour	(%)	Hour	(%)	Hour	(%)		
1989	1	740	99.5	730	98.1	744	100.0	744	100.0	2,958	99.4	93,606	78.6
	2	672	100.0	672	100.0	669	99.6	672	100.0	2,685	99.9	66,437	61.8
	3	744	100.0	744	100.0	729	98.0	744	100.0	2,961	99.5	84,147	70.7
	4	655	91.0	654	90.8	720	100.0	425	59.0	2,454	85.2	70,485	61.2
	5	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	79,503	66.8
	6	720	100.0	417	57.9	649	90.1	389	54.0	2,175	75.5	55,174	47.9
	7	744	100.0	400	53.8	780	104.8	711	95.6	2,635	88.5	90,541	76.1
	8	207	27.9	697	93.7	342	46.0	595	80.0	1,841	61.9	34,014	28.6
	9	439	60.9	190	26.4	588	81.6	265	36.8	1,481	51.4	19,325	16.8
	10	232	31.2	621	83.5	86	11.6	744	100.0	1,683	56.6	25,345	21.3
	11	720	100.0	426	59.2	445	61.8	720	100.0	2,311	80.2	63,872	55.4
	12	702	94.4	744	100.0	744	100.0	722	97.0	2,912	97.9	98,606	82.8
Total		7,319	83.6	7,039	80.4	7,240	82.7	7,475	85.3	29,074	83.0	781,055	55.7
1990	1	744	100.0	744	100.0	585	78.6	744	100.0	2,817	94.7	100,383	84.3
	2	672	100.0	672	100.0	672	100.0	672	100.0	2,688	100.0	98,940	92.0
	3	744	100.0	706	94.9	709	95.3	742	99.7	2,901	97.5	82,325	69.2
	4	629	87.4	720	100.0	615	85.4	720	100.0	2,684	93.2	60,521	52.5
	5	736	98.9	506	68.0	658	88.4	465	62.5	2,365	79.5	54,907	46.1
	6	594	82.5	720	100.0	299	41.5	701	97.4	2,314	80.3	63,409	55.0
	7	421	56.6	564	75.8	742	99.7	503	67.6	2,230	74.9	57,350	48.2
	8	443	59.5	361	48.5	736	98.9	744	100.0	2,284	76.7	35,875	30.1
	9	695	96.5	118	16.4	720	100.0	720	100.0	2,253	78.2	33,281	28.9
	10	159	21.3	655	88.0	738	99.2	704	94.6	2,256	75.8	34,047	28.6
	11	305	42.4	720	100.0	720	100.0	720	100.0	2,465	85.6	54,568	47.4
	12	734	98.6	726	97.6	736	98.9	742	99.7	2,938	98.7	98,775	83.0
Total		6,875	78.5	7,212	82.3	7,930	90.5	8,177	93.3	30,194	86.2	774,381	55.2
1991	1	737	99.1	728	97.8	737	99.1	744	100.0	2,946	99.0	81,760	68.7
	2	672	100.0	658	97.9	670	99.7	666	99.1	2,666	99.2	67,491	62.8
	3	689	92.6	729	98.0	744	100.0	744	100.0	2,906	97.6	96,602	81.2
	4	720	100.0	694	96.4	368	51.1	196	27.2	1,978	68.7	69,504	60.3
	5	700	94.1	744	100.0	744	100.0	744	100.0	2,932	98.5	92,681	77.9
	6	353	49.0	617	85.7	720	100.0	720	100.0	2,410	83.7	57,305	49.7
	7	275	37.0	309	41.5	315	42.3	744	100.0	1,643	55.2	35,931	30.2
	8	119	16.0	504	67.7	336	45.2	744	100.0	1,703	57.2	32,803	27.6
	9	418	58.1	505	70.1	171	23.8	715	99.3	1,809	62.8	32,852	28.5
	10	744	100.0	227	30.5	268	36.0	729	98.0	1,968	66.1	41,235	34.6
	11	720	100.0	673	93.5	720	100.0	720	100.0	2,833	98.4	94,145	81.7
	12	743	99.9	725	97.4	744	100.0	744	100.0	2,956	99.3	104,510	87.8
Total		6,890	78.7	7,113	81.2	6,537	74.6	8,210	93.7	28,750	82.0	806,819	57.6
1992	1	689	92.6	509	68.4	744	100.0	744	100.0	2,686	90.3	70,982	59.6
	2	241	34.6	696	100.0	696	100.0	696	100.0	2,329	83.7	55,049	49.4
	3	668	89.7	689	92.5	744	100.0	744	100.0	2,844	95.6	58,277	49.0
	4	632	87.8	600	83.3	81	11.3	104	14.4	1,417	49.2	32,560	28.3
	5	737	99.1	743	99.9	743	99.9	743	99.9	2,967	99.7	90,595	76.1
	6	714	99.2	714	99.2	717	99.6	720	100.0	2,865	99.5	108,970	94.6
	7	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	116,885	98.2
	8	744	100.0	743	99.9	743	99.9	743	99.9	2,974	99.9	93,276	78.4
	9	478	66.4	546	75.8	720	100.0	720	100.0	2,464	85.6	48,758	42.3
	10	332	44.6	744	100.0	744	100.0	744	100.0	2,564	86.2	49,919	41.9
	11	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	99,413	86.3
	12	744	100.0	682	91.7	744	100.0	744	100.0	2,914	97.9	93,048	78.2
Total		7,443	84.7	8,130	92.6	8,141	92.7	8,167	93.0	31,880	90.7	917,732	65.3
1993	1	661	88.9	744	100.0	744	100.0	739	99.4	2,889	97.1	51,866	43.6
	2	205	30.5	672	100.0	672	100.0	644	95.8	2,193	81.6	56,159	52.2
	3	287	38.6	334	44.9	734	98.6	730	98.1	2,085	70.1	68,764	57.8
	4	416	57.8	396	55.0	688	95.6	720	100.0	2,220	77.1	87,087	75.6
	5	738	99.2	744	100.0	744	100.0	744	100.0	2,970	99.8	112,588	94.6
	6	720	100.0	720	100.0	720	100.0	720	100.0	2,880	100.0	113,048	98.1
	7	744	100.0	732	98.4	744	100.0	744	100.0	2,964	99.6	109,815	92.3
	8	744	100.0	383	51.5	744	100.0	744	100.0	2,615	87.9	44,601	37.5
	9	705	97.9	307	42.6	713	99.0	713	99.1	2,438	84.7	46,714	40.6
	10	447	60.1	652	87.6	744	100.0	744	100.0	2,587	86.9	60,890	51.2
	11	720	100.0	720	100.0	720	100.0	717	99.5	2,877	99.9	89,347	77.6
	12	744	100.0	744	100.0	744	100.0	744	100.0	2,976	100.0	117,386	98.6
Total		7,132	81.4	7,148	81.6	8,711	99.4	8,703	99.4	31,694	90.5	958,265	68.4



I

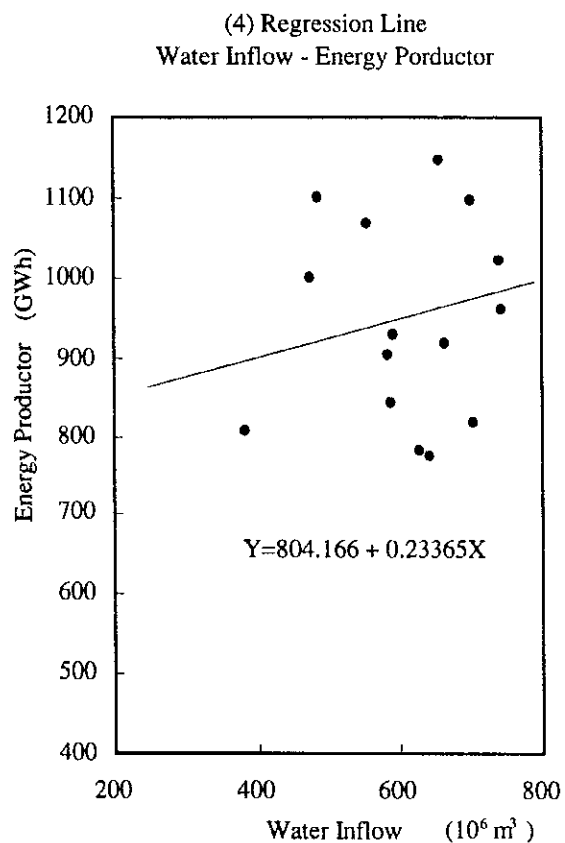
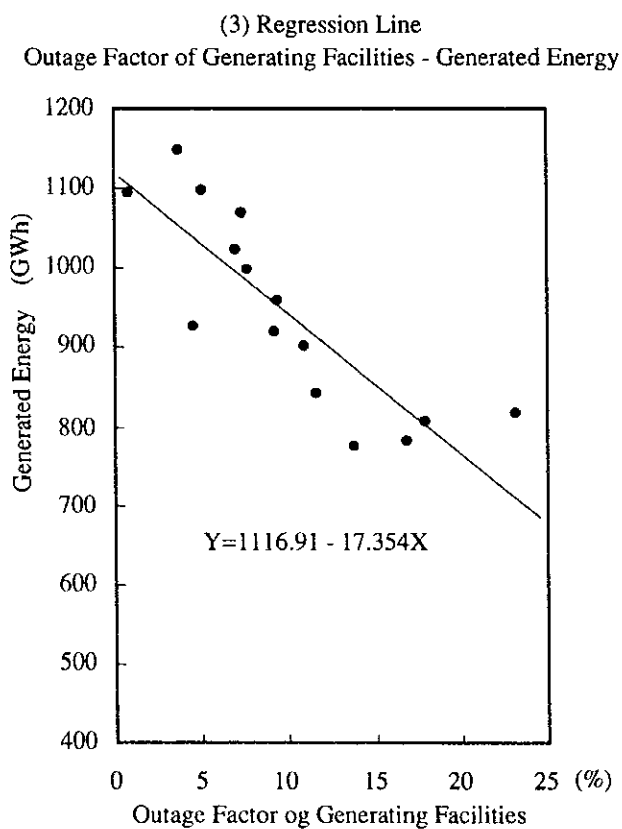
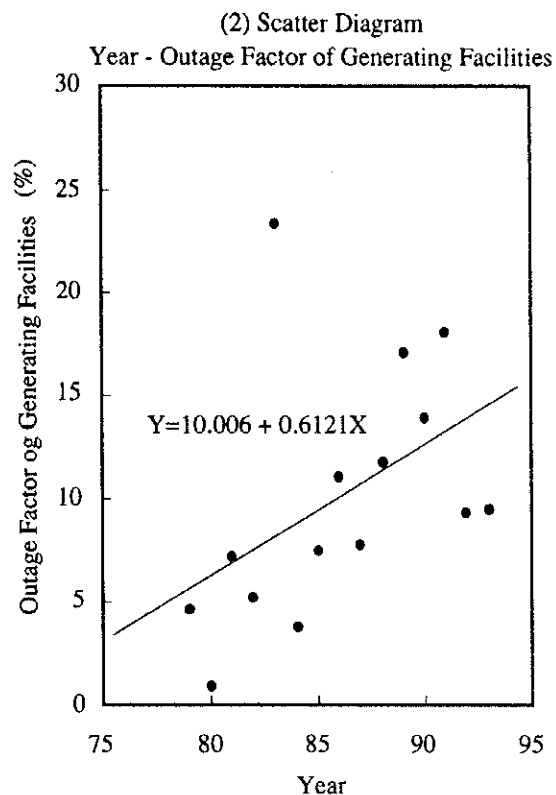
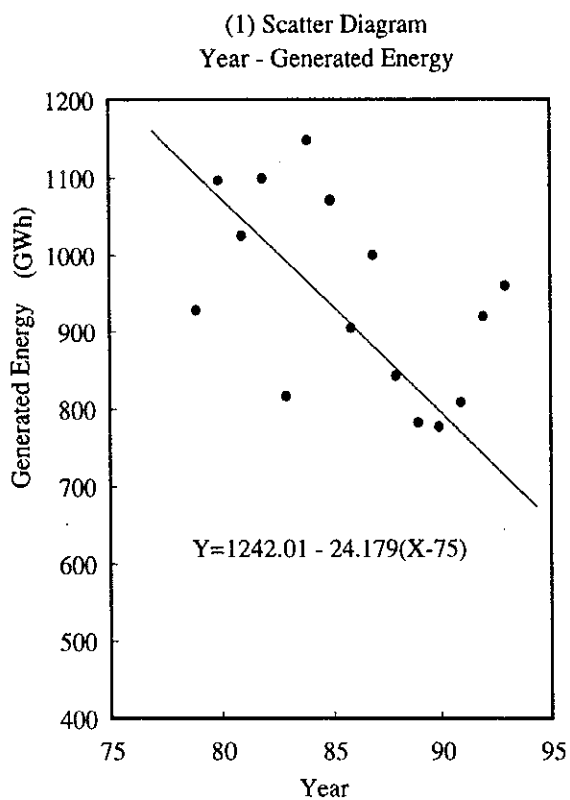
FIRR= 20.13%

Year	Cost				Tax	Total	Benefit due to Additional Energy				Energy Loss	Benefit of Renewal		Total Benefit	Balance of Benefit and Cost	Present Worth	PWV Discount Rate
	Rehabilitation		Upgrade				Rehabilitation		Upgrade			Renewal Benefit	O & M Benefit				
	Invest.	O & M	Invest.	O & M			Add Enrgy	Add Sales	Add Enrgy	Add Sales							
1996	110,100	424,735	45,000	0	0	579,835							424,735	424,735	-155,100	-155,100	-155,100
1997	915,300	424,735	271,600	23,860	0	1,635,495							424,735	424,735	-1,210,760	-1,187,020	-1,007,854
1998	4,291,900	297,315	2,069,400	47,720	3,827	6,710,162				6,750	38,273	359,400	424,735	103,608	-6,606,554	-6,350,014	-4,577,770
1999	1,265,700	297,315		47,720	46,813	1,657,547	69.06	391,585	13,500	76,545		704,331	424,735	188,534	-1,469,013	-1,384,284	-847,314
2000		169,894		47,720	124,257	341,871	148.75	843,398	70,400	399,168			424,735	1,667,301	1,325,431	1,224,493	636,378
2001		169,894		47,720	164,379	381,993	159.37	903,627	130,540	740,162			424,735	2,068,524	1,686,531	1,527,543	674,049
2002		169,894		47,720	208,635	426,249	169.99	963,856	197,970	1,122,490			424,735	2,511,081	2,084,832	1,851,272	693,598
2003		169,894		47,720	255,379	472,993	180.61	1,024,085	269,790	1,529,709			424,735	2,978,529	2,505,536	2,181,220	693,868
2004		169,894		47,720	266,057	483,671	191.24	1,084,314	278,000	1,576,260			424,735	3,085,309	2,601,638	2,220,473	599,739
2005		169,894		47,720	272,080	489,694	201.86	1,144,543	278,000	1,576,260			424,735	3,145,538	2,655,844	2,222,291	509,633
2006		169,894		47,720	278,103	495,717	212.48	1,204,772	278,000	1,576,260			424,735	3,205,767	2,710,050	2,223,185	432,884
2007		169,894		47,720	284,126	501,740	223.10	1,265,001	278,000	1,576,260			76,500	424,735	3,342,496	2,840,756	2,284,715
2008	113,000	169,894		47,720	290,149	620,763	233.73	1,325,230	278,000	1,576,260			2,044,900	424,735	5,371,125	4,750,362	3,745,628
2009	1,472,000	169,894		47,720	296,172	1,985,786	244.35	1,385,459	278,000	1,576,260			6,597,400	297,315	9,856,433	7,870,647	6,084,266
2010	699,300	169,894		47,720	302,195	1,219,109	254.97	1,445,687	278,000	1,576,260			183,700	297,315	3,502,962	2,283,853	1,730,875
2011		169,894		47,720	308,218	525,832	265.59	1,505,916	278,000	1,576,260			27,500	169,894	3,279,570	2,753,739	2,046,068
2012		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	998,637	72,852
2013		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	979,055	60,643
2014		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	959,858	50,480
2015	1,498,100	169,894		47,720	157,626	1,873,340			278,000	1,576,260			169,894	1,746,154	-127,186	-87,304	-3,898
2016		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	922,586	34,978
2017		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	904,496	29,117
2018		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	886,761	24,237
2019		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	869,373	20,175
2020		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	852,327	16,794
2021		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	835,614	13,980
2022		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	819,230	11,637
2023		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	803,166	9,687
2024		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	787,418	8,063
2025		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	771,979	6,712
2026		169,894		47,720	157,626	375,240			278,000	1,576,260			1,498,100	169,894	3,244,254	2,869,014	1,583,899
2027		169,894		47,720	157,626	375,240			278,000	1,576,260			169,894	1,746,154	1,370,914	742,002	4,653
2028		169,894		47,720	0	217,614							169,894	169,894	-47,720	-25,322	-1,35
2029		169,894		47,720	0	217,614							169,894	169,894	-47,720	-24,825	-1,12
2030	1,498,100	169,894		47,720	0	1,715,714							169,894	169,894	-1,545,820	-788,412	-3,023
2031		169,894		47,720	0	217,614							169,894	169,894	-47,720	-23,861	-78
2032		169,894		47,720	0	217,614							169,894	169,894	-47,720	-23,393	-65
2033		169,894		47,720	0	217,614							169,894	169,894	-47,720	-22,935	-54
2034		169,894		47,720	0	217,614							169,894	169,894	-47,720	-22,485	-45
2035		169,894		47,720	0	217,614							169,894	169,894	-47,720	-22,044	-37
2036		169,894		47,720	0	217,614							169,894	169,894	-47,720	-21,612	-31
2037		169,894		47,720	0	217,614							169,894	169,894	-47,720	-21,188	-26
2038		169,894		47,720	0	217,614							169,894	169,894	-47,720	-20,773	-22
2039		169,894		47,720	0	217,614							169,894	169,894	-47,720	-20,365	-18
2040		169,894		47,720	0	217,614							169,894	169,894	-47,720	-19,966	-15
2041		169,894		47,720	0	217,614							1,498,100	169,894	1,667,994	1,450,380	594,941
2042		169,894		47,720	0	217,614							169,894	169,894	-47,720	-19,191	-10
2043		169,894		47,720	0	217,614							169,894	169,894	-47,720	-18,814	-8
2044		169,894		47,720	0	217,614							169,894	169,894	-47,720	-18,446	-7
2045	1,498,100	169,894		47,720	0	1,715,714							169,894	169,894	-1,545,820	-585,802	-19

32,790,214

Table 7.5 Demand Forecast in Upgrading Areas

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Ninh Son																		
(GWh)	2.20	2.50	4.90	5.70	6.50	7.40	8.50	10.20	0.00									
(MW)	0.70	0.80	1.40	1.60	1.80	2.10	2.40	2.80	0.00									
Thap Cham																		
(GWh)	31.60	40.50	49.80	51.40	65.00	79.30	90.00	101.30	113.46	127.07	141.05	156.56	172.22	189.44	206.49	225.08	245.33	264.96
(MW)	8.00	10.30	11.90	13.60	16.00	18.80	21.00	24.00	26.88	30.11	33.42	37.09	40.80	44.88	48.92	53.33	58.12	62.77
Phan Ri																		
(GWh)	6.90	8.80	10.70	13.20	16.00	19.50	24.00	28.70	33.87	39.62	45.57	51.95	58.70	65.74	72.97	80.27	87.50	95.37
(MW)	2.30	2.80	3.40	4.20	5.00	6.20	7.50	9.10	10.01	11.01	12.11	13.32	14.66	16.05	17.57	19.15	20.88	22.76
Phan Thiet																		
(GWh)	31.10	34.40	38.60	39.40	46.00	53.20	60.00	67.40	74.81	83.04	92.18	101.40	111.54	122.69	133.73	145.77	158.89	173.19
(MW)	7.90	8.80	9.80	10.00	11.50	13.50	15.00	16.80	18.65	20.70	22.98	25.27	27.80	30.58	33.33	36.33	39.60	43.17
Cam Ranh																		
(GWh)	19.20	20.00	45.00	60.00	82.00	105.00	116.50	130.00	143.00	157.30	173.03	190.33	209.37	228.21	248.75	271.14	292.83	316.25
(MW)	4.00	5.50	8.00	10.00	12.00	14.50	15.00	16.00	16.80	17.64	18.52	19.45	20.42	21.44	22.51	23.64	24.82	26.06
Dien Khanh																		
(GWh)	16.50	22.00	66.00	80.00	100.00	120.00	140.00	160.00	182.40	207.94	234.97	263.16	292.11	321.32	350.24	381.76	412.30	445.29
(MW)	4.30	10.00	12.00	15.00	16.00	18.00	19.00	20.00	21.00	22.05	23.15	24.31	25.28	26.29	27.35	28.44	29.58	30.76
Total																		
(GWh)	107.50	128.20	215.00	249.70	315.50	384.40	430.50	487.40	547.54	614.97	686.79	763.40	843.93	927.41	1,012.19	1,104.01	1,196.85	1,295.06
(MW)	27.20	38.20	46.50	54.40	62.30	73.10	77.50	85.90	93.34	101.51	110.18	119.45	128.96	139.25	149.69	160.89	173.00	185.52



CHAPTER 8

CONCLUSION AND RECOMMENDATION



CHAPTER 8 CONCLUSION AND RECOMMENDATION

The Da Nhim power system has been operated over 30 years since its commission in 1964. Facilities in the system are remarkably deteriorated and facing the serious declination of the proper functions due to the long run operation without genuine spare parts. Since the system still stands on an important position in the country's power sector, rehabilitation of the system is urgently required.

Recent power demand in the towns of Phan Rang, Phan Ri, Phan Thiet, Cam Ranh, and Dien Khanh supplied through 66kV facilities from the Da Nhim power plant is rapidly increasing and resulting in the needs of urgent capacity increase of the power facilities in those areas.

The Government of Viet Nam requested the Government of Japan to study the actual situation of the system and to formulate the rehabilitation plan of the facilities as well as an upgrade plan of the existing 66kV power facilities. The Study Team was dispatched to the site under the agreement of both governments for the requested study.

Investigation and analyses for the facilities of the Study Team resulted that

- (1) the existing facilities are remarkably deteriorated and some of them are operated in the critical technical condition,
- (2) the continuous operation of those facilities without rehabilitation will lead to further serious troubles, and
- (3) the present power demand is reaching the limit of capacity of the existing 66kV power facilities.

From the results of investigation and analyses, the Study Team technically concluded that the rehabilitation and upgrade of the facilities should be urgently implemented for stabilization of the country's power sector and restoration and development of the infrastructure in the country, and formulated the implementation plans for the rehabilitation and upgrade of the existing facilities. Besides, the Study Team also formulated alternative implementation plan of the Project that the Project should be implemented by phasing into two stages for financing facilely the project fund.

In addition to the technical evaluation, the Study Team carried out the economical and financial evaluation in the manners of the internal rate of return.

The economic and financial internal rate of returns (EIRR and FIRR) for the urgent rehabilitation Project of the Da Nhim power system and the 66 kV system voltage upgrade Project are 21.69 % and 20.13 %, respectively. While, as a result of the analysis of the economic viability of the project phasing, it is recommended that the Project of second phase should be implemented after one (1) year of commencement of the first phase. Thus, the formulated plans are considered to be adequate both economically and financially.

Accordingly, the Study Team recommends the plans of the rehabilitation and upgrade to be urgently implemented.

JICA