2.2.4 年間負荷曲線

年間負荷曲線の作成は、絶えず変動する電力潮流を正確に管理する時計のもとに情報（データ）を収集することが必要である。Fig.2.2.4 はジャワ・バリ系統の年間負荷曲線を示すが、一部データの欠測部分が含まれている。発電設備の運用形態として、本図より大きく以下により分類することが出来る。

a. ベース発電
   - 流れ込み式発電所
   - スチーム
   - 地熱
   - PLN 以外の発電

b. ベースプラス負荷変動吸収分
   - コンバインドサイクル
   - スチーム

c. 負荷変動吸収分
   - ガスタービン
   - ディーゼル
   - 水力（貯水池式）

2.2.5 供給責任

電力供給者の需要者に対する責任は、良質の周波数と電圧を届けることであり、この側面からジャワ・バリ系統の状況は以下に要約される。

a. 系統周波数

PLN における系統周波数の許容限度は 50±0.5Hz となっており、調査時点のピーク負荷が約 1,000 万 kW に達する系統としては変動範囲が大きいといえる（日本の電力系統における許容値は 50±0.1-0.2Hz である)。このため許容限度を現在の半分 50±0.25Hz に目標値を定め、この範囲内に実績を達成するようにもっていくことが薦められる。

Fig.2.2.5 は 1997 年 7 月 30 日から 8 月 2 日までの実績周波数の代表例を示したもので、変動範囲は 50±0.5Hz 以内に収まるよう運用されているが、部分的に許容値を超える状況も見られる。システム時間はプラス側に制御されているといえる。調査時点での系統定数は 80 MW / 0.1 Hz 前後であり、最大の単位負荷はセメント工場の 45 MW である。

b. 母線電圧

系統運用上、母線電圧特に上位電圧を適正に保つことは重要である。ジャワ・バリ系統における現状の運用からは、500 kV 系統の場合、ピーク時は 500 kV 変電所の母線電圧を適正値に保つことに問題は提起されないが、オフピーク時は電圧が上昇しすぎるためリアクタにより電圧を下げて運用している。また 150 kV 系において部分的であるが許容値を外れて運用している個所もみられる。

c. 負荷制限 (Load shedding)

系統分離事故時などで、過度の周波数変動が生じ場合、下記に示したように周波数の低下の大きさに応じて、一定量の負荷を自動遮断する負荷制限機能が設けられている。

50.5 – 49.5 Hz	正常運転
49.0 – 48.4 Hz	負荷制限運転
48.3 Hz	分離運転
47.8 Hz	ホスト負荷

Table 2.1.1-1 Length of Transmission Lines

Year	Voltage level (kV)							
	20-30 *1		70		150		500	
	Length (km)	Incre.(%)	Length (km)	Incre.(%)	Length (km)	Incre.(%)	Length (km)	Incre.(%)
1987/88	2,007.45	-	4,012.73	-	6,419.53	-	977.20	-
1988/89	2,001.36	-0.30	4,314.28	7.51	7,453.79	16.11	1,060.92	8.57
1989/90	2,161.98	8.03	4,347.17	0.76	7,809.80	4.78	1,106.92	4.34
1990/91	1,891.95	-12.49	4,314.09	-0.76	8,315.66	6.48	1,148.12	3.72
1991/92	1,833.55	-3.09	4,453.88	3.24	8,569.82	3.06	1,143.23	-0.43
1992/93	1,856.49	1.25	4,366.20	-1.97	10,255.06	19.66	1,189.53	4.05
1993/94	1,808.25	-2.60	4,475.54	2.50	10,974.98	7.02	1,501.51	26.23
1994	1,750.77	-3.18	4,667.51	4.29	11,216.20	2.20	1,565.42	4.26
1995	913.18	-47.84	4,762.03	2.03	12,149.65	8.32	1,728.00	10.39
1996	763.04	-16.44	4,797.44	0.74	13,348.59	9.87	1,873.00	8.39
Average (87-96) (%)		-10.19		2.00		8.47		7.50

*1: "20kV" lines are normally classified into distribution lines.

Source: PLN STATISTICS 1996

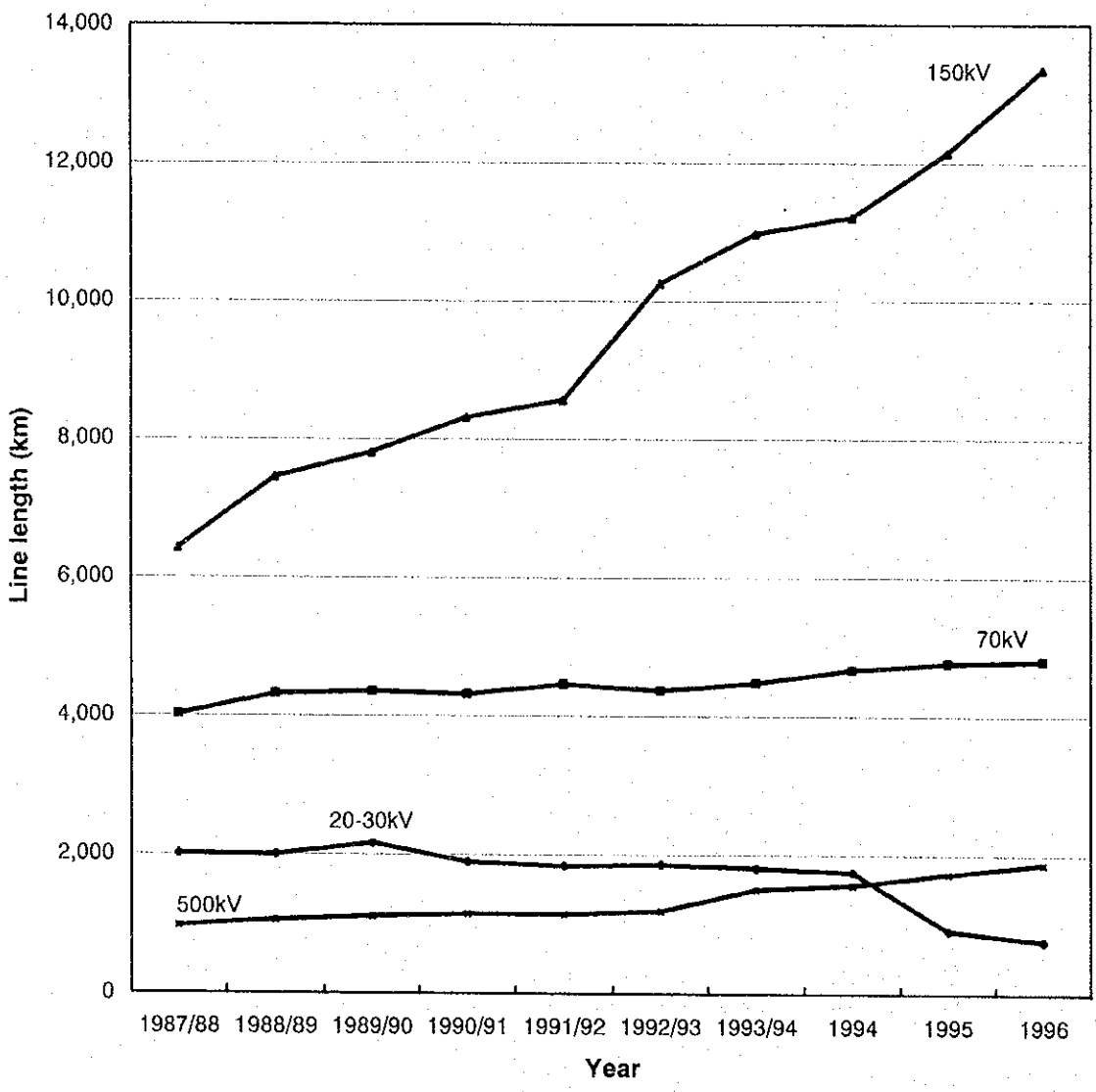


Table 2.1.1-2 Transmission Network of Java-Bali System

Year : 1995/96

(1/2)

Type & size of conductor (mm^2)	Section		Capacity (Amp)	Number of circuit	Length (km)	Year in service
	From	To				
150kV:						
ACSR 1x468.45	Gl. Bandung Selata	Gl. Kamojang	635	2	27	1992
ACSR 1x281.10	Gl. Bandung Selata	Gl. Pan Asia	600	2	9	1989
ACSR 1x281.10	Gl. Bandung Selata	Gl. Ujungberung	470	2	20	1987
ACSR 1x327.94	Gl. Banjar	Gl. Majenang	380	2	8.24	1993
ACSR 1x281.10	Gl. Ciamis	Gl. Banjar	380	2	27	1983
ACSR 2x327.94	Gl. Cigereleng	Gl. Bandung Selata	1,200	2	13.2	1979
ACSR 1x327.94	Gl. Cigereleng	Gl. Cianjur	600	2	39.1	1980
ACSR 1x298.07	Gl. Cigereleng	Gl. Lagadar	580	1	16.38	1984
ACSR 1x298.07	Gl. Cigereleng	Gl. Padalarang	580	1	27.21	1964/1983
ACSR 2x484.05	Gl. Cikasungka	Gl. Kamojang	1,270	2	15.22	24-09-1986
ACSR 1x281.10	Gl. Garut	Gl. Darajat	580	2	25.36	1969
ACSR 1x281.10	Gl. Garut	Gl. Tasikmalaya	580	2	40	1983
ACSR 2x327.94	GIS. Kiaracondong	Gl. Bandung Selata	1,200	2	20.23	1983/05-12-1995
ACSR 2x484.05	Gl. KIIC	Gl. New Karawang	1,270	2	5	21-12-1995
ACSR 1x281.10	Gl. Kamojang	Gl. Darajat	580	2	14.02	1987/1988
ACSR 1x327.94	Gl. Kosambi Baru	Gl. Bekasi	580	2	16.4	1980
ACSR 1x281.10	Gl. Kosambi Baru	Gl. Dawuan	780	2	9	1980
ACSR 1x298.07	Gl. Kosambi Baru	Gl. Jatiluhur	580	2	22.9	1980/1986
ACSR 2x484.05	Gl. Kosambi Baru	Gl. Maligi	1,270	1	6.7	03-09-1996
ACSR 2x484.05	Gl. Kosambi Baru	Gl. Pindodeli	1,270	1	7.46	20-04-1996
ACSR 2x484.05	Gl. Pindodeli	Gl. Mitra Karawang	1,270	1	5.11	20-04-1996
ACSR 1x298.07	Gl. Lagadar	Gl. Padalarang	580	1	10.83	1964/1983
ACSR 2x484.05	Gl. Maligi	Gl. Mitra Karawang	1,270	1	2.6	03-09-1996
ACSR 2x484.05	Gl. Mitra Karawang	Gl. KIIC	1,270	1	7.69	31-01-1996
ACSR 2x484.05	Gl. Mitra Karawang	Gl. Peruri	1,270	1	3.73	31-01-1996
ACSR 1x327.94	Gl. Padalarang	GIS. Cibabat	600	2	9.05	1993
ACSR 1x210.26	Gl. Padalarang	Gl. Bandung Utara	470	2	12.8	1984
TACSR 1x240	Gl. Padalarang	Gi. Cirata	930	2	33.33	1995
ACSR 1x298.07	Gl. Padalarang	Gl. Jatiluhur	580	2	44.54	1964/1983
ACSR 2x484.05	Gl. Peruri	Gl. KIIC	1,270	1	4.51	21-12-1995
ACSR 2x484.05	Gl. Rancaekek	Gl. Cikasungka	1,270	2	9.88	24-09-1996
ACSR 1x327.94	Gl. Rancaekek	Gl. Sunyaragl	600	2	26.73	1931/04-06-1996
ACSR 1x281.10	Gl. Tasikmalaya	Gl. Ciamis	580	2	18	1984
ACSR 2x327.94	Gl. Ujunggerung	GIS. Kiaracondong	1,200	2	13.1	1983/1985
ACSR 1x327.94	Gl. Ujunggerung	Gl. Rancaekek	600	2	12.57	1981/04-06-1996
ACSR 2x484.05	Gl. KIIC	Gl. Bintang Puspita	1,270	2	4.3	29-11-1996

Type & size of conductor (mm^2)	Section		Capacity (Amp)	Number of circuit	Length (km)	Year in service
	From	To				
70kV:						
ACSR 1x210.26	Gl. Bandung Barat	Gl. Bengkok	470	2	14.1	1923/1972
ACSR 1x210.27	Gl. Bandung Barat	Gl. Padalarang	470	2	36.15	1923/1972
ACSR 1x142.84	Gl. Bandung Timur	Gl. Ujungberung	380	2	8.9	1973
ACSR 1x187.48	Gl. Cigereleng	Gl. Bandung Timur	470	2	10.4	1968
ACSR 1x187.48	Gl. Cigereleng	Gl. Cikalong	440	2	29.7	1965
ACSR 1x99.23	Gl. Cigereleng	Gl. Bengkok	310	2	19.7	1923/1981
ACSR 1x210.26	Gl. Cigereleng	Gl. Majalaya	470	2	16	1974
ACSR 1x187.48	Gl. Cikalong	Gl. Lamajan	310	2	3.7	1965
ACSR 1x240/20	Gl. Cilata Lama	Gl. Cirata Baru	440	1	1.5	-
ACSR 1x187.48	Gl. Kosambi Baru	Gl. Indobharat	440	1	10.96	1929/1992
ACSR 1x187.48	Gl. Kosambi Baru	Gl. Pindodeli	440	2	26.5	1929/1992
ACSR 1x187.48	Gl. Kosambi Baru	Gl. Purwakaita	440	1	22.9	1939
ACSR 1x176.77	Gl. Kosambi Baru	Gl. Rengasdengklot	348	2	25.36	1994
ACSR 1x176.77	Gl. Kosambi Baru	Gl. Sukamadi	440	2	33	1982
ACSR 1x176.77	Gl. Lamajan	Gl. Santosa	348	1	7.5	03-04-1996
ACSR 1x176.77	Gl. Lamajan	Gl. Sumadra	348	1	17.91	03-04-1996
ACSR 1x176.77	Gl. Banjar	Gl. Pangandaran	440	2	44.2	1987
ACSR 1x187.48	Gl. Puwakarta	Gl. Cirata	440	2	17.4	1984
ACSR 1x298.07	Gl. Puwakarta	Gl. Indorama	457	2	6.5	-
ACSR 1x176.77	Gl. Puwakarta	Gl. Subang	440	2	30.6	1981
ACSR 1x176.77	Gl. Sumadra	Gl. Pameungpeuk	500	1	15.37	24-04-1996
ACSR 1x176.77	Gl. Santosa	Gl. Sumadra	500	1	10.41	04-04-1996
ACSR 1x187.48	Gl. South Pasific	Gl. Indobharat	440	1	2.13	1992
ACSR 1x187.48	Gl. Puwakarta	Gl. South Pasific	440	1	12.98	1929/1992
ACSR 1x142.64	Gl. Tasikmalaya	Gl. Malangbon	380	2	36.5	1983
ACSR 1x187.48	Gl. Ujungberung	Gl. Sumedang	440	1	26	1973
ACSR 1x187.48	Gl. Ujungberung	Gl. Parakan	440	1	26	1973
30kV:						
ACSR 1x99.22	Gl. Lamajan	Gl. Plengan	230	2	3.5	1923

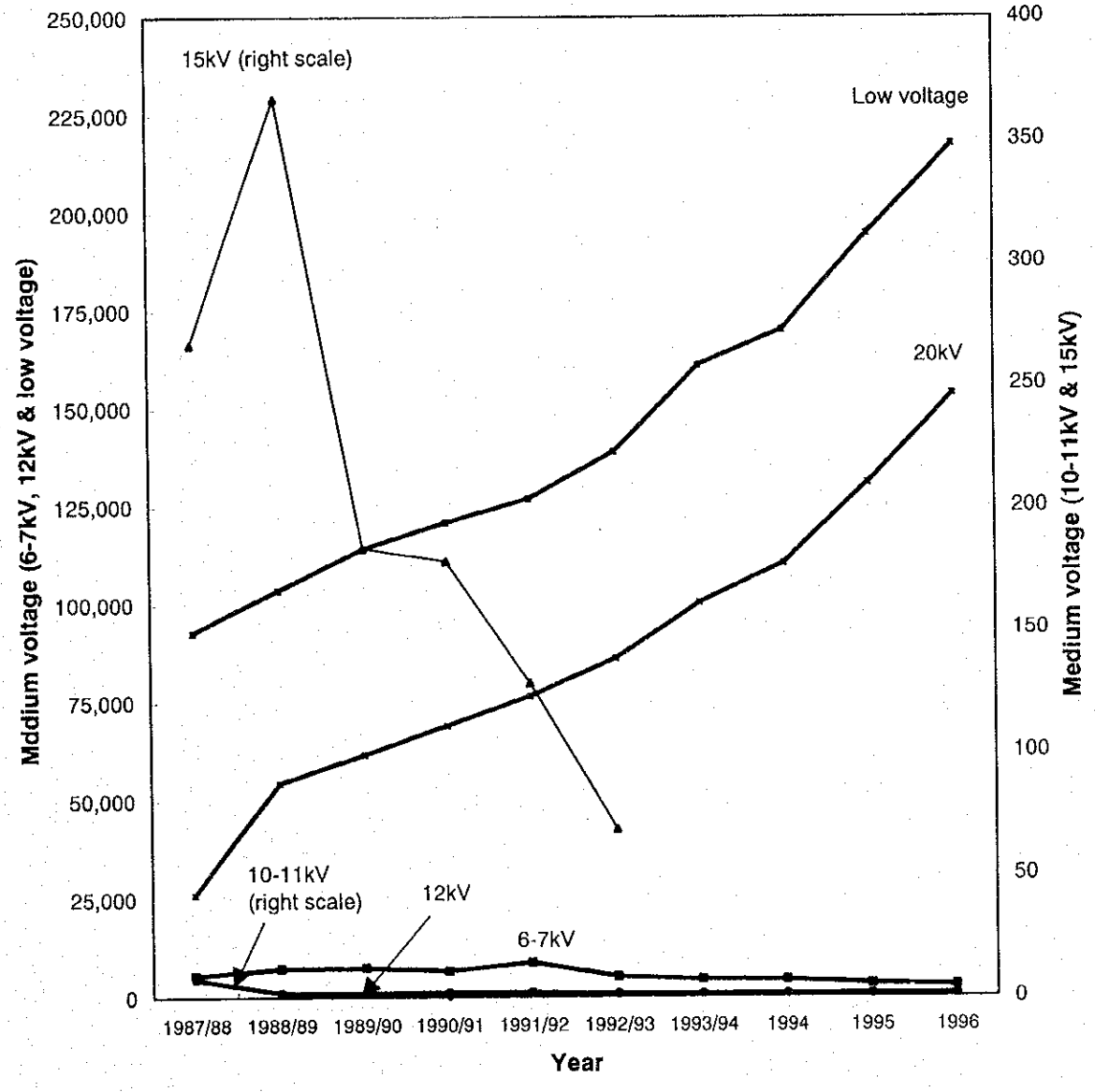
Source : STATISTIK 1995 (Bandung)

Table 2.1.2-1 Evolution of Medium and Low Voltage Lines

Year	Medium voltage (kV)											
	6-7		10-11		12		15		20		Low voltage 1)	
	Len(km)	Inc(%)	Len(km)	Inc(%)	Len(km)	Inc(%)	Len(km)	Inc(%)	Len(km)	Inc(%)	Len(km)	Inc(%)
1987/88	5,609	-			4,731	-	266	-	26,228	-	92,837	-
1988/89	7,347	30.97	1.63	-	1,118	-76.36	367	37.72	54,560	108.02	103,694	11.69
1989/90	7,593	3.35	1.63	0.00	1,133	1.28	183	-50.10	61,752	13.18	114,246	10.18
1990/91	6,773	-10.79	0.51	-68.71	1,187	4.77	178	-2.88	69,206	12.07	120,919	5.84
1991/92	8,874	31.01	1.63	219.61	1,187	0.00	128	-28.06	76,584	10.66	126,919	4.96
1992/93	5,198	-41.43			832	-29.88	68	-46.44	86,150	12.49	138,917	9.45
1993/94	4,443	-14.52			720	-13.50			100,316	16.44	160,935	15.85
1994	4,329	-2.58			787	9.28			110,412	10.06	170,039	5.66
1995	3,327	-23.15			784	-0.38			131,005	18.65	194,726	14.52
1996	2,875	-13.57			784	0.05			153,756	17.37	217,532	11.71
Average (87-96)(%)		-7.16				-18.10				21.71		9.92

Note : 1) included public street lighting

Source : PLN STATISTICS 1996



Talbe 2.1.2-2 Length of Medium Voltage Lines and Low Voltage Lines

Year : 1996

PLN operational unit/province	Medium voltage (kV)			Low voltage 1)
	6-7	12	20	
Region I			5,529.74	7,404.45
Region II			15,891.90	17,240.18
Region III:	255.62		6,583.48	8,652.37
West Sumatra	62.17		4,370.25	6,155.00
Riau	193.45		2,213.23	2,497.37
Region IV:	1,157.99	781.32	8,215.15	11,780.67
South Sumatra	259.39	781.32	3,845.20	4,813.53
Jambi	275.12		965.01	1,252.89
Lampung	210.78		2,630.16	3,840.27
Bengkulu	412.70		774.78	1,873.98
Region V			4,544.50	5,012.00
Region IV:	220.45		8,066.93	9,169.84
Central Kalimantan	46.81		1,631.10	1,866.33
South Kalimantan	173.60		3,780.34	4,575.55
East Kalimantan	0.04		2,655.49	2,727.96
Region VII:	320.08		5,996.80	5,826.81
North Sulawesi	306.23		3,543.25	3,415.36
Centarl Sulawesi	13.85		2,453.55	2,411.45
Region VIII:	177.52	1.64	8,151.96	18,699.18
South Sulawese		1.64	7,084.78	16,470.18
Southeast Sulawese	177.52		1,067.18	2,229.00
Region IX			2,482.95	1,540.43
Region X	33.28		993.00	1,968.18
Region XI:			9,046.73	613.03
Bali			3,762.07	267.19
West Nusa Tenggara			2,481.48	76.09
East Nusa Tenggara			2,318.09	122.82
East Timor			485.09	146.93
Special Region of Batam	8.23		490.44	264.94
Outside Java	2,173.17	782.96	75,993.58	88,172.08
Distribution of East Java	55.87		20,360.13	34,890.00
Distribution of Central Java:	85.66		27,233.41	32,561.23
Central Java	85.66		23,760.15	27,340.32
Di Yogyakarta			3,473.26	5,220.91
Distribution of West Java	560.54		20,093.24	40,158.61
Distribution of Jaya & Tangerang		1.00	10,075.73	21,749.69
Java-Bali GENCO I				
Java-Bali GENCO II				
Java-Bali Transmission and Control Cneter				
Java	702.07	1.00	77,762.51	129,359.53
Indonesia	2,875.24	783.96	153,756.09	217,531.61

1) included Public Street Lighting

Source : PLN STATISTICS 1996

Table 2.1.3-1 Existing Hydropower Plants

(1/2)

Name	River	Type	Year of Installation	Installed capacity (MW)	Annual energy generation (GWh)	Province	Operation
PLN Region I							
Mini & micro hydro				0.756			PLN
Sub total				0.756			
PLN Region II							
Sigura-Gura	Asahan	Reservoir	1983	286.000	1,868.00	North Sumatra	P.T. Inalum 1)
Tangga	Asahan	Reservoir	1983	317.000	2,054.00	North Sumatra	P.T. Inalum
Mini & micro hydro				6.200			PLN & private
Sub total				609.200	3,922.00		
PLN Region III							
Batang Agam	Bt. Agam	Run-off-river	1976	10.500	21.00	West Sumatra	PLN 2)
Maninjau	Bt. Antokan	Lake outlet	1984	68.000	270.00	West Sumatra	PLN
Mini & micro hydro				0.780			PLN
Sub total				79.280	291.00		
PLN Region IV							
Tes-I	A. Ketaun	Run-off-river	1992	16.000	68.00	Bengkulu	PLN
Mini & mini hydro				2.470			PLN
Sub total				18.470	68.00		
Sumatra							
Mini & micro hydro				0.400			PLN
Sub total				0.400			
PLN Region VI							
Riam Kanan	Riam Kanan	Reservoir	1971/81	30.000	136.00	South Kalimantan	PLN
Sub total				30.000	136.00		
PLN Region VII							
Tonsea Lama	Tondano	Run-off-river	1971/81	14.380	58.02	North Sulawesi	PLN
Tanggari-I	Tondano	Run-off-river	1988	16.600	90.00	North Sulawesi	PLN
Mini & micor hydro				1.960			PLN
Sub total				32.940	148.02		
PLN Region VIII							
Larona	Larona	Run-off-river	1978	165.000	680.00	Central Sulawesi	P.T. Inco 3)
Bakaru	Sadang	Run-off-river	1991	126.000	703.20	South Sulawesi	PLN
Mini & micor hydro				1.810			PLN
Sub total				292.810	1,383.20		
PLN Region X							
Mini & micro hydro				0.360			PLN
Sub total				0.360			
PLN Region XI							
Mini & micro hydro				0.980			PLN & PU
Sub total				0.980			
PLN East Java							
Mandalan	Brantas/Konto	Run-off-river	1955	23.000	76.65	East Java	PLN
Siman	Brantas/Konto	Run-off-river	1955	10.800	54.00	East Java	PLN
Karangkates	Brantas	Reservoir	1973/76	105.000	487.50	East Java	PLN
Wlingi	Brantas	Reservoir	1979	54.000	166.60	East Java	PLN
Sengguruh	Brantas/Lesti	Reservoir	1989	29.000	98.60	East Java	P.U. 4)
Tulung Agung	Brantas	Run-off-river	1993	36.000	136.00	East Java	P.U.
Mini & micro hydro				18.242			PLN & MME
Sub total				276.042	1,019.35		

Name	River	Type	Year of installation	Installed capacity (MW)	Annual energy generation (GWh)	Province	Operation
PLN Central Java							
Jelok	Tuntang	Run-off-river	1938	20.480	96.95	Central Java	PLN
Ketenger	Banjaran	Run-off-river	1939	7.040	30.80	Central Java	PLN
Timo	Tuntang	Run-off-river	1963	12.000	31.00	Central Java	PLN
Garung	Serayu/T. Menjer	Reservoir	1983	26.400	47.70	Central Java	PLN
Wonogiri	Bengawan Solo	Reservoir	1983	12.400	28.20	Central Java	P.U.
Mrica	Serayu	Reservoir	1989	184.500	600.00	Central Java	PLN
Kedungombo	Serang	Reservoir	1992	23.000	74.40	Central Java	P.U.
Wadaslintang	Badegolan	Reservoir	1988	16.000	92.00	Central Java	P.U.
Mini & micro hydro				2.607			PLN & MME
Sub total				304.427	1,001.05		
PLN Wes Java							
Plengan	Cilaki	Reservoir	1922/62	5.150	22.56	West Java	PLN
Ubrug	Citatih	Run-off-river	1924/50	17.100	55.45	West Java	PLN
Lamajan	Cisangkuy	Run-off-river	1924	19.200	70.70	West Java	PLN
Kracak	Cianten	Run-off-river	1927	16.570	59.50	West Java	PLN
Parakan Kondang	Cemanuk	Run-off-river	1955	9.920	52.80	West Java	PLN
Cikalong	Cisangkuy	Run-off-river	1961	19.200	65.30	West Java	PLN
Jatiluhur	Citarum	Reservoir	1966	150.000	790.00	West Java	POJ 5)
Saguling	Citarum	Reservoir	1987	700.000	1,974.00	West Java	PLN
Cirata	Citarum	Reservoir	1989	500.000	1,332.00	West Java	PLN
Mini & micro hydro				8.866			PLN, private, KPPK & MME
Sub total				1,446.006	4,422.31		
Java							
Mini & micro hydro				2.570			PLN
Sub total				2.570			
Total				3,094.241	12,390.93		
Total (PLN)				2,179.3			

Note : 1) P.T. Indonesia Asahan Aluminium 2) State Electricity Corporation
3) P.T. International Nickel Indonesia 4) Ministory of Public Works
5) Jatiluhur Development Authority

Source : JICA Report "The Master Plan Study of Electric Power Development in The Republic of Indonesia (March 1995)" and PLN STATISTICS 1995

Table 2.1.3-2 Existing Mini and Micro Hydropower Plants

(1/2)

Name	Year of Installation	Installed capacity (MW)	Operation
PLN Region I			
Angkup	1989	0.756	PLN (State Electricity Corporation)
Sub total		0.756	
PLN Region II			
Munthe	1976	0.080	PLN
Tarutung	1926	0.120	Private
Raisan	1988	1.500	PLN
Silang	1988	0.750	PLN
Sibundong	1988	0.750	PLN
Kombih	1988	3.000	PLN
Sub total		6.200	
PLN Region III			
Lempur	1979	0.090	PLN
S. Penuh	1957	0.070	PLN
Koto Anau	1977	0.160	PLN
Muara-Laboh	1982	0.400	PLN
S. Puar	1974	0.060	PLN
Sub total		0.780	
PLN Region IV			
Tes	1957	1.320	PLN
Arga Makmur (Sidourip)	1977	0.100	PLN
Kepala Curup	1985	1.000	PLN
Kota Agung	1976	0.050	PLN
Sub total		2.470	
Sumatra			
Boho	1992	0.200	PLN
Tonduhan	1992	0.200	PLN
Sub total		0.400	
PLN Region VII			
Pontak	1979	0.060	PLN
Tenga	1979	0.180	PLN
Sawidago	1983	0.120	PLN
Hanga Hanga	1983	1.600	PLN
Sub total		1.960	
PLN Region VIII			
Sawito	1976	1.620	PLN
Cenai	1971	0.090	PLN
Soppeng	1977	0.100	PLN
Sub total		1.810	
PLN Region X			
Wamena	1977	0.360	PLN
Sub total		0.360	
PLN Region XI			
Karang-Asem	1972	0.080	PLN
Narmada	1976	0.120	PLN
Ruteng	1979	0.120	PLN
Bajawa	1981	0.160	PLN
Mamak	1994	0.500	PU (Ministry of Public Works)
Sub total		0.980	

Name	Year of Installation	Installed capacity (MW)	Operation
PLN East Java Distribution			
Kloncing	1927	0.052	PLN (State Electricity Corporation)
Pakis Baru	1979	0.120	PLN
Widas (Bening Dam)	1984	0.650	P.U. (Ministry of Public Works)
Selorejo	1973	4.480	PLN
Lodoyo	1982	4.500	PLN
Giringan	1955	3.200	PLN
Golang	1959	2.700	PLN
Ngebel	1968	2.200	PLN
Maron	1976	0.080	PLN
Sawahan	1990	0.040	MME (Ministry of Mines and Energy)
Genilangit	1990	0.040	MME
Galengdowo	1990	0.040	MME
Kluncing	1990	0.040	MME
Pasrujambe	1990	0.040	MME
Tanggul	1979	0.060	PLN
Sub total		18.242	
PLN Central Java Distribution			
Wonosobo	1943	0.124	PLN
Banjar Negara	1949	0.256	PLN
Wonodadi/Luwung	1981	0.210	PLN
Tonjong	1978	0.208	PLN
Mejagong	1980	0.575	PLN
Sempor	1980	1.000	PLN
Talang Krasak	1980	0.150	PLN
Ngargoyoso	1993	0.060	PLN
Segorogunung	1975	0.024	MME
Sub total		2.607	
PLN West Java Distribution			
Maja	1977	0.075	PLN
Cijedil	1923	0.552	PLN
Talaga	1985	0.716	PLN
Cibinong		0.033	PLN
Bengkok/Dago	1923	3.850	PLN
Gunung Tua	1988	1.360	Private
Cinongling		1.200	Private
Cijambe		0.750	Private
Cipayung	1993	0.250	PLN
Talegong	1990	0.020	KPPK (Ministry of Cooperative and
Cileles	1994	0.020	Promotion of Small Enterprise)
Jabaleaer	1991	0.040	MME
Sub total		8.866	
Java			
Klambu	1992	1.170	PLN
Pejengkolan	1992	1.400	PLN
Sub total		2.570	
Total		32.285	

Source : JICA Report "The Master Plan Study of Electric Power Development in The Republic of Indonesia (March 1995)" and PLN STATISTICS 1995

Table 2.1.3-3 Existing Thermal Power Plants

1. Steam turbine and geothermal (1/2)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
II	Steam (O)	BELAWAN	1-2	65.0	2	130.0	1984	MFO	STEIN INDUST.	ALSTHON	PLN, (O) Oil fired
			3-4	65.0	2	130.0	1989	MFO	SULZER	BBC	PLN
Sub total						260.0					
III	Steam (C)	OMBILIN	1-2	100.0	2	200.0	1996/98	COAL		G. ELECTRIC	(C) Coal fired
Sub total						200.0					
IV	Steam (C)	BUKIT ASAM	1-2	65.0	2	130.0	1987	COAL	STEIN INDUST.	ALSTHON	PLN
			3-4	65.0	2	130.0	1994/96	COAL	STEIN INDUST.	ALSTHON	PLN
	Steam (O)	KRAMASAN	1-2	12.5	2	25.0	1974	MFO	DURODAKOVIC	YUGOTURBINE	PLN
Sub total						285.0					
VIII	Steam (O)	TELLO	1-2	12.5	2	25.0	1971	MFO	DURODAKOVIC	YUGOTURBINE	PLN
Sub total						25.0					
JATIM	Steam (O)	PERAK	1-2	25.0	2	50.0	1964	MFO	FOSTER WHELE	W. HOUSE	
			3-4	50.0	2	100.0	1978	MFO	MITSUBISHI	MITSUBISHI	
	Stema (O)	GRESIK	1-2	100.0	2	200.0	1981	MFO	IHI	TOSHIBA	Gasification of #1-4:
			3-4	200.0	2	400.0	1988	MFO	IHI	TOSHIBA	1994-1995
Sub total						750.0					
JATENG	Steam (O)	T. LOROK	1-2	50.0	2	100.0	1978	MFO	FOSTER WHELE	G. ELECTRIC	
			3	200.0	1	200.0	1983	MFO	RELAY-MITSUI	MITSUBISHI	
Sub total						300.0					
JABAR	Steam (O)	PRIOK	1	25.0	1	25.0	1962	MFO	SIEMENS	MAN	
			2	25.0	1	25.0	1964	MFO	SIEMENS	MAN	
			3-4	50.0	2	100.0	1972	MFO	MITSUBISHI	MITSUBISHI	
	Steam (O)	M. KARANG	1-3	100.0	3	300.0	1979	MFO	D. BABCOCK	MITSUBISHI	
			4-5	200.0	2	400.0	1981	MFO	MITSUBISHI	MITSUBISHI	
	Steam (C)	SURALAYA	1	400.0	1	400.0	1984	COAL	B&W	MITSUBISHI	
			2	400.0	1	400.0	1985	COAL	B&W	MITSUBISHI	

1. Steam turbine and geothermal (2/2)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
			3	400.0	1	400.0	1988	COAL	B&W	MITSUBISHI	
			4	400.0	1	400.0	1989	COAL	B&W	MITSUBISHI	
			5-7	600.0	3	1,800.0	1996/98	COAL	B&W	MITSUBISHI	
	Steam (C)	PAITON	1-2	400.0	2	800.0	1993/95	COAL	STEIN INDUST.	ALSTHON	
Sub total						5,050.0					
JABAR	Geothermal	KAMOJANG	1	30.0	1	30.0	1982	-	-	MITSUBISHI	PLN
			2-3	55.0	2	110.0	1987			MITSUBISHI	PLN
	Geothermal	SALAK	1-2	55.0	2	110.0	1994	-	-		PLN
	Geothermal	DRAJAT	1	55.0	1	55.0	1994	-	-		PLN
	Geothermal	LAHENDONG		2.5	1	2.5	1995	-	-	-	
Sub total						307.5					
Total						7,177.5					
Total (PLN)											

2. Gas turbine (1/3)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
II	Gas turbine	GLUGUR	1	19.85	1	19.85	1976	HSD	JBR		PLN
			2	12.80	1	12.80	1967	HSD	AEG		PLN
	Gas turbine	P. PASIR	1-2	14.47	2	28.94	1976	HSD&GA	WESCAI		PLN
			3-4	20.10	2	40.20	1977	HSD&GA	ALSTHON		PLN
			5	21.35	1	21.35	1983	HAD&GA	ALSTHON		PLN
Sub total						123.14					
III	Gas turbine	P. LIMO	1-2	21.35	2	42.70	1983	HSD	ALSTHON		
			3-4	30.00	2	60.00	1994	HSD	ALSTHON		
	Gas turbine	P. BARU		21.35	1	21.35	1983	HSD	ALSTHON		
	Gas turbine	PADANG	1-2	35.00	2	70.00	1993/95	HSD	G.E.		
Sub total						194.05					
IV	Gas turbine	BOM BARU	1	14.00	1	14.00	1967	HSD	AEG		
	Gas turbine	KRAMASAN	1	14.47	1	14.47	1967	HSD&GA	WESCAI		
			2	14.47	1	14.47	1979	HAD&GA	WESCAI		

2. Gas turbine (2/3)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
			3	21.35	1	21.35	1984	HAD&GA	ALSTHON		
Sub total						64.29					
	Gas turbine	TARAHAN		21.35	1	21.35	1984	HSD	ALSTHON		
VI	Gas turbine	TRISAKTI		21.35	1	21.35	1984	HSD	ALSTHON		
Sub total						42.70					
VIII	Gas turbine	TELLO	1	14.47	1	14.47	1977	HSD	WESCAI		
			2	21.35	1	21.35	1983	HSD	ALSTHON		
Sub total						35.82					
JABAR	Gas turbine	TG. PRIOK	1	26.00	1	26.00	1974	HSD	JBR		
			2-3	20.10	2	40.20	1976	HSD	WHS		
			4-7	20.1 + 26.0		46.10	1977	HSD	G.E.		
	Gas turbine	P. GADUNG	1-2	20.05	2	40.10	1974	HSD	ALSTHON		
			3	20.10	1	20.10	1975	HSD	JBR		
			4	20.00	1	20.00	1976	HSD	ALSTHON		
			5-6	26.00	2	52.00	1976	HSD	WHS		
	Gas turbine	SUNYARAGI	1-4	40.1 + 40.2		80.30	1976	HSD&GAS	ALSTHON		
Sub total						324.80					
JATENG	Gas turbine	TAMBAX LOROX		21.40	1	21.40	1983	HSD	ALSTHON		
	Gas turbine	PANDEAN LAMPER	1	14.00	1	14.00	1968	HSD	AEG		
			2	19.90	1	19.90	1974	HSD	G.E.		
			3	20.10	1	20.10	1976	HSD	ALSTHON		
Sub total						75.40					
JATIM	Gas turbine	PASANGGARAHAN	1	21.35	1	21.35	1984	HSD	ALSTHON		
			2	20.10	1	20.10	1993	HSD	G.E.		
			3-4	42.00	2	84.00	1995	HSD	WHS		
	Gas turbine	BALI		21.40	1	21.40					
	Gas turbine	GRESIK	1-2	20.10	2	40.20	1977	HSD	ALSTHON		
JATIM	Gas turbine	GRESIK	3	21.35	1	21.35	1984	HSD	ALSTHON		
			4-5	20.10	2	40.20	1994	HSD	G.E.		

2. Gas turbine (3/3)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
	Gas turbine	PERAK		26.50	1	26.50	1975	HSD	WHS		*1 Private power (from
	Gas turbine	CIKARANG LISTRINDO *1		33.00	2	66.00	1993	GAS	G.E.		GT-to CC (114MW))
	Gas turbine	TATA JABAR SEJAHTERA		19.00	1	19.00					Private power
Sub total						360.10					
Total						1,220.30					
Total (PLN)											

3. Combined cycle (1/2)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
II	Combined	BELAWAN	GT1/1	130.00	1	130.00	1988	HSD&GAS	KWU		
			GT /2	130.00	1	130.00	1992	HSD&GAS	KWU		
			GT1/1	140.00	1	140.00	1993/94	-		G.E.	
			Block 2	400.00	1	400.00	1995/96	HSD&GAS	G.E.	G.E.	
Sub total						800.00					
VI	Combined	VANJUG	GT 1	66.00	1	66.00					
Sub total						66.00					
JATIM	Combined	GRESIK	GT1/1	112.00	1	112.00	1992	HSD&GAS	MHI		
			GT /2	112.00	1	112.00	1992	HSD&GAS	MHI		
			GT /3	112.00	1	112.00	1992	HSD&GAS	MHI		
			GT2/1	112.00	1	112.00	1992	HSD&GAS	MHI		
			GT /2	112.00	1	112.00	1992	HSD&GAS	MHI		
			GT /3	112.00	1	112.00	1992	HSD&GAS	MHI		
			GT3/1	112.00	1	112.00	1993	GAS	MHI		
			GT /2	112.00	1	112.00	1993	GAS	MHI		
			GT /3	112.00	1	112.00	1993	GAS	MHI		
			ST1/1	188.91	1	188.91	1993			MHI	
			ST /2	188.91	1	188.91	1993			MHI	
			ST /3	188.91	1	188.91	1993			MHI	
Sub total						1,574.73					
JABAR	Combined	M. KARANG	GT 1	108.00	1	108.00	1992	HSD&GAS	G.E.		

3. Combined cycle (2/2)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of unit	Total			Boiler	Turbine	
JABAR			GT 2	108.00	1	108.00	1993	HSD&GAS	G.E.		
			GT 3	108	1	108.00	1993	HSD&GAS	G.E.		
			ST 1	190	1	190.00	1995			G.E.	
	Combined	PRIOK	GT1/1	130	1	130.00	1993	HSD	ABB		
			GT /2	130	1	130.00	1993	HSD	ABB		
			GT /3	130	1	130.00	1993	HSD	ABB		
			GT2/1	130	1	130.00	1994	HSD&GAS	ABB		
			GT /2	130	1	130.00	1995	HSD&GAS	ABB		
			GT /3	130	1	130.00	1995	HSD&GAS	ABB		
			ST1/1-2							ABB	
Sub total						1,294.00					
JATENG	Combined	T. LOROK	GT1/1	108	1	108.00	1993	HSD	G.E.		
			GT /2	108	1	108.00	1993	HSD	G.E.		
			GT /3	108	1	108.00	1993	HSD	G.E.		
			GT2/1-3	108	3	324.00	1995	HSD	G.E.		
			ST1/1-2	190	2	380.00				G.E.	
Sub total						1,028.00					
W. JAVA	Combined	NUAON VAEOAR		600	1	600.00					Under construction
Sub total						600.00					
E. JAVA	Combined	COAH		600	1	600.00					Under construction
Sub total						600.00					
C. JAVA	Combined	T. LOAOK		600	1	600.00					Under construction
Sub total						600.00					
Total						6,562.73					
Total (PLN)											

4. Diesel engine (1/4)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
I	Diesel	BANDA ACHE		3.456	0.040	16.811	1973 -	40			
	Diesel	LANGSA		3.456	0.020	9.862	1979 -	36			
	Diesel	LHOKSEUMAWE		1.224	0.028	10.627	1973 -	40			
	Diesel	LUENG BATA		6.368	0.200	106.468	1973 -	32			
	Diesel	MEULABOH		3.456	0.040	18.300	1976 -	77			
Sub total						162.068					
II	Diesel	BELAWAN									
	Diesel	BINJAI		1.100	0.038	18.435	1962 -	63			
	Diesel	GLUGUR									
	Diesel	PEMATANG SIANTAR		1.224	0.040	20.389	1961 -	77			
	Diesel	SIBOLGA		2.544	0.020	33.672	1962 -	87			
	Diesel	MEDAN		4.140	2.500	37.500	1976 -	11			
Sub total						109.996					
III	Diesel	BUKIT TINGGI		0.328	0.040	4.988	1976 -	29			
	Diesel	DUMAI		5.218	0.040	35.543	1976 -	49			
	Diesel	PADANG		6.300	0.040	35.085	1974 -	39			
	Diesel	PAKAN BARU		6.368	0.040	68.502	1972 -	75			
	Diesel	SOLOK		1.100	0.040	3.976	1972 -	20			
	Diesel	TANJUNG PINANG		2.544	0.040	31.616	1976 -	46			
Sub total						179.710					
IV	Diesel	BANDAR LAMPUNG		10.500	0.250	127.630	1956 -	37			
	Diesel	BANGKA		5.218	0.100	22.316	1979 -	17			
	Diesel	BENGKULU		5.218	0.038	29.371	1961 -	58			
	Diesel	BUKIT ASAM		6.368		25.472	1984	4			
	Diesel	JAMBI		5.218	0.040	45.651	1970 -	64			
	Diesel	KRAMASAN		12.600	2.500	15.100	1962 -	3			
	Diesel	LAHAT		1.100	0.040	17.140	1968 -	53			
	Diesel	PALEMBANG		0.560	0.040	10.293	1972 -	55			
	Diesel	TANJUNG KARANG		1.100	0.040	18.820	1958 -	85			
	Diesel	TANJUNG PANDAN		3.000	0.040	17.320	1978 -	16			
Sub total						329.113					

4. Diesel engine (2/4)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
V	Diesel	KAPUAS		10.400	1.100	76.700	1973 -	14			
	Diesel	PONTIANAK		2.800	0.020	28.826	1972 -	110			
	Diesel	SINGKAWANG		2.500	0.040	21.646	1976 -	32			
Sub total						127.172					
VI	Diesel	BARITO		12.400	5.400	65.296	1983 -	8			
	Diesel	BALIKPAPAN		6.400	0.040	65.293	1997 -	30			
	Diesel	BANJARMASIN		0.260	0.038	1.078	1976 -	11			
	Diesel	BANJARMASIN	3-4			24.000	1993/94	2			
Sub total						155.667					
VI	Diesel	BARABAI		3.000	0.040	16.864	1977 -	27			
	Diesel	KOTA BARU		1.240	0.040	6.672	1977 -	19			
	Diesel	KUALA KAPUAS		3.000	0.040	12.444	1972 -	45			
	Diesel	PALANGKARAYA		3.000	0.040	28.094	1972 -	52			
	Diesel	SAMARINDA		6.400	0.040	68.986	1973 -	38			
	Diesel	TARAKAN		2.544	0.040	16.748	1963 -	34			
Sub total						149.808					
VII	Diesel	MINAHASA		8.800	1.000	53.100	1954 -	13			
	Diesel	GORONTALO		2.500	0.040	14.722	1963 -	26			
	Diesel	KT MUBAGU		2.500	0.040	12.070	1973 -	22			
	Diesel	MANADO		0.760	0.040	2.790	1963 -	16			
	Diesel	PALU		7.600	0.030	56.180	1974 -	106			
	Diesel	TAHUNA		0.560	0.040	5.960	1974 -	34			
Sub total						144.822					
VIII	Diesel	BAKARU									
	Diesel	TELLO		12.600	0.500	60.812	1962 -	11			
	Diesel	BULUKUMBA		1.224	0.020	13.347	1962 -	55			
	Diesel	KENDARI		2.544	0.020	22.893	1940 -	75			
	Diesel	PALOPO		3.000	0.038	16.121	1962 -	24			
	Diesel	PARE PARE		3.000	0.038	24.572	1935 -	43			
	Diesel	PINRANG		3.100	0.020	18.748	1963 -	42			

4. Diesel engine (3/4)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
	Diesel	UJUNG PANDANG		0.260	0.038	1.426	1978 -	15			
	Diesel	WATAMPONE		3.000	0.038	25.344	1961 -	54			
Sub total						183.263					
IX	Diesel	AMBON		7.040	0.020	56.648	1977 -	96			
	Diesel	TERNATE		3.541	0.020	24.541	1977 -	70			
Sub total						81.189					
X	Diesel	BIAK		2.544	0.020	11.973	1973 -	22			
	Diesel	FAKEAK		0.560	0.020	3.251	1974 -	20			
	Diesel	JAYAPURA		3.000	0.020	24.967	1953 -	42			
	Diesel	MONOKWARI		1.350	0.020	7.715	1973 -	35			
	Diesel	MERAUKE		0.560	0.012	4.074	1965 -	26			
	Diesel	SORONG		2.544	0.020	12.120	1973 -	17			
Sub total						64.100					
XI	Diesel	BIMA		3.000	0.020	9.663	1976 -	26			
	Diesel	DENPASAR		0.346	0.040	2.290	1976 -	11			
	Diesel	DILI		3.000	0.020	22.504	1973 -	71			
	Diesel	ENDE		1.050	0.020	12.248	1975 -	73			
	Diesel	KUPANG		5.218	0.020	39.801	1973 -	76			
	Diesel	MATARAWA		6.368	0.040	41.198	1974 -	26			
	Diesel	SINGARAJAA		1.000	0.336	4.744	1969 -	7			
	Diesel	SUMBAWAD		3.000	0.020	10.508	1976 -	35			
	Diesel	WAINGAPU		0.536	0.020	4.018	1976 -	29			
Sub total						146.974					
JAKARTA	Diesel	KEBAYORAN				10.100	1962 -				
	Diesel	SENAYAN				6.100	1991 -				
Sub total						16.200					
JAVA	Diesel	KALTIMEX				6.400			Private power		
	Diesel	TATA JABAR SEJAHTERA				3.740			Private power		
	Diesel	INDOKISAR JAYA				3.120			Private power		

4. Diesel engine (4/4)

PLN region	Type	Name of plant		Installed capacity (MW)			Year of operation	Type of fuel	Manufacturer		Remark
		Name	Unit	Unit cap.	No. of uni	Total			Boiler	Turbine	
JAVA	Diesel	CIKARANG LISTRINDO				14.000			Private power		
Sub total						27.260					
Outside of JAVA	Diesel	KLP SINAR SIWOMEGO				2.310			Private power		
	Diesel	KLP SAMABOTUNA				2.570			Private power		
	Diesel	KLP SINAR RINJANI				2.550			Private power		
Sub total						7.430					
Total						1,803.583					
Total (PLN)											

Source : JICA Report "The Master Plan Study of Electric Power Development in The Republic of Indonesia (March 1995)"
PLN Evaluation and Analysis Subdivision

Table 2.1.3-4 Installed Capacity and Rated Capacity

Type of facility	Capacity (MW)	Year									
		1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994	1995	1996
Hydro	Installed	1,512	1,970	1,973	2,095	2,116	2,179	2,179	2,179	2,179	2,184
	Rated	1,455	1,936	1,931	2,057	2,051	2,158	2,129	2,054	1,990	2,171
	Increment(%)	96.2	98.3	97.9	98.2	96.9	99.1	97.7	94.3	91.3	99.4
Steam	Installed	2,817	3,417	3,947	3,941	3,891	3,941	4,691	4,756	4,821	5,021
	Rated	2,617	3,118	3,533	3,694	3,686	3,718	4,535	4,581	4,531	4,243
	Increment(%)	92.9	91.3	89.5	93.7	94.8	94.4	96.7	96.3	94.0	84.5
Gas turbine	Installed	1,117	1,234	1,234	1,073	1,094	1,223	996	982	1,002	1,093
	Rated	825	810	875	839	819	775	663	733	759	886
	Increment(%)	73.8	65.7	70.9	78.2	74.8	63.4	66.5	74.6	75.7	81.0
Combined	Installed						1,329	3,411	3,942	4,414	5,053
	Rated						1,265	3,243	3,662	4,397	4,719
	Increment(%)						95.2	95.1	92.9	99.6	93.4
Geothermal	Installed	140	140	140	140	140	140	195	305	305	309
	Rated	140	140	140	140	140	140	195	305	305	306
	Increment(%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.2
Diesel	Installed	1,652	1,769	1,795	1,870	1,948	2,062	2,128	2,164	2,265	2,449
	Rated	1,207	1,348	1,302	1,273	1,870	1,448	1,464	1,502	1,564	2,005
	Increment(%)	73.1	76.2	72.5	68.1	96.0	70.2	68.8	69.4	69.0	81.9
Total	Installed	7,238	8,529	9,088	9,118	9,188	10,874	13,600	14,328	14,987	16,109
	Rated	6,243	7,353	7,781	8,002	8,565	9,505	12,230	12,837	13,546	14,330
	Increment(%)	86.3	86.2	85.6	87.8	93.2	87.4	89.9	89.6	90.4	89.0

Source: PLN STATISTICS 1996

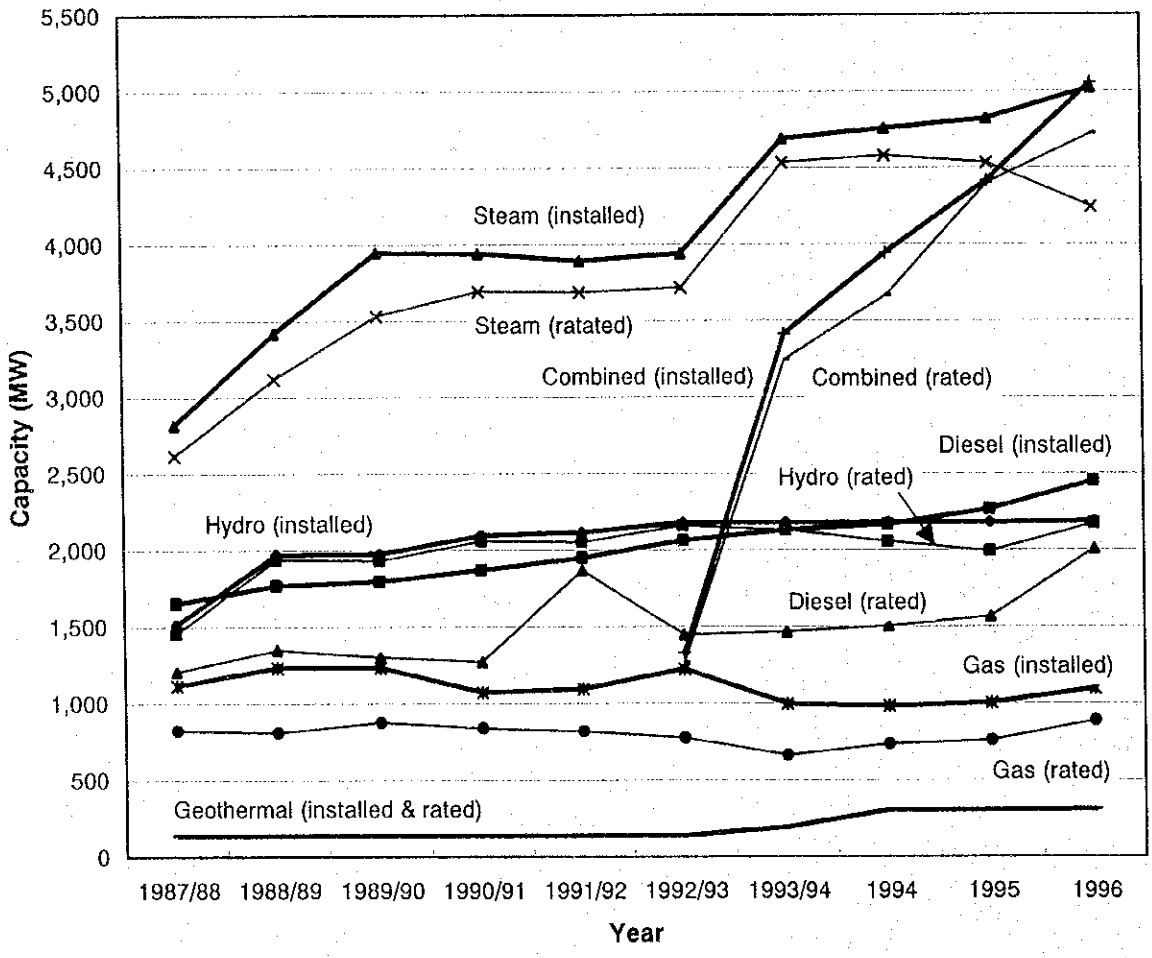


Table 2.1.3-5 Installed Capacity of Java-Bali System

(unit : MW)

Type of facilities	Year				
	1992/93	1993/94	1994	1995	1996
PLN:					
Hydro (PLTA)	1,876	1,876	1,876	1,876	1,876
Steam (PLTU)	3,450	3,850	4,250	4,250	4,250
Gas turbine (PLTG)	618	431	535	604	659
Combined (PLTGU)	1,329	3,011	3,411	3,596	3,925
Geothermal (PLTP)	140	195	305	305	305
Diesel (PLTD)	92	92	92	92	92
Sub total	7,505	9,455	10,469	10,723	11,107
Private:					
Hydro Jatiluhur (PLTA)	150	150	150	150	150
Steam Krakatau Steel (PLTU)	160	160	0	0	0
Gas Cikarang L. (PLTG)	0	68	68	68	150
Sub total	310	378	218	218	300
Total	7,815	9,833	10,687	10,941	11,407
Increment (%)	18.7	25.8	8.7	2.4	4.3

Source : STATISTIC PT. PLN PENYALURAN DAN PUSAT RENGATUR BEBAN JABA BALI 1996

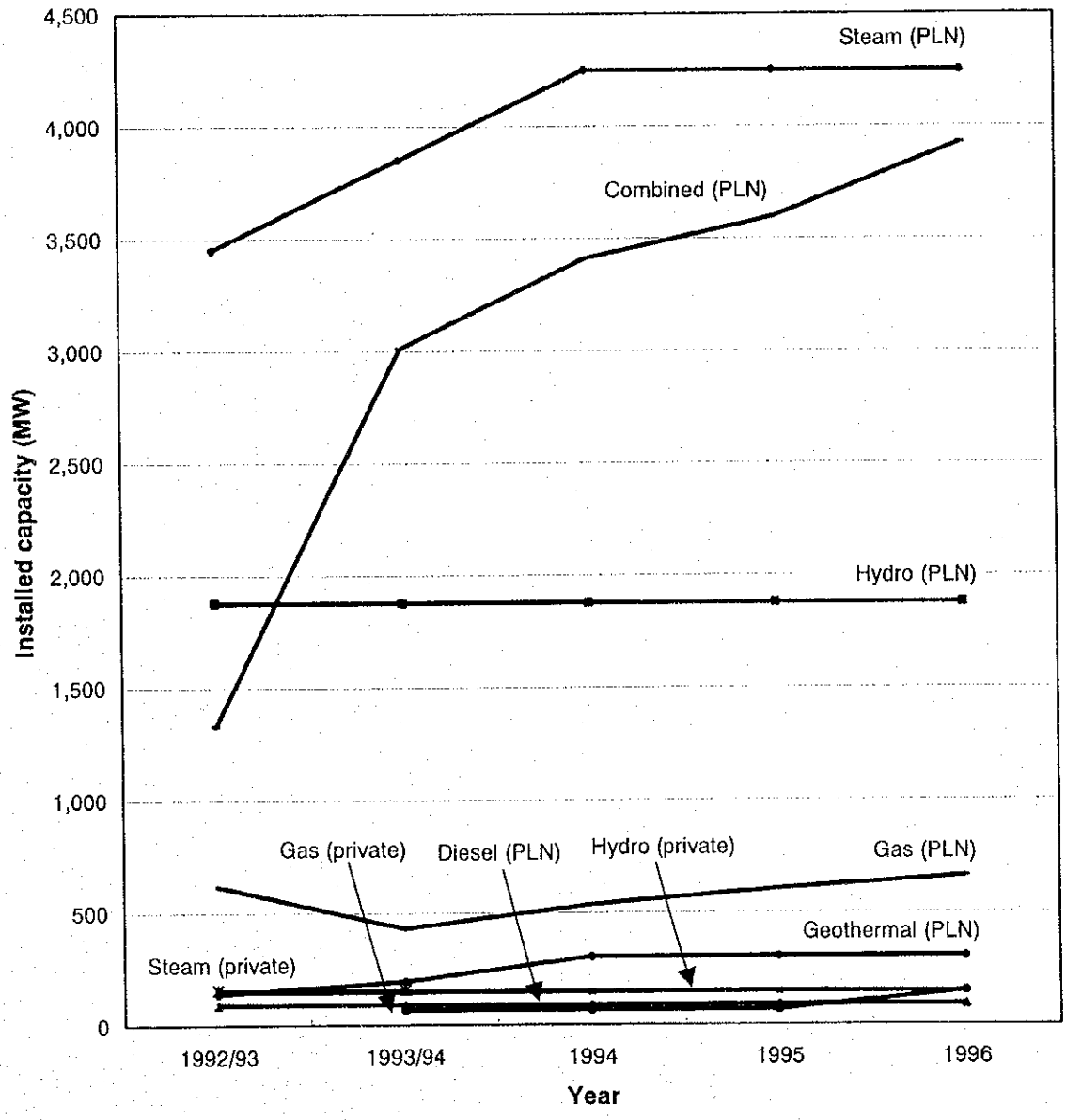


Table 2.1.4-1 Number and Total Capacity of Substation Transformer
Year 1996

PLN operation unit/ province	500kV		275kV		150kV		70kV		<30kV		Total	
	No	MVA	No	MVA	No	MVA	No	MVA	No	MVA	No	MVA
Region I					2	40					2	40
Region II			2	80	49	1,637					51	1,717
Region III:					14	248					14	248
West Sumatra					14	248					14	248
Riau												
Region IV:					12	300	25	250	9	90	46	640
South Sumatra					4	150	19	200			23	350
Jambi												
Lampung					8	150					8	150
Bengkulu							6	50	9	90	15	140
Region V					3	90					3	90
Region VI:					8	210	14	110			22	320
Central Karimantan												
South Karimantan					3	100	14	110			17	210
East Karimantan					5	110					5	110
Region VII:							15	208			15	208
North Sulawesi							15	208			15	208
Central Sulawesi												
Region VIII:					19	410	14	208	2	30	35	648
South Sulawesi					19	410	14	208	2	30	35	648
Southeast Sulawesi												
Region IV												
Region X												
Region XI:												
Bali												
West Nusa Tenggara												
East Nusa Tenggara												
East Timor												
Special Region of Batam					4	180					4	180
Outside Java			2	80	111	3,115	68	776	11	120	192	4,091
Dist. of East Java					93	3,578	51	753			144	4,331
Dist. of Central Java												
Cental Java												
DI Yogyakarta												
Dist. of West Java									5	6,350	5	6,350
Dist. of Jaya & Tangerang												
Java-Bali GENCO I												
Java-Bali GENCO II												
Java-Bali Transmission and Control Centre	24	11,500			492	21,809	231	4,049			747	37,358
Java	24	11,500			585	25,387	282	4,802	5	6,350	896	48,039
Indonesia	24	11,500	2	80	696	28,502	350	5,578	16	6,470	1,088	52,130

Source : PLN STATISTICS 1996

Table 2.1.4-2 Number & Installed Capacity of Distribution Substation Transformer
Year 1996

PLN operation unit/ province	20kV		12-15kV		6-7kV		Total	
	No	MVA	No	MVA	No	MVA	No	MVA
Region I	3,472	265.89					3,472	265.89
Region II	11,832	1,365.70					11,832	1,365.70
Region III:	4,561	536.37			321	43.37	4,882	579.74
West Sumatra	3,181	336.75			186	38.28	3,367	375.03
Riau	1,380	199.62			135	5.09	1,515	204.71
Region IV:	4,340	611.45	1,100	281.42	1,060	115.40	6,500	1,008.27
South Sumatra	1,640	222.85	1,100	281.42	180	17.73	2,920	522.00
Jambi	700	103.61			200	22.08	900	125.69
Lampung	1,500	226.56			280	30.24	1,780	256.80
Bengkulu	500	58.43			400	45.35	900	103.78
Region V	2,940	247.05					2,940	247.05
Region VI:	6,076	676.04			292	32.63	6,368	708.67
Central Karimantan	948	83.79			26	1.65	974	85.44
South Karimantan	2,952	331.05			266	30.98	3,218	362.03
East Karimantan	2,176	261.20					2,176	261.20
Region VII:	3,806	341.32			178	8.13	3,984	349.45
North Sulawesi	2,307	231.88			178	8.13	2,485	240.01
Central Sulawesi	1,499	109.44					1,499	109.44
Region VIII:	6,427	546.99			12	1.28	6,439	548.27
South Sulawesi	5,963	536.30			1	0.04	5,696	536.34
Southeast Sulawesi	464	10.69			11	1.24	475	11.93
Region IV	1,512	129.07					1,512	129.07
Region X	813	97.23			64	6.96	877	104.19
Region XI:	6,214	594.21					6,214	594.21
Bali	3,156	325.48					3,156	325.48
West Nusa Tenggara	1,361	126.39					1,361	126.39
East Nusa Tenggara	1,358	108.66					1,358	108.66
East Timor	339	33.68					339	33.68
Special Region of Batam	185	80.22					185	80.22
Outside Java	52,178	5,491.54	1,100	281.42	1,927	207.77	55,205	5,980.73
Dist. of East Java	24,168	3,210.99			22	2.01	24,190	3,213.00
Dist. of Central Java	59,105	2,753.56			34	4.56	59,139	2,758.12
Cental Java	50,531	2,392.59			34	4.56	50,565	2,397.15
DI Yogyakarta	8,574	360.97					8,574	360.97
Dist. of West Java	18,809	4,290.21			140	28.23	18,949	4,318.44
Dist. of Jaya & Tangerang	9,755	4,610.78	1	0.40			9,756	4,611.18
Java-Bali GENCO I								
Java-Bali GENCO II								
Java-Bali Transmission and Control Centre								
Java	111,837	14,865.54	1	0.40	196	34.80	112,034	14,900.74
Indonesia	164,015	20,357.08	1,101	281.82	2,123	242.57	167,239	20,881.47

Source : PLN STATISTICS 1996

Table 2.1.5-1 Histrical Data of Energy and Peak Load

Year	Java-Bali system								Indonesia	
	Energy sales		Energy	Energy	Load	Peak load		Installed	Energy	Incre.
	Sales (GWh)	Incre. (%)	production (GWh)	requiremen (GWh)	factor (%)	Load (MW)	Incre. (%)	capacity (MW)	sales (GWh)	(%)
1979/80	4,242.3	-	5,500.1	5,263.6	65.8	953.7	-		5,333.4	-
1980/81	5,112.1	20.50	6,582.5	6,312.6	63.5	1,184.0	24.15		6,560.0	23.00
1981/82	6,343.1	24.08	7,930.7	7,613.5	66.2	1,367.5	15.50		7,845.5	19.60
1982/83	7,383.7	16.41	9,344.9	8,924.4	64.5	1,653.2	20.89		9,101.0	16.00
1983/84	8,044.3	8.95	10,526.1	10,052.4	69.3	1,740.7	5.29		9,999.7	9.87
1984/85	8,901.6	10.66	11,675.9	11,092.1	68.6	1,943.7	11.66		11,039.3	10.40
1985/86	10,133.1	13.83	13,365.1	12,643.4	69.3	2,202.8	13.33		12,644.2	14.54
1986/87	11,700.9	15.47	15,521.0	14,807.0	69.4	2,520.3	14.41		14,786.4	16.94
1987/88	13,537.9	15.70	17,791.4	16,919.6	69.7	2,913.2	15.59		17,076.8	15.49
1988/89	15,854.7	17.11	20,353.1	19,416.9	68.9	3,372.2	15.76		19,992.8	17.08
1989/90	18,759.6	18.32	23,545.9	22,345.1	68.0	3,950.5	17.15		23,423.7	17.16
1990/91	22,401.8	19.42	28,494.8	27,107.1	69.0	4,713.3	19.31		27,741.0	18.43
1991/92	25,566.5	14.13	31,847.2	30,355.7	73.5	4,945.6	4.93		31,481.1	13.48
1992/93	28,389.4	11.04	33,901.7	32,441.0	79.4	4,874.3	-1.44	7,815	34,964.0	11.06
1993/94	31,818.8	12.08	37,932.0	36,348.3	75.2	5,757.0	18.11	9,833	38,962.0	11.43
1994/95	36,639.2	15.15	41,979.4	40,399.3	71.2	6,735.4	16.99	10,687	44,669.1	14.65
1995	40,939.7	11.74	48,026.1	46,671.8	70.5	7,773.0	15.41	10,941	49,748.8	11.37
1996	46,827.9	14.38	54,839.6	52,865.4	71.0	8,822.0	13.50	11,407	56,932.0	14.44
Average	15.17		14.48	14.53		13.98			14.95	

Source: PLN STATISTIC 1996

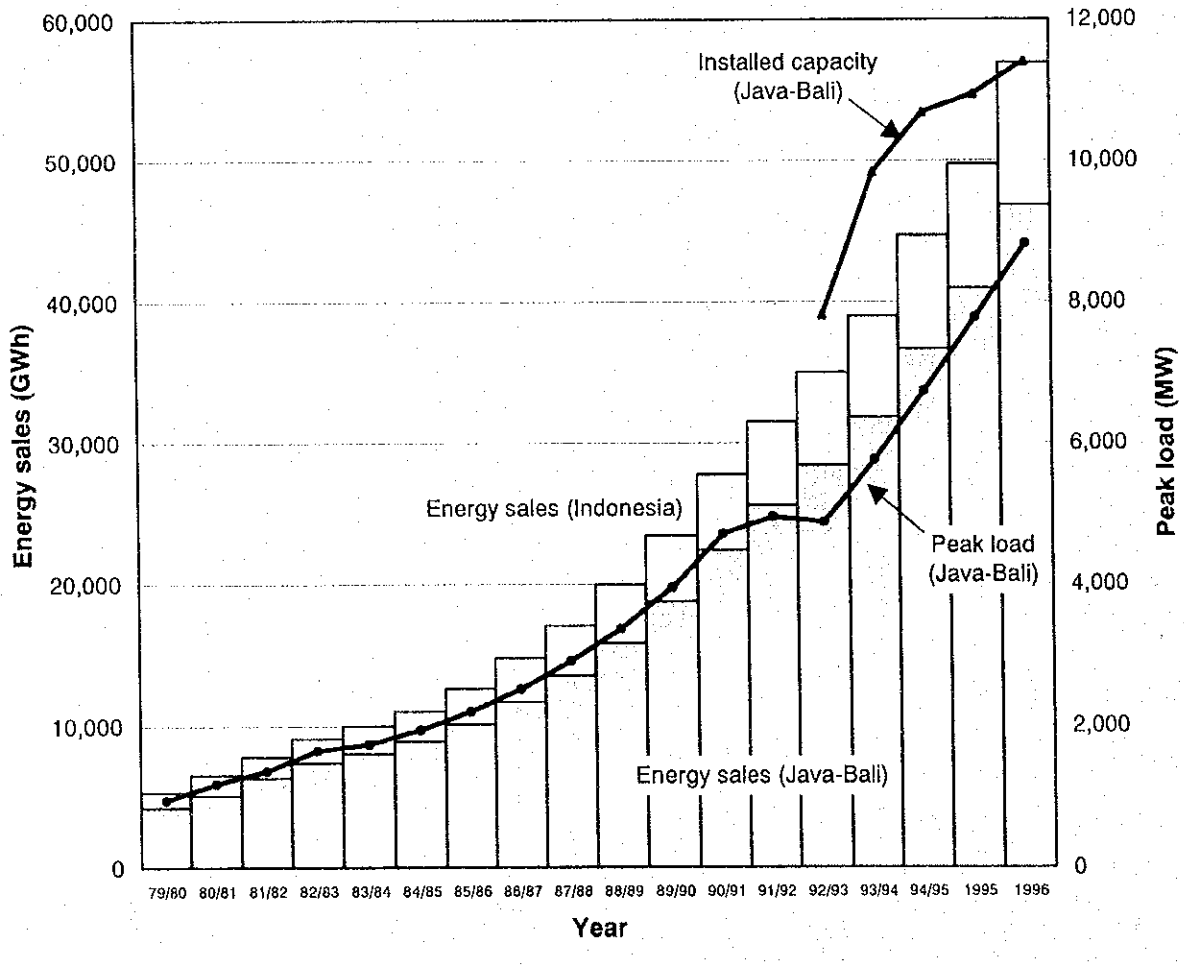


Table 2.1.5-2 Energy Production

Year	Own generated (GWh)							Purchased	Total (GWh)	
	Hydro	Steam	Gas	Combind	Geother.	Diesel	Sub total	(GWh)	Total	Incre.(%)
1987/88	4,457	12,222	1,375		719	2,786	21,559	747	22,306	14.7
1988/89	5,227	14,218	1,582		1,012	2,901	24,940	683	25,623	14.9
1889/90	6,630	16,486	1,454		1,007	3,157	28,734	836	29,570	15.4
1990/91	5,675	21,428	2,175		1,125	3,608	34,012	867	34,879	18.0
1991/92	6,601	23,842	2,644		1,050	3,758	37,894	837	38,731	11.0
1992/93	8,788	22,567	2,689	1,775	1,084	3,978	40,880	1,058	41,937	8.3
1993/94	7,859	21,784	2,609	7,795	1,090	4,332	45,469	1,250	46,719	11.4
1994	7,043	21,581	1,013	14,228	1,602	4,599	50,066	1,412	51,478	10.2
1995	7,529	22,775	1,470	19,304	2,210	4,922	58,211	1,193	59,404	15.4
1996	8,118	25,506	1,299	23,044	2,352	5,410	65,730	1,656	67,386	13.4
Average*1	6.9	8.5	-0.6	89.8	14.1	7.7	13.2	9.3	13.1	

Average *1 : annual average growth rate (%)

Source : PLN STATISTICS 1996

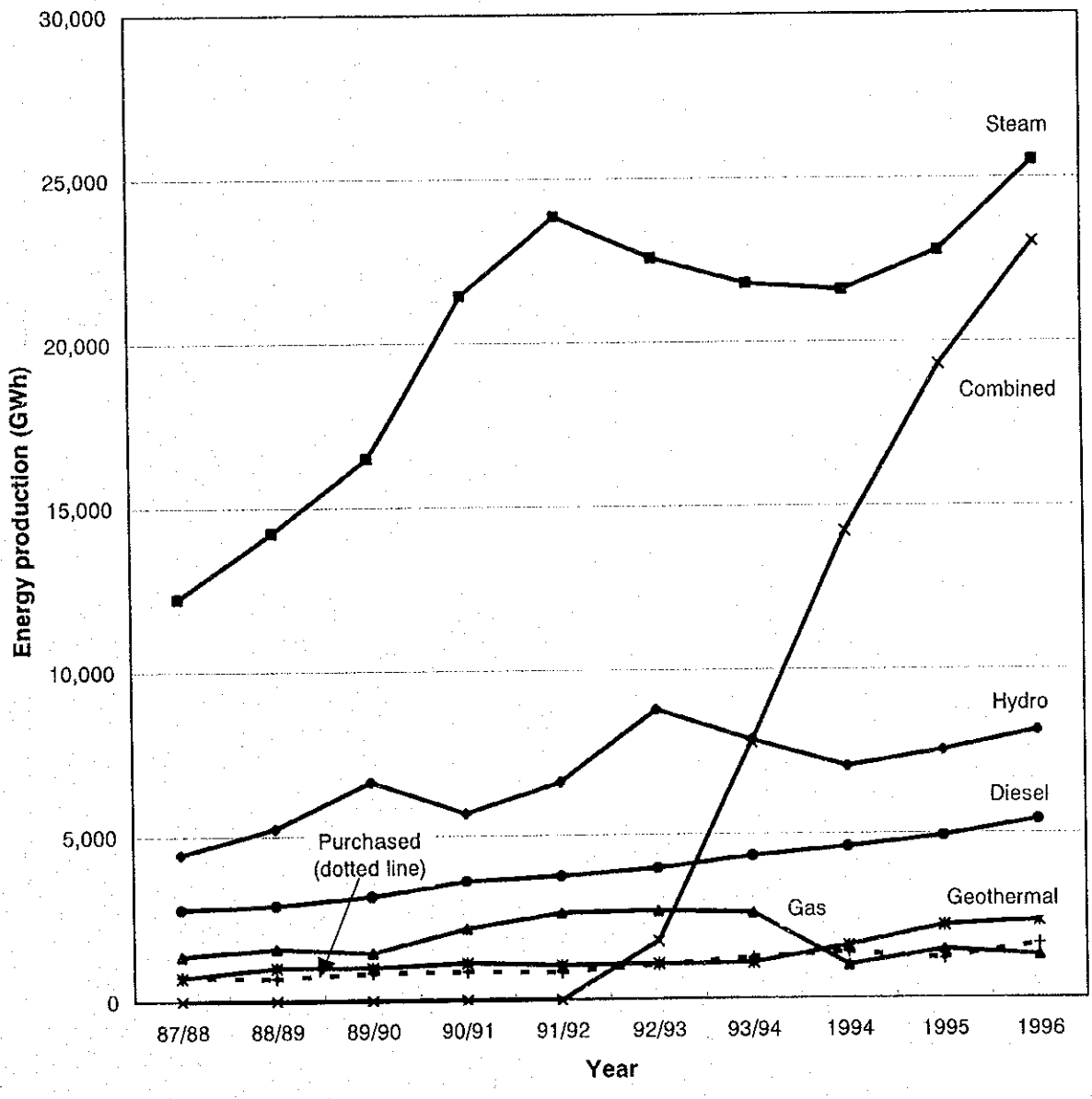


Table 2.1.5-3 Distribution Capacity of Branch Office

(unit : TWh)

Year	Name of branch office													Total
	Bandung	Banten	Bekasi	Bogor	Cianjur	Cimahi	Cirebon	Depok	Garut	Majalaya	Purwakarta	Sukabumi	Tasikmalaya	
1985/86	667	76	103	457	32	197	195		30	162	91	51	59	2,119
1986/87	755	188	150	421	38	207	252	107	36	184	248	59	65	2,710
1987/88	849	236	218	508	43	228	284	130	42	207	322	66	75	3,207
1988/89	987	290	295	584	52	271	337	163	50	237	409	75	94	3,843
1989/90	1,126	736	433	645	58	333	374	205	57	333	458	88	107	4,953
1990/91	1,327	830	635	725	68	403	433	253	66	483	501	102	127	5,953
1991/92	1,514	848	816	834	97	486	475	289	75	652	589	116	147	6,939
1992/93	1,659	1,237	997	1,001	89	546	518	328	83	701	686	128	169	8,143
1993/94	1,830	1,502	1,153	1,168	100	609	571	364	93	774	749	142	195	9,249
1994/95*1	944	843	644	582	90	339	369	229	77	348	436	115	184	5,198
Average*2	13.5	45.2	35.3	12.5	15.1	15.2	14.4	19.1	15.1	21.6	30.1	13.5	16.1	20.2

*1 : Around half year quantity

*2 : Annual average growth rate (%) (1985/86-1994/95)

Source : INTIMULYA MULTIKENCANA

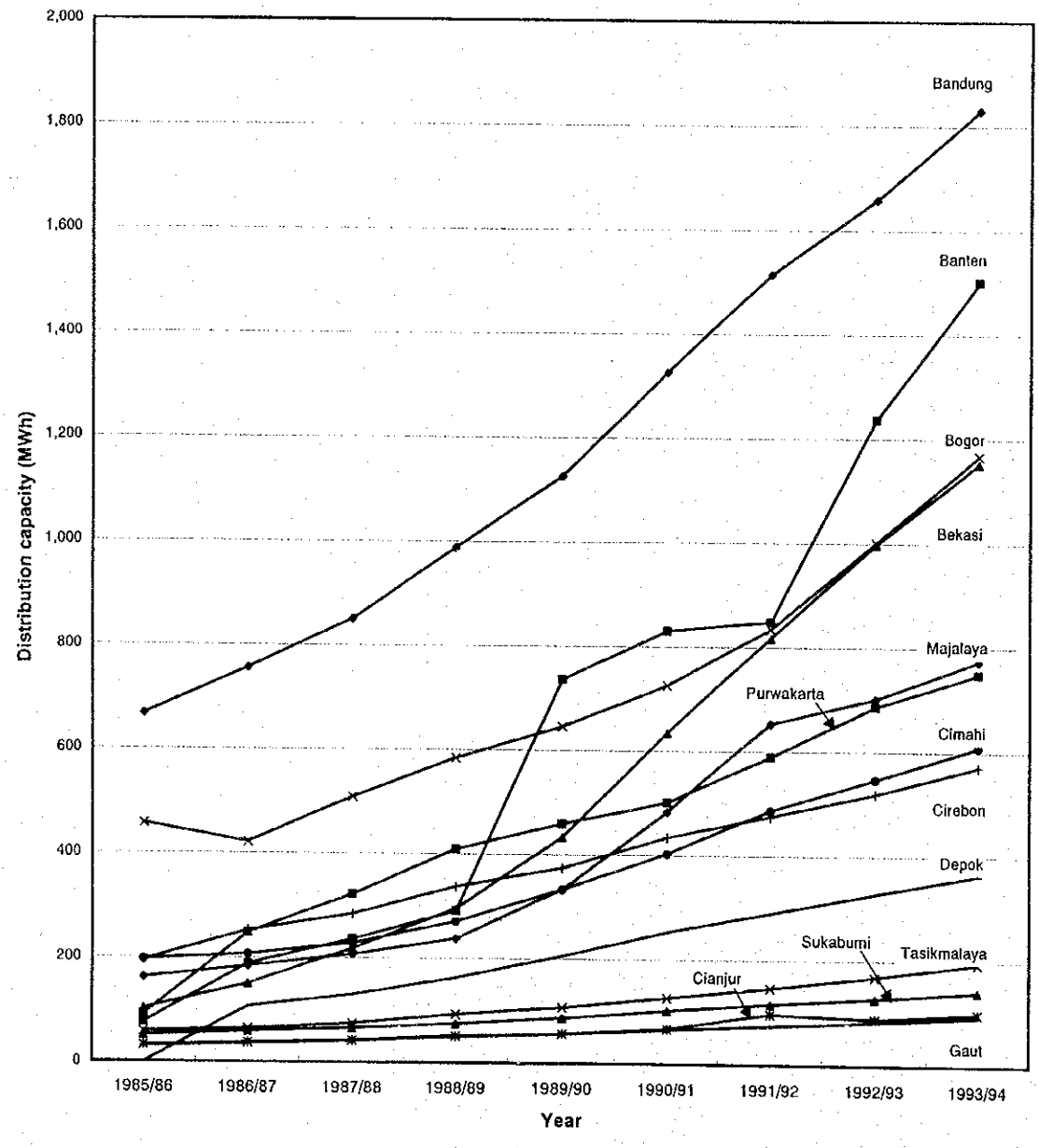


Table 2.1.6 Own Used and Energy Losses

Year	Energy generated (GWh)	Own used		Transmission		Distribution		Total	
		Energy (GWh)	Ratio (%)	Energy (GWh)	Ratio (%)	Energy (GWh)	Ratio (%)	Energy (GWh)	Ratio (%)
1987/88	22,305.91	1,051.06	4.7	749.81	3.4	3,428.21	15.4	4,178.02	18.7
1988/89	25,622.75	1,270.00	5.0	770.69	3.0	3,554.76	13.9	4,325.45	16.9
1989/90	29,570.10	1,455.48	4.9	877.64	3.0	3,800.77	12.9	4,678.41	15.8
1990/91	34,878.56	1,672.50	4.8	884.10	2.5	4,569.01	13.1	5,453.11	15.6
1991/92	38,731.23	1,788.10	4.6	1,036.07	2.7	4,432.18	11.4	5,468.25	14.1
1992/93	41,936.45	1,780.95	4.2	1,241.18	3.0	3,950.38	9.4	5,191.56	12.4
1993/94	46,718.75	1,901.22	4.1	1,188.96	2.5	4,667.05	10.0	5,856.01	12.5
1994	51,478.38	1,980.87	3.8	1,416.93	2.8	4,957.59	9.6	6,374.52	12.4
1995	59,404.22	2,260.91	3.8	1,698.58	2.9	5,626.12	9.5	7,324.70	12.3
1996	67,386.40	2,588.33	3.8	1,825.40	2.7	6,088.59	9.0	7,913.99	11.7
Average 1)	13.1	10.5	-2.2	10.4	-2.4	6.6	-5.7	7.4	-5.1

1) Annual average rate (1987-1996) (%)

Source : PLN STATISTICS 1996

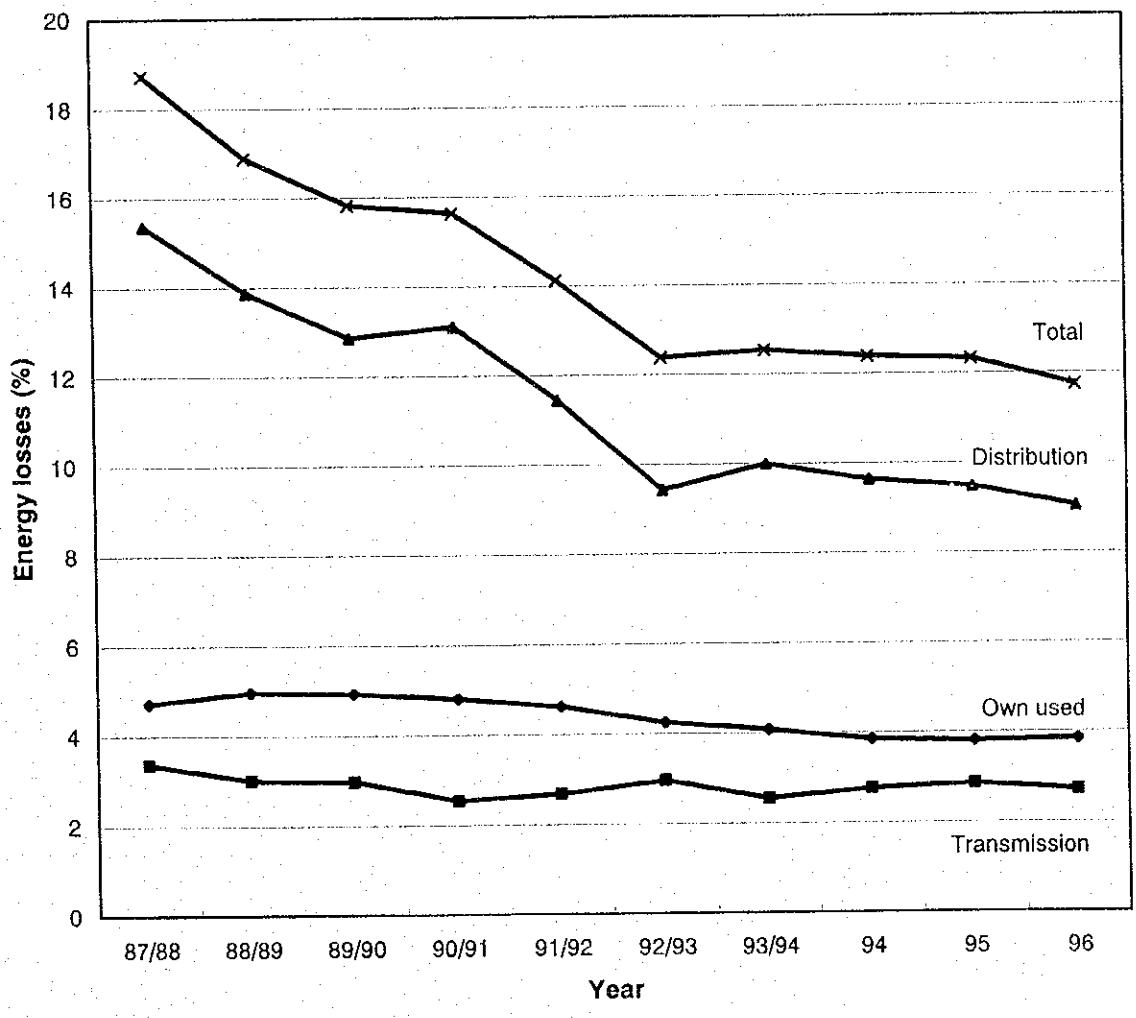


Table 2.1.7 Number of Villages and Elecrification Ratio

PLN operational unit/province	Villages		Villages electrified				Customers	
	1992	1996	1992	%	1996	(%)	1992	1996
Region I	5,465	5,351	2,557	46.79	4,188	78.27	229,945	289,117
Region II	4,885	5,275	2,191	44.85	3,253	61.67	314,415	737,605
Region III:	3,240	4,114	1,385	42.75	1,817	44.17	215,097	346,358
West Sumatera	2,257	3,138	1,217	53.92	1,397	44.52	154,776	226,121
Riau	983	976	168	17.09	420	43.03	50,231	120,237
Region IV:	5,682	6,133	1,731	30.46	3,676	59.94	292,346	692,451
South Sumatera	2,368	2,345	709	29.94	1,470	62.69	139,981	304,875
Jambi	751	1,267	157	20.91	538	42.46	29,601	86,728
Lanpung	1,535	1,517	443	28.86	1,011	66.64	69,097	215,681
Bengkulu	1,028	1,004	422	41.05	657	65.44	53,667	85,167
Region V	1,284	4,633	325	25.31	967	20.87	77,471	176,654
Region VI:	4,357	4,358	1,315	30.18	2,304	52.87	211,820	436,920
Central Kalimantan	1,054	1,055	154	14.61	328	31.09	27,981	66,560
South Kakimantan	2,304	2,304	1,007	43.71	1,616	70.14	118,000	216,118
East Kalimantan	999	999	154	15.42	360	36.04	65,839	154,242
Region VII:	2,391	2,316	1,215	50.82	1,779	76.81	200,269	291,531
North Sulawesi	1,173	1,099	848	72.29	1,076	97.91	151,948	204,365
Central Sulawesi	1,218	1,217	367	30.13	703	57.76	48,321	87,166
Region VIII:	1,906	1,701	785	41.19	1,754	103.12*1	294,486	529,240
South Sulawesi	1,240	1,109	635	51.21	1,351	121.82*1	273,300	489,475
Southeast Sulawesi	666	592	150	22.52	403	68.07	21,186	39,765
Region IX	1,438	1,438	438	30.46	857	59.60	85,589	118,090
Region X	890	890	94	10.56	278	31.24	25,874	50,442
Region XI:	3,360	3,108	1,170	34.82	1,458	46.91	400,955	597,509
Bali	631	535	534	84.63	577	107.85*1	548,230	343,762
West Nusa Tenggara	564	505	381	67.55	454	89.90	115,357	177,445
East Nusa Tengara	1,723	1,626	223	12.94	324	19.93	34,839	71,006
East Timor	442	442	32	7.24	103	23.30	2,529	5,296
Special Region of Batam	890		94	10.56			25,874	
Outside Java	35,788	39,317	13,300	37.16	22,331	56.80	2,374,141	4,265,917
Distribution of East Java	7,584	7,723	4,618	60.89	6,521	84.44	1,571,153	2,933,492
Distribution of Central Java:	8,917	8,243	6,214	69.69	8,041	97.55	1,589,188	3,092,975
Central Java	8,479	7,850	5,767	68.02	7,610	96.94	1,357,365	2,734,576
DI Yogyakaria	438	393	357	81.51	431	109.67*1	231,823	358,399
Distribution of West Java	6,333	6,692	3,853	60.84	5,831	87.13	1,714,646	3,667,141
Distribution of Jaya & Tangeran	401		401	100.00			299,315	
Java	23,235	22,658	15,086	64.93	20,393	90.00	5,174,302	9,693,608
Indonesia	59,023	61,975	28,386	48.09	42,724	68.94	7,548,443	13,959,525

Source : PLN Statistics 1992/1993 and 1996

*1: More than 100%, Because the villages electrified were increasing in number as a result of rural development, whereas the number of villages were copied from the Decree of Minister for Internal Affairs No. 74/1989 dated 16 December 1989.

第３章　電気関連制度

電気関連制度は、1997 年の後半に発生した大規模な経済危機の影響を受け、既制度の抜本的改造を図るべく検討を実施中である。また、早いところでは、その一部について 1999 年度での実現を目標としている。従って、現在は、それまでの間ないし改革終了までの間（約 5 ヶ年）の過渡期に当たっている。

なお、既存制度にしても、卸電気事業の導入を政策の中心に据えて、改変過程にあったもので、流動的部分を含んでいた。

このような状況から、この章では、この改革が始まるまでの制度の改変状況と現在改革検討中の事柄について述べることとし、今後の推移を待つものとする。

3.1. 改革前の制度の変遷

インドネシアにおける電気事業に関する基本法令は、①PLN に関する政令 17 号 (1972) 並びに② 改正電気事業法第 15 号 (1985) であるが、その後、③PLN に関して政令 17 号 (1990), ④ その他の事業者に関して政令 10 号 (1989) で改正された。また、民間資本の導入促進を図るため政令 10 号 (1989) により規模を整備するとともに、発電セクターにおける民間電気事業者の参入を促すよう⑤大統領令 37 号 (1992) によって具体的な指針を規定した。

また、政府は、民間資本の導入と共に、電気事業に競争原理を導入して、従来の準独占的公営事業体による電気事業を効率化し、電力コストの低減することが重要との認識の下、世銀等の指示，援助に基づく構造改革の検討，実施に着手した。この過程でとられた主な施策は次の通りであった。

① PLN の株式会社化 (Persero) と機構改革

PLN は、1994 年政令 73 号によって、8 月 1 日付でそれまでの公社 (Perusahaan Umum) から有限責任会社 (Persero) に転換された。この改正によって、PLN は従来の発・送・配電に関する固有の業務の他に、外部の会社，団体との間で資本を Joint Venture し、または業務を提携し、建設，運転，財務，教育訓練，研究，開発等の業務を共同で実施することや子会社の設立，他事業への出資が可能となった。

そして、既にジャワ発電会社（Ⅰ，Ⅱ），エンジニアリングサービス会社等の分社化が実現した。

② 電気事業構造改革

鉱山エネルギー省電力エネルギー開発総局に民営電気事業局を設置，IPP を含む民営電気事業の許認可，監督を担当することとなった。また、政府は世銀の勧告を受け、次の事柄の達成を図った。

a. 電気事業の監督許認可体制及び事業自体の構造改革

- ジャワ－バリ系統における電気事業の構造改革，再編成
  ジャワ島（バリ島を含む）の電気事業は既に設備規模，容量，収益性からみて十分成熟した段階にあるので、発電，送電，配電，販売のそれぞれの段階を分離して別会社にするものとし、別会社後の PLN の役割は、Dispatching and Planning Center 機能と共に、PLN の発電会社，IPP，Captive Power Suppliers からの電力を Single Buyer として購入し、配電・販売会社に卸売ることとした。
  また、送電会社は主に 500 kV での送電業務を担当し、送電費用を収受するものである。

- ジャワ－バリ系統以外
  ジャワ－バリ系統以外の地域，系統については当面の間は、従来とおり PLN が発送配電設備の全てを所有し、運営することが推奨され、スマトラ島については、縦貫送電線完成後は配電部門を分離，別会社にする等の案とされた。しかし、ジャワ－バリ系統を分離後は経営が成り立たないので、今後とも様々な検討が必要とされた。

b. 許認可，監督体制の変更

上記の構造改革に伴って、電気事業に関する許認可，監督体制とその役割の変更も必要であるとされた。この内容は、鉱山エネルギー省の電力エネルギー開発総局の組織，所管の改訂，関連行政機関と電気事業体との間の許認可に関する関係整備が考えられていた。さらに、電気事業の円滑，効率的な運用が図られるためには関連規準及び基準，手続要領等の整備が必要とされた。

③ 水力発電と法令

既に述べた電気事業法等法令においては、水力発電を再生可能なエネルギー，河水の有効利用等の観点から、その開発の促進を図るべく謳った規定は無いが、レプリタ 6 や第二次 25 ヶ年計画において、かかるエネルギーの優先利用を謳うと共に PLN にその具体策を指示している。PLN はそれを受けての積極策として、1995 年 8 月、IPP が開発する風力，太陽，水力発電（ジャワーバリ系統下で 30 MW 以下、それ以外の地域で 15 MW 以下）によって発生する電気の購入促進策を定めた。

なお、鉱山エネルギー省は、これら水力とは異なる分野としての地方電化用の独立分散型小水力については、別途に規準 (PSKSK) を設けている。
また、他の省や機関（協同組合・小規模企業省 (MOC), 価額技術応用評価庁 (BPPT), 州政府，郡）で取組まれて実現している。
電気の監理権限と言う面からは、このような水力であっても、鉱山エネルギー省電力エネルギー開発総局が関わっている。

3.2. 改革検討中の事項

1998 年 8 月、鉱山エネルギー大臣は電力セクターの抜本的な構造改革路線を掲げた。これは、1996 年頃から進んだ PLN の資金繰りの悪化に、追い討ちをかけるかのように、1997 年には大規模な経済危機が発生、売電収入が激しく落ち込むこととなった他に、IPP との契約による電気の購入，建設投資問題等にも直面、財務のバランスが崩れ、電気事業全体にとって将来に大きな不安が発生することとなり、その結果、3.1. 章で述べた在来の改革路線では問題の解決が不可能となったためである。

新路線では、電力市場における「自由競争」の導入を 2003 年内（今後 5 年間）に実現して応ずるものとし、必要な段階的対応について具体的な検討を始めている。
そこでは、市場での自由競争，仕組みの透明性，より効率的な民営会社の確保が梃子となっている。

そして手順は、

① 第一段階として、1999 年中頃に JBEC（ジャワーバリ電力会社(発電，配電)）の

創設と PLN を再編成すること（ジャワーバリ送電担当局及びジャワーバリ送電外担当局を持つように改組）。
政府は同時にジャワーバリにおける必要な事業規準・計画・入札規準・高圧送電網規準の施行や簡明な民営体制の発足を通じて単一の電力購入市場を起す。

② 1999 年中に現行法を改める新電気事業法案を議会に提出。また、2000 年の早い時機に PLN から REC（地方電力会社）と JBTC（ジャワーバリ電力会社）を造る。

③ 従前の民営化の事態を考慮しつつ、「新」ジャワーバリ電力民営化の構築に向けて最大の努力を払う。

④ 一方で、事業構造，商的利害，民間会社の参加という異質域をカバーするための多用な段階移行策は、競争を通して相互に強化，充実が進む。

⑤ 具体的な進行計画を策定する。また、その際、諸外国の例を考慮に入れる他、関連部門との協議に努める。

⑥ 高級ステアリングコミッティを政府に設置し、改革過程を監理する。このコミッティは、専用スタッフを有する上級事務局の格を以って、鉱山エネルギー省電力エネルギー開発総局内に設ける。また、コミッティは、必要に応じコンサルタントを雇用する。

を掲げ、実施中である。

また、JBTC，REC，改革行政についての概要は次のとおり。

① JBTC について
- 発電コストの回収，回復の実行が認められる。また、新規発電・送電資産の入札，計画について責任が存在。なお、5 ヶ年計画を策定、毎年、見直しの義務がある。
- 送電コストの回収，回復は配電営業の拡大を通じて実現（配電会社のコスト回収，回復は販売会社を通じて実現）。
- 唯一の購入者の地位は、移行までの間であり、送電サービスとシステム操作は継続するが、電気の購入，販売は止める（2003 年内には、多様な購入者，販

売者を導入）。

② RECについて

- 暫定的に政府に置く。
- 資金の調達，資産の保有，ユーザーとの契約が認められる。

③ 改革行政について

- Ministry for the Empowerment of State-Owned Enterprises（国有企業権限責任付与省）において民営化プログラム開発を実施。
- 同省は、PLNを所有，監理下に置く。
- 鉱山エネルギー省は、政策の立案，法律の制定，執行等に当たる。
- 次に、新電気事業法を踏まえて The independento reguratory Badan（独立監督庁）を設立する。

なお、その他の概要は次のとおり。

① 自由競争に当たって、地理的条件及び事業手法の別を考慮し、また、電気事業を発電，送電，配電，販売の4つに分ける。

② PLNのジャワーバリ外の資産は、政府が保有の法人RECへ移管するが、将来は、RECを地域別に分ける可能性がある。

③ ジャワーバリの発電，配電は数個の独立会社に分割する。なお、これらは、JBEC(持株会社(ジャワーバリ電力会社))の参加に置く。

④ 3個の新会社 (REC，JBEC，JBTC) の設立により、PLNには、電力購入協定，相続契約が残る。既存のジャワ発電会社、即ち PJB1（ジャワ発電会社Ⅰ），PJB2（ジャワ発電会社Ⅱ）を5社程度に分ける。

3.3. その他

構造改革に当たっては、上記事柄を骨格に、一定期間で、構造改革を纏める上での議論が続いてる。
しかし、特に、IPPに伴った購入料金の問題，供給力過多による高コストの対策，料

金改定及びその補助策等の実施についての対応策は急がなければならない状況下にある。

危機の事態に遭遇したことは、遺憾なことであるが、政府と民間による以上の構造改革は、今後とも、諸外国の支援をも活用しつつ進展し、成功することを期待，希望し止まない。なお、関係法制度は今後新たに整備されるが、参考までに、現行電気事業法第 15 号 1985 を添付する。また、現在の鉱山エネルギー省電力エネルギー開発総局組織図を Fig.3-3-1 に示す。

THE PRESIDENT
OF
THE REPUBLIC OF INDONESIA

LAW OF THE REPUBLIC OF INDONESIA
NO. 15 1985
ON
ELECTRIC ENERGY

BY THE GRACE OF GOD ALMIGHTY
THE PRESIDENT
OF THE REPUBLIC OF INDONESIA

Considering : a. that the objectives of national development are to improve public welfare and create an intelligent nation for the purpose of realizing a just and prosperous society with material and spiritual equality based on the Pancasila and the 1945 Constitution;

b. that electric energy is very important for improving the welfare and the prosperity of the people in general and for stimulating improved economic activities in particular, and that it is thus necessary to step up the efforts to supply, utilize and manage electric energy so that it may be available in adequate and equal allocations with a good quality of service;

c. that in order to step up continued electric energy development efforts are needed to optimize the utilization of energy sources to generate electricity, thereby guaranteeing its availability;

d. that in order to achieve the abovementioned objectives and in view of the fact that the Ordinance dated September 13, 1890 on the Stipulations on Installation and Utilization of Lines for Electric Lighting and Transmission of Power by Means of electricity in the Netherland-Indies inserted in State Gazette No. 190, 1890 and amended several times, the latest with the Ordinance dated February 8, 1934 (State Gazette No. 63, 1934) which is no longer suitable to the situational progress and the requirements of electric energy development, a Law on Electric Energy needs to be made.

Adhering to : Article 5 paragraph (1), Article 20 Paragraph (1) and Article 33 of the 1945 Constitution.

WITH THE APPROVAL OF
THE HOUSE OF REPRESENTATIVES OF
THE REPUBLIC OF INDONESIA

HEREBY DECREES :

Enacting : THE LAW ON ELECTRIC ENERGY

CHAPTER I
GENERAL PROVISIONS

Article 1

What is referred to herein as :

1. Electric energy matters, shall be everything related to the supply and utilization of electricity.
2. Electricity, shall be one of the forms of secondary energy generated, transmitted and distributed for all kinds of purposes, but not including electricity utilized for communication or signalling.
3. Electric energy supply, shall be the supply of electricity from the generating point up to the utilization point.
4. Electric energy ufilization, shall be the use of electric energy starting from the utilization point.
5. Electricity Enterprise Authorization (EEA), shall be the authorization given by the Government to the BUMN (state-owned enterprise) assigned the sole task of providing electricity for public use, and assigned the task as supportive electricity enterprise.
6. Electricity Enterprise Permit (EEP) shall be the permit issued by the Government to cooperatives or private entities to provide electricity for public use, or to cooperatives, private entities or other BUMNs to supply electricity for own use.
7. Minister, shall be the minister responsible for electric energy matters.

CHAPTER II
BASIS AND OBJECTIVE OF ELECTRIC ENERGY DEVELOPMENT

Article 2

Elecgric energy development shall be based on the principles of utilization, fairness and equality, self-confidence, and enviromnental preservation.

Article 3

Electric energy development shall have as its objective the improvement of the people's welfare and prosperity in a fair and equal manner as well as the stimulation of enhanced economic activities.

CHAPTER III
ENERGY SOURCES FOR ELECTRICITY

Article 4

(1) The natural resources serving as energy sources availabe throughout the territories of the Republic of Indonesia shall be utilized to the maximum extent possible for various purpose including guaranteeing the availability of power.

(2) The policy for ther supply and utilization of energy sources to generate electric energy shall be established by the Government taking into account the aspects of security, balance and environmental preservation.

CHAPTER IV
GENERAL ELECTRIC ENERGY PLANNING

Article 5

(1) The Government shall determine the general electric energy plan in an overall and integrated manner.

(2) In preparing the general plan refereed to in paragraph (1) the Government shall be obliged to take into account the thoughts and views that exist in society.

CHAPTER V
ELECTRICITY ENTERPRISE

Article 6

(1) Electricity enterprise shall comprise :
   a. electricity supply enterprise,
   b. supportive electricity enterprise.

(2) The electricity supply enterprise refereed to in paragraph (1) letter a may comprise the following types of enterprise :

   a. electricity generation;
   b. electricity transmission;
   c. electricity distribution.

(3) The supportive electricity enterprise referred to in paragraph (1) letter b may comprise :

   a. consultancy services related to electric energy matters;
   b. construction and installation of electrical equipment;
   c. maintenance of electrical equipment;
   d. technological development of equipment supporting the supply of electricity.

Article 7

(1) The supply of electricity shall be organized by the Government and shall be carried out by the BUMN established as the Holder of the EEA in accordance with the prevailing legislative regulations.

(2) In an effort to meet the need for electricity in a more equitable manner and to further improve the capability of the Government to supply electricity as referred to in Article 6 paragraph (2), for public use as well as own use, insofar as the interests of the State are not harmed, the widest possible opportunity shall be given to cooperatives and other enterprises to supply electricity based on the EEP.

(3) The requirement for the EEP referred to in paragraph (2) shall be waived for electricity supply operations for own use the capacity of which shall be fixed with a Government Regulation.

Article 8

The issuance of the EEP referred to in Article 7 paragraph (2) shall be regulated with a Government Regulation.

Article 9

The stipulation on the supportive electricity enterprise referred to in Article 6 paragraph (3) shall be specified in a Government Regulation.

Article 10

In the event the operations of the electricity supply enterprise referred to in Article 6 paragraph (2) have not been, or cannot be, performed by the Holder of the EEA alone, the Holder of the EEA may cooperate with another enterprise after obtaining the approval of Minister.

Article 11

(1) For the sake of the public, the Holder of the EEA and the Holder of the EEP for Public Use in performing the electricity supply operations refered to in Article 6 paragraph (2) shall be authorized to :

a. cross rivers or lakes either on or under the surface;

b. cross seas, either on or under the surface;

c. cross public roads and railroads.

(2) Insofar as there is no contradiction, adhering to prevailing legislative regulations, for the sake of the puclic the Holder of the EEA and the Holder of the EEP shall also be authorized to :

a. enter public or private places and use them temporarily;

b. use land, crossing on or under it;

c. cross on or under buildings constructed on or under the ground,

d. fell or cut plants that are obstructives.

Article 12

(1) For the sake of the public, those who are in possession of tittles to land, buildings and plants shall allow the Holder of the EEA and the Holder of the EEP for Public Use to implement the authorization referred to in Article 11 paragrapn (2), obtaining a compensation, unless the land is Government-owned, from the Holder of the EEA.

(2) The compensation referred to in paragraph (1) shall be borne by the Holder of EEA and the Holder of the EEP for Public Use.

(3) The Holder of the EEA and the Holder of the EEP for Public Use may commence operations only after the compensation referred to in paragraph (1) has been settled.

Article 13

The obligation to pay the compensation referred to in Article 12 shall not apply to those who construct buildings, plant trees, etc, on land that will be, or has been, used for electricity supply operations with the purpose of obtaining such compensation.

Article 14

The compensation stipulation, procedure and payment referred to in Article 12 shall conform to the provisions of the prevailing legislative regulations.

CHAPTER VI
RELATIONSHIP BETWEEN THE HOLDER OF THE EEA, THE HOLDER OF THE EEP FOR PUBLIC USE AND THE PUBLIC IN ELECTRICITY SUPPLY OPERATIONS

Article 15

(1) The Holder of the EEA and the Holder of the EEP for Public Use shall be obliged to :

a. provide electricity;

b. provide the best possible services to the public;

c. take occupational safety and public safety precautions.

(2) The stipulation on the relationship between the Holder of the EEA, the Holder of the EEP for Public Use and the Public with regard to the respective entitlements, obligations and responsibilities shall be specified in a Government Regulation.

Article 16

The Government shall regulate the selling price of electricity

CHAPTER VII
SUPPLY AND UTILIZATION OF ELECTRICITY

Artikel. 17

The conditions for the supply exploitation utilization, installation and standardization of electricity shall be specified by the Government.

CHAPTER VIII
MANAGEMENT AND SUPERVISION

Article 18

(1) The Government shall conduct general management and supervision of the operations and implementation of electricity enterprises.

(2) The general management and supervision referred to in paragraph (1) shall especially relate to occupational safety, public safety, enterprise development, and the accomplishment of standardization in the electric energy sector.

(3) The procedures for the general menagement and supervision referred to in paragraphs (1) and (2) shall be specified in a Government Regulation.

CHAPTER IX
CRIMINAL ACT CLAUSE

Article 19

Anyone who utilizes electricity that is not rightly allocated to him/her shall have commited a criminal act of theft as referred to in the Penal Code.

Article 20

(1) Anyone who undertakes to supply electricity without the EEA or the EEP shall be sentenced to a maximum of 6 (six) years imprisonment or fined a maximum of Rp 50.000.000 (fifty million rupiahs).

(2) The stipulation referred to in paragraph (1) shall not apply to electricity supply enterprises for own use as referred to in Article 7 paragraph (3).

(3) Anyone who undertakes to supply electricity without fulfilling obligations to wards those who are entitled to land, buildings and plants as referred to in Article 12 paragraph (3) shall be sentenced to a maximum of 1 (one) year imprisonment or fined a maximum of Rp 10.000.000 (ten million rupiahs) and the relevant EEP shall be revoked.

Article 21

(1) Anyone who on account of negligence causes a person's demise by means of electricity shall be sentenced to a maximum of 5 (five)-years imprisonment.

(2) In the event the negligence referred to in paragraph (1) is committed by the Holder of the EEA or the Holder of the EEP, the maximum imprisonment shall be 7 (seven)-years.

(3) In addition to the punishment referred to in paragraph (2), the Holder of the EEA or the Holder of the EEP shall be obliged to pay compensation.

(4) The amount, procedure and payment of the compensation referred to in paragraph (3) shall be specified in a Government Regulation.

Article 22

(1) The Holder of the EEA or the Holder of the EEP for Public Use who does not comply with the impelementation stipulation referred to in Article 15 paragraph (1) shall be sentenced to a maximum of 6 (six)-years imprisonment or fined a maximum of Rp 5.000.000 (five million rupiahs).

(2) In addition to the punishment referred to in paragraph (1), an additonal punishment may be inflicted in the form of a revocation of the EEP.

Article 23

(1) The acts referred to in Articles 19, 20 and 21 shall constitue criminal acts.

(2) The act referred to in Article 22 shall constitute a violation.

CHAPTER X
INVESTIGATION

Article 24

(1) Besides a public investigator assigned the task of investigating criminal acts, certain Civillian Government Officials appointed in accordance with the prevailling legislative regulations may also conduct an investigation into the criminal acts referred to in this Law.

(2) The investigator erferred to in paragraph (1) shall be authorized to :

a. verify reports or information related to criminal acts in the electric energy sector ;

b. inspect persons or institutions suspected of committing criminal acts in the electric energy sector;

c. request information or evidence from persons or institutions in relation to criminal acts in the electric energy sector;

d. make inspections at certain places suspected to be the locations of evidence and confiscate items that can be used as evidence in cases of criminal acts in the electric energy sector;

e. take other actions in accordance with the provisions of the prevailing legislative regulations.

CHAPTER XI
TRANSITION CLAUSE

Article 25

In view of the enactment of this Law the implementation regulation on electric energy issued in accordanche with the Ordinance dated September 13,1890 on stipulations on the Installation and Utilization of Lines for Electric Lighting and Transmission of Power by Means of Electricity in the Netherlands–Indies inserted in State Gazette No. 190, 1890, as amended several times, the latest with the Ordinance dated February 8, 1934 inserted in State Gazette No. 63, 1934, shall remain effective, insofar as it is not contradictory to this Law or has been replaced or amended in accordance with this Law.

CHAPTER XII
CONCLUDING CLAUSES

Article 26

At this time this Law starts to take effect, the Ordinance dated September 13, 1890 on the Stipulations on the Installation and Utilization of Lines for Electric Lighting and Transmission of Power by Means of Electricity in Indonesia inserted in State Gazette No. 190, 1890 and amended several times, the latest with the Ordinance dated February 8, 1934 inserted in State Gazette No. 63 1934 shall be no longer effective.

Article 27

This Law shall be effective as of the date of enactment.
To enable everyone to be aware of this Law, it is instructed that this Law be inserted in the State Gazette of the Republic of Indonesia.

Ratified in Jakarta
on December 30, 1985

THE PRESIDENT OF
THE REPUBLIC OF INDONESIA

(signed)

SOEHARTO

Enacted in Jakarta
on December 30, 1985

THE MINISTER/STATE SECRETARY
OF
THE REPUBLIC OF INDONESIA

(signed)

SUDHARMONO, S.H.

STATE GAZETTE OF
THE REPUBLIC OF INDONESIA
NO. 74, 1985

A true copy of the original

THE SECRETARIAT OF THE CABINET
OF THE REPUBLIC OF INDONESIA

Head of Legal and Legislative
Affairs Bureau

(signed)

BAMBANG KESOWO, S.H., LL. M.

第Ⅱ部　チラキ川流れ込み式水力発電計画のマスタープラン調査

第Ⅱ部　チラキ川流れ込み式水力発電計画のマスタープラン調査

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第Ⅱ部　チラキ川流れ込み式水力発電計画のマスタープラン調査

第1章　序　　論

水力には、流れ込み式，調整池式，貯水池式，揚水式の四種がある。インドネシア政府が独立後推進してきた水力は、サグリン，チラタ等にみられる大規模貯水池式発電が主である。この方式には大規模出力，低コストの電力を得られるものの、近年では、場所により大規模住民移転，大規模農地の滅失等大きな問題を抱えている。

その点、流れ込み式発電は、中小，豆級とはなるものの、エネルギーを得るために貯水池を必要とせず、環境問題が無い。落差が高いほど出力は大きく、かつ低コストの電気が得られる。

このような水力地点は、ジャワ，スマトラ，カリマンタン，スラウェシ島等の山脈が抱える急勾配河川の上中流部に多く存在し、その活用は、電力供給網の拡張整備に適する。

これ等の河川に低コストを実現する「新型流れ込み式水力技術」を導入した水力開発を推進していく事が得策と考えられる。

この技術導入の実施に当り、モデル地域としてジャワ島内で最も開発の遅れている西部ジャワ州インド洋側が適当と判断され、将来この技術導入を核とした自立的技術発展をテコに順次ジャワ，スマトラ，カリマンタン，スラウェシ島等への技術普及を進めて行く基礎とする。

またこの技術は老朽水力更新にも役立てる事ができるものと考えられる。

なおこの地域での試みは、バンドン市での学術研究、工業集積等を通じた技術等の活用に極めて利便性があるであろうという利点も考えられる。

西部ジャワ州インド洋側には20を超える河川があり、この中で既設送電線が近くに存在し、サイト近くに道路があり、乾季でも十分な流量があると見なされ、更に1/50,000地形図上で階段状に3ヶ所の水力開発が考えられる等の理由でチラキ川がモデルケースの対象として選ばれた。