Table 3.36 Transmission and Substation Projects (1/3)

PROJECT	FOREX ($M)	LOCAL (PM)	TOTAL (PM)	START DATE	COMM. DATE
I. LUZON GRIDS					
A. GENERATION ASSOCIATED T/L					
1. BACMAN I T/L	3.86	54.58	162.89	1993	1993
2. FAST TRACK GEN. T/L	82.26	179.69	2,211.51	1993	1993
3. BACMAN II T/L	1.50	15.10	55.80	1993	1993
4. POLAR POWER BARGE T/L	1.08	6.00	35.14	1993	1993
5. ORMAT MAKBAN GEO T/L	0.15	2.06	6.26	1992	1994
6. MAIBARARA BIN. GEO T/L	0.22	5.40	11.49	1993	1994
7. ORMAT BACMAN GEO T/L	0.08	1.36	3.57	1993	1994
8. MAKBAN D & E GEO T/L	1.26	7.29	45.04	1993	1994
9. SUBIC DIESEL T/L (ENRON 2)	1.16	2.51	31.16	1993	1994
10. LIMAY COMBINED CYCLE T/L	6.08	49.72	220.01	1993	1994
11. CALACA II COAL T/L	8.65	69.29	311.40	1993	1995
12. SUBIC DIESEL T/L (ENRON 2)	1.16	2.51	31.16	1994	1995
13. MASINLOC COAL T/L	17.30	153.49	620.40	1993	1996
14. HOPEWELL I & II COAL T/L	12.58	176.23	515.94	1993	1996
15. LEYTE A GEO T/L	317.79	0.00	8,580.33	1993	1997
16. DEL GALLEGO GEO T/L	3.57	40.50	136.84	1994	1997
17. PINAMUKAN T/L	11.03	190.98	488.79	1994	1999
18. NALATANG HYDRO ASSO. T/L	0.48	10.32	23.21	1995	1999
19. SUAL IMPORTED COAL	3.39	26.77	118.16	1995	1999
20. SAN JUAN T/L	8.55	99.88	330.64	1996	2000
21. ATIMONAN T/L	8.55	99.88	330.64	1996	2000
22. SARIAYA T/L	5.03	53.82	189.59	1997	2001
23. BAKUN HYDRO T/L	0.70	15.18	34.13	1998	2002
24. AGNO-LABRADOR EHV T/L	33.06	217.61	1,110.29	1998	2002
25. PASACAO T/L	5.73	50.21	204.93	1999	2003
26. OAS T/L	43.41	385.10	1,557.03	1999	2003
27. AMBURAYAN HYDRO T/L	1.74	37.64	84.64	2000	2004
28. PASIL B HYDRO T/L	0.14	3.04	6.83	2000	2004
29. PASIL C HYDRO T/L	0.34	7.29	16.38	2000	2004
30. SAN ROQUE HYDRO T/L	1.23	17.71	50.99	2001	2005
31. KANAN HYDRO T/L	4.95	184.97	318.52	2001	2005
32. DASOL T/L	33.06	217.61	1,110.19	2001	2005
SUB-TOTAL	620.09	2,383.74	18,953.90		
B. GRID REINFORCEMENT					
1. SAN JOSE-KALAYAAN EHV LINE	51.10	454.71	1,882.36	1990	1993
2. BALINTAWAK-SAN JOSE T/L	8.80	96.98	343.48	1993	1993
3. DASMARINAS S/S UPRATING	7.39	35.29	241.49	1993	1994
4. ROSARIO S/S EXPANSION	4.31	58.39	174.76	1993	1994
5. (NEW) CRUZ-NA-DAAN S/S	4.10	19.10	135.30	1993	1994
6. DARAGA S/S EXPANSION	2.52	14.38	82.42	1993	1994

Table 3.36 Transmission and Substation Projects (2/3)

PROJECT	FOREX ($M)	LOCAL (PM)	TOTAL (PM)	START DATE	COMM. DATE
7. SANTIAGO EXPANSION PROJ	2.52	14.38	82.42	1993	1994
8. LAOAG S/S EXPANSION	1.40	8.02	45.82	1993	1994
9. IBRD 3163-PH ENERGY SECTOR PROJ.	39.16	199.66	1,290.08	1993	1994
10. MEXICO CAPACITOR PROJ	6.00	24.30	186.30	1993	1994
11. SUCAT-ARANETA-BALINTAWAK PROJ	97.09	904.95	3,526.38	1993	1995
12. DASMARINAS-ZAPOTE PROJ	17.65	130.68	607.23	1993	1996
13. TAYABAS-DASMARINAS EHV LINE	88.83	827.09	3,244.92	1993	1996
14. PCB REPLACEMENT PROJ	11.00	0.00	297.00	1993	1996
15. LABRADOR-S MANUEL-S JOSE EHV LINE	153.65	1,332.03	5,519.47	1993	1996
16. DASMARINAS S/S EXPANSION	5.57	31.82	182.21	1995	1996
17. NAGA-KALAYAAN EHV T/L REHAB	42.00	323.54	1,499.59	1993	1997
18. MAKBAN-BINAN-SUC 230 KV PROJ	23.32	174.71	804.43	1995	1997
19. SAN MANUEL S/S EXPANSION	2.52	12.98	81.02	1996	1997
20. LA TRINIDAD S/S EXPANSION	3.53	22.71	121.57	1997	1998
21. CONCEPCION S/S EXPANSION	3.24	20.82	111.42	1997	1998
22. HERMOSA S/S EXPANSION	1.36	8.74	46.81	1997	1998
23. SAN JOSE S/S EXPANSION	1.74	11.17	59.86	1997	1998
24. TAYA-DASMA-SN JOSE EHV UPRATING	241.04	1,354.86	7,862.77	1995	1999
25. LABRA-S MANUEL-S JOSE EHV UPRATING	147.30	794.50	4,771.78	1995	1999
26. MEXICO S/S EXPANSION	3.53	22.71	121.57	1998	1999
27. SAN ESTEBAN S/S EXPANSION	1.38	8.91	47.58	1998	1999
28. BATANGAS S/S EXPANSION	3.28	21.10	112.89	1998	1999
29. CABANATUAN S/S EXPANSION	2.53	16.30	87.13	1998	1999
30. TAYABAS-SAN JOSE EHV EXPANSION	53.39	274.55	1,715.95	1996	2000
31. LABRADOR-HERMOSA-SAN JOSE EHV	238.41	1,761.04	8,198.04	1997	2001
32. BATAAN S/S EXPANSION	1.36	8.74	46.81	2000	2001
33. OLONGAPO S/S EXPANSION	3.24	20.82	111.42	2001	2002
34. MAKBAN S/S EXPANSION	1.36	8.74	46.81	2001	2002
35. TUGUEGARAO S/S EXPANSION	2.66	17.07	91.44	2001	2002
36. NAGA-TAYABAS EHV S/S UPRATING	107.99	613.34	3,529.08	2000	2003
37. BOTOLAN S/S EXPANSION	2.66	17.07	91.44	2002	2003
38. LABRADOR S/S EXPANSION	2.66	17.07	91.44	2002	2003
39. DASMARINAS S/S EXPANSION	1.87	11.99	64.22	2002	2003
40. NAGA-TAYABAS EHV LINE II	133.36	935.75	4,536.47	2000	2004
41. S ESTEBAN-B BUHAY-BAUANG T/L	20.04	201.91	742.92	2000	2004
42. DASMARINAS EHV S/S EXPANSION	14.74	75.82	473.84	2000	2004
43. MEXICO S/S EXPANSION	7.91	29.21	250.55	2003	2004
44. HERMOSA-DASMARINAS EHV T/L	86.48	658.36	2,993.46	2001	2005
SUB-TOTAL	1,655.99	11,596.31	56,553.95		
C. DISTRIBUTION PROJECTS					
1. 14th ADB POWER PROJECT	1.70	48.67	96.19	1993	1993
2. REGIONAL IND'L CENTERS 69 KV T/L	0.44	8.16	20.04	1993	1994
3. CABANATUAN-SAN ISIDRO T/L	0.28	5.17	12.73	1993	1994

Table 3.36 Transmission and Substation Projects (3/3)

PROJECT	FOREX ($M)	LOCAL (PM)	TOTAL (PM)	START DATE	COMM. DATE
4. CABANATUAN-TALAVERA T/L	0.28	5.17	12.73	1993	1994
5. BALAYAN-CALATAGAN T/L	0.38	5.95	16.21	1993	1994
6. TUGUEGARAO-CABAGAN T/L	0.43	6.76	18.37	1993	1994
7. SANTIAGO-CAUAYAN T/L	1.25	23.60	57.35	1993	1994
SUB-TOTAL	4.76	103.48	233.62		
LUZON GRID TOTAL	2,280.84	14,083.53	75,741.47		
II. VISAYAS GRIDS					
A. GENERATION ASSOCIATED T/L	17.27	213.00	678.95		
B. GRID REINFORCEMENT	210.32	2,221.21	7,899.89		
C. DISTRIBUTION PROJECTS	25.20	266.13	906.71		
VISAYAS GRID TOTAL	252.79	2,700.34	9,485.55		
III. MINDANAO GRIDS					
A. GENERATION ASSOCIATED T/L	59.65	482.68	2,012.10		
B. GRID REINFORCEMENT	91.11	894.27	3,354.15		
C. DISTRIBUTION PROJECTS	14.85	239.18	640.13		
MINDANAO GRIDS TOTAL	165.61	1,616.13	6,006.38		
GRAND TOTAL	2,699.24	18,400.00	91,233.40		

Source : NPC Power Development Program 1993-2000

Table 3.37 Philippine Resource Power Potential

LOCATION	HYDRO POWER						GEOHERMAL									COAL			
	STATUS	NO OF UNIT	CAPACITY MW	%	ENERGY GWh	%	STATUS	NO OF UNIT	LOW POTENTIAL CAPACITY MW	%	LOW POTENTIAL ENERGY GWh	%	HIGH POTENTIAL CAPACITY MW	%	HIGH POTENTIAL ENERGY GWh	%	LOCATION	MINABLE RESERVE (M.TON)	HEATING VALUE (BTU/LB)	PLANT CAPACITY (MW)
LUZON	EXISTING	12	1,226	12	3,675	13	EXISTING	2	660	60	4,336	60	660	45	4,336	45	SEMIRARA	93.00	7,000	673
	PRE-FEASIBILITY	120	5,083	50	13,644	46	PRE-FEASIBILITY	3	170	16	1,117	16	240	16	1,577	16	CAGAYAN VALLEY	88.04	4,600	418
	FEASISBILITY	35	2,510	25	7,785	26	FEASISBILITY	1	60	5	394	5	170	11	1,117	11	SOUTH MINDANAO	2.40	8,500	21
	DEFINITE DESIGN	4	1,281	13	4,396	15	DEFINITE DESIGN	5	210	19	1,380	19	410	28	2,694	28	POLIPIA BATAN	7.70	12,000	95
																	QUESON	0.08	12,000	1
																	MASBATE	0.18	9,800	2
	TOTAL	171	10,100	100	29,500	100	TOTAL	11	1,100	100	7,227	100	1,480	100	9,724	100	TOTAL	191.40	-	1,210
VIASAYAS	EXISTING	2	2	0	15	1	EXISTING	2	227	24	1,489	24	227	15	1,491	15	NEGROS	1.05	8,100	9
	PRE-FEASIBILITY	42	339	53	1,507	64	PRE-FEASIBILITY	2	418	43	2,746	43	578	37	3,797	37	NORTH CEBU	1.03	9,300	10
	FEASISBILITY	6	279	44	792	33	FEASISBILITY	0	0	0	0	0	0	0	0	0	CENTRAL CEBU	1.42	9,800	14
	DEFINITE DESIGN	1	20	3	58	2	DEFINITE DESIGN	10	320	33	2,102	33	740	48	4,862	48	SOUTH SEBU	3.32	11,500	39
																	BOHOL	0.53	8,700	5
																	SAMAR LEYETE	6.35	7,300	48
	TOTAL	51	640	100	2,372	100	TOTAL	14	965	100	6,337	100	1,545	100	10,150	100	TOTAL	13.70	-	125
MINDANAO	EXISTING	9	986	27	4,552	31	EXISTING	0	0	0	0	0	0	0	0	0	DABAO	0.12	7,100	1
	PRE-FEASIBILITY	45	1,327	37	5,183	35	PRE-FEASIBILITY	0	0	0	0	0	0	0	0	0	SURIGAO	34.28	7,100	251
	FEASISBILITY	17	1,314	36	5,154	35	FEASISBILITY	1	120	86	788	86	240	63	1,577	63	ZAMBOANGA	11.15	11,100	233
	DEFINITE DESIGN	0	0	0	0	0	DEFINITE DESIGN	5	20	14	131	14	140	37	920	37				
	TOTAL	71	3,627	100	14,889	100	TOTAL	6	140	100	919	100	380	100	2,497	100	TOTAL	45.55	-	485
PHILIPPINES	EXISTING	23	2,214	15	8,242	18	EXISTING	4	887	40	5,825	40	887	26	5,827	26				
	PRE-FEASIBILITY	207	6,749	47	20,334	43	PRE-FEASIBILITY	5	588	27	3,863	27	818	24	5,374	24				
	FEASISBILITY	58	4,103	29	13,731	29	FEASISBILITY	2	180	8	1,182	8	410	12	2,694	12				
	DEFINITE DESIGN	5	1,301	9	4,454	10	DEFINITE DESIGN	20	550	25	3,613	25	1,290	38	8,476	38				
	TOTAL	293	14,367	100	46,761	100	TOTAL	31	2,205	100	14,483	100	3,405	100	22,371	100	TOTAL	250.65	-	1,820

DATA SURCE : NPC POWER DEVELPMENT PROGRAM (1993 - 2005)

Table 3.38 Cumulative Generation of NPC Plants in Luzon

1991 VS 1992

REGION / PLANT	INSTALLED MW	GROSS GENERATION (GWH) ACTUAL 1991 A	ACTUAL 1992 B	PLANNED 1992 C	% INC B-A / A	% DEC(-) B-C / C
LUZON GRID TOTAL	4,508.80	19,516.72	19,942.00	20,226.00	2.18	-1.40
NORTHERN	793.00	1,656.93	1,792.72	1,733.00	8.20	3.45
AMBUKLAO	75.00	0.00	0.00	0.00	0.00	0.00
ANGAT	246.00	486.47	345.94	271.00	-28.89	27.65
BINGA	100.00	405.61	393.04	457.00	-3.10	-14.00
MAGAT	360.00	535.60	753.45	760.00	40.67	-0.86
MASIWAY	12.00	23.53	28.68	42.00	21.89	-31.71
PANTABANGAN	100 *	183.76	174.90	203.00	-4.82	-13.84
CLARK DIESEL	13 *	0.00	25.19	0.00	0.00	0.00
NIA-BALIGATAN	6 *	18.31	17.78	0.00	-2.89	0.00
HEADCOR	12.05 *	3.65	36.84	0.00	909.32	0.00
NMHC	6 *	0.00	16.90	0.00	0.00	0.00
SOUTHERN	1,010.80	4,713.62	4,580.59	4,687.00	-2.82	-2.27
CALIRAYA	32.00	19.23	39.08	12.00	103.22	225.67
BARIT	1.80	3.69	1.54	12.00	-58.27	-87.17
BOTOCAN	17.00	33.97	46.96	37.00	38.24	26.92
KALAYAAN	300.00	165.80	58.02	121.00	-65.01	-52.05
MAK-BAN	330.00	2,451.83	2,437.54	2,452.00	-0.58	-0.59
TIWI	330.00	2,039.10	1,997.45	2,053.00	-2.04	-2.71
METRO MANILA	2,705.00	13,146.17	13,568.69	13,806.00	3.21	-1.72
BATAAN 1	75.00	372.27	538.32	493.00	44.60	9.19
BATAAN 2	150.00	4.84	284.70	679.00	5,782.23	-58.07
BATAAN GT	120.00	370.98	619.87	504.00	67.09	22.99
SUCAT 1	150.00	973.24	1,069.51	972.00	9.89	10.03
SUCAT 2	200.00	712.76	1,096.72	876.00	12.69	25.20
SUCAT 3	200.00	562.12	996.67	366.00	39.83	172.31
SUCAT 4	300.00	2,332.77	1,406.67	1,844.00	150.24	-23.72
MANILA 1	100.00	728.83	661.41	694.00	-71.65	-4.70
MANILA 2	100.00	631.99	683.08	630.00	-6.28	8.43
MALAYA 1	300.00	1,581.82	1,245.69	1,918.00	97.11	-35.05
MALAYA 2	350.00	1,897.06	1,828.97	1,707.00	15.62	7.15
MALAYA GT	90.00	287.31	340.50	356.00	-82.05	-4.35
CALACA	300.00	1,826.70	1,655.35	1,698.00	476.15	-2.51
NAVOTAS GT	60.00	275.36	297.31	576.00	-83.72	-48.38
HOPEWELL GT	210.00	588.12	843.92	493.00	206.48	71.18

NOTES

		1991	1992
KALAYAAN GENERATION FROM CURRENT PUMPING	=	312.39	264.84
KALAYAAN GENERATION FROM RESERVOIR	=	36.28	45.14
KALAYAAN PUMPING ENERGY	=	433.74	376.82
PUMPING ENERGY STORED IN RESERVOIR	=	26.77	53.40

* Non-NPC Plants not included in total

Table 3.39 Management of Rural Electrification of Cooperatives

As of 1992

	TALRAC		NUEVA ECIJA				PAMPANGA			BATAAN	ZAMBALES		Total
	TARELCO-I	TARELCO-II	NEECO-I	NEECO-II	SAJELCO	PRESCO	PELCO-I	PELCO-II	PELCO-III	PENINSULA	ZAMECO-I	ZAMECO-II	
1 Energy purchases (MWH)	38.868	27.277	49.915	78.324	19.292	4.475	35.329	103.332	104.348	87.340	23.306	33.793	605.599
2 Energy sales (MWH)	28.580	21.549	28.916	49.736	14.855	3.085	22.752	65.099	85.565	63.077	17.946	22.540	423.700
3 System loss (%)													
-Techincal loss	15	15	22	15	22	18	25	26	11	15	15	15	18
-Non-Techincal loss	11	6	20	22	1	13	11	11	7	13	8	18	12
4 Peak demand (kW)	10.681	7.414	10.243	19.437	3.337	1.241	7.160	21.064	20.310	19.941	5.321	6.651	132.800
5 Load factor (%)	42	42	56	46	66	41	56	56	59	50	50	58	52
6 Service data													
Nos of membership													
-Potential	81.000	42.000	42.000	123.000	14.000	7.000	43.000	78.000	38.000	72.000	30.000	35.000	605.000
-Actual	47.435	32.233	37.435	78.846	10.489	6.831	32.223	67.576	36.651	59.883	21.256	27.536	458.394
-% of Connection	58.6	76.7	89.1	64.1	74.9	97.6	74.9	86.6	96.5	83.2	70.9	78.7	75.8
Nos of customer by class													
-Residential	41.651	27.529	31.478	69.579	9.325	6.383	30.943	58.283	33.528	50.282	16.315	21.403	396.699
-Commercial	1.349	1.616	1.078	2.487	993	25	652	2.155	739	4.307	1.540	1.518	18.459
-Industrial	157	55	128	222	48	48	22	118	50	119	82	33	1.082
-Others	978	247	436	677	1.096	375	606	3.615	561	1.063	182	346	10.182
-Total	44.135	29.447	33.120	72.965	11.462	6.831	32.223	64.171	34.878	55.771	18.119	23.300	426.422
Nos of Barragay													
-Potential	412	119	97	511	41	41	113	170	97	230	118	112	2.061
-Actual	342	118	95	330	40	41	113	167	96	221	106	111	1.778
-% of energized	83.0	99.2	95.9	64.6	97.6	100	100	98.2	99.0	96.1	89.8	99.1	86.3
7 Energy sales by class (KWH)													
-Residential	18.133	14.474	16.999	32.675	5.369	2.729	15.686	48.526	27.990	39.561	8.542	16.035	246.719
-Commercial	3.202	3.251	2.903	3.214	2.160	34	2.937	6.901	4.923	10.448	1.891	2.666	44.530
-Industrial	5.050	2.748	8.333	12.532	6.342	257	944	6.226	50.672	8.535	3.527	2.491	107.657
-Others	2.195	1.076	681	1.315	984	65	3.185	3.446	1.980	4.533	3.986	1.348	24.794
-Total	28.580	21.549	28.916	49.736	14.855	3.085	22.752	65.099	85.565	63.077	17.946	22.540	423.700
8 Triff structure by class (P/kWH)													
-Residential	3.38	3.30	3.72	3.61	2.75	3.42	3.37	2.92	2.95	3.09	3.34	3.17	3.25
-Commercial	3.46	3.33	3.77	3.67	2.77	3.43	3.42	2.97	2.97	3.12	3.35	3.20	3.29
-Industrial	3.34	3.27	3.69	3.67	2.73	3.32	3.37	2.89	2.89	3.06	3.36	3.14	3.23
-Others	3.27	3.30	3.42	2.99	2.77	3.32	3.37	2.83	2.95	3.06	3.34	3.13	3.15
9 Existing distribution facilities													
3-phase D/L (kM)	168	118	48	198		18	31	138	86	180	314	74	
V-phase D/L (kM)	120	28	41	86		26	43	91	44	44	46	17	
Single -phase (kM)	800	376	376	555		115	344	688	393	422	470	367	
10 Substation equipment													
Nos of substation	2		3	3	1	1	1			2	2	2	
Operation voltage (kV)	13.2/7.62		13.2/7.62	13.2/7.62	13.8/7.968	13.2/7.62	13.2/7.62			13.8/7.968	4.16 0.24	13.8/7.968	
Installed capcity of trans. (kVA)	15.000		20.000	20.000	5.000	5.000	10.000			10.000	9.000	10.000	

Source : Natinal Electrification Administration

Table 3.40 MERALCO (Utilities) Tariff Structure

RESIDENTIAL AND GENERAL SERVICE (RGS-3)

A. Customers Consuming 300kwhs and Below

Generation Charge

First 50kwh	Applicable Generation Charge per kwh for **subsidized** consumption for the billing month
Excess kwh	Applicable Generation Charge per kwh for **subsidizing** consumption for the billing month

Distribution charge

First 10kwh	P8.00
Next 40kwh	0.80 per kwh
Excess kwh	1.07 per kwh

B. Customers Consuming more than 300kwhs

Generation Charge

Total kwh	Applicable Generation Charge per kwh for **subsidizing** consumption for the billing month

Distribution charge

Total kwh	P 1.07 per kwh

Currency Exchange Rate Adjustment (CERA)

Applicable CERA for the billing month applied on the basic distribution charge excluding that of the first 50 kwh consumption of customers consuming within 300 kwhs per month.

Special Discount

A 16% discount on the basic distribution charge is applicable for Educational Institutions and Medical Services.

Minimum Charge - P 8.00 per month

NON-INDUSTRIAL(NIS-3) AND INDUSTRIAL SERVICE (IS-3)

Generation Charge Applicable Generation Charge per kwh for **subsidizing** consumption for the billing month

Distribution Charge

		NIS	IS
Demand Charge		P25.00/kw	P25.00/kw
Energy Charge			
Small	(5kw< demand< 40kw)	0.72/kwh	0.52/kwh
Medium	(40kw≤ demand≤ 200kw)	0.67/kwh	0.48/kwh
Large	(200kw<demand)	0.62/kwh	0.44/kwh

Distribution Charge

Special discount for Educational Institution and Medical Service	=	12% of the combined Demand and Energy Charges
Primary Metering Discount for Customers who own the substation	=	14.0% of the combined Demand and Energy Charges
Power Factor Adjustment (applicable on the total bill excluding discounts and CERA, for medium and large customers only)	=	0.6% surcharge for every percentage point lower than 85% 0.6% discount for every percentage point higher than 85%

Currency Exchange Rate Adjustment (CERA)

Applicable CERA for the billing month applied on the distribution charge after discount.

Minimum Charge

Small	P 125.00 per month
Medium and Large	P 1,000.00 per month

GOVERNMENT HOSPITALS AND STREET LIGHTING SERVICE (GHMS-7)

Generation Charge — Applicable Generation Charge per kwh for **subsidizing** consumption for the billing month

Distribution Charge

Demand< 40kw	
First 10kwh	₱ 8.00
Excess kwh	0.80 per kwh
Demand≥ 40kw	
Total kwh	₱ 8.00

Minimum Charge

Demand< 40kw	₱ 8.00
Demand≥ 40kw	500.00 per month

FLAT STEETLIGHTING SERVICE (FS-8)

	Generation Charge (Per Lamp)	Distribution Charge (Per Lamp)
4,000 Lumens, Mercury fluorescent or equivalent	50 kwh*GC[1]	₱ 45.00
9,000 Lumens, Mercury fluorescent or equivalent	100 kwh*GC[1]	₱ 95.00
16,000 Lumens, Mercury fluorescent or equivalent	150 kwh*GC[1]	₱ 115.00

Note : Generation Charge Clause

A. **Subsidized consumption**

Subsidized consumption shall be charged a generation charge per kwh equal to:

$$\text{Generation Charge for Subsidized consumption for Billing Month} = \text{50\% of Purchased Power Cost Per KWH for Supply Month} \times \frac{1}{(1 - \text{Franchise Tax Rate})}$$

Where:

Purchased power cost per kwh for Supply Month = Total Cost of electricity purchased during a supply month from the National Power Corporation (NPC) and all other suppliers divided by total KWHs purchased.

B. **Subsidizing consumption**

Subsidizing consumption shall be charged a generation charge per kwh equal to:

$$\text{Generation Charge for Subsidizing consumption for Billing Month} = \frac{\text{Net Cost of Electricity Purchased during Supply Month}}{\text{Subsidizing KWH}} \times \frac{1}{(1 - \text{Franchise Tax Rate})}$$

Where:

Net Cost of Electricity Purchased = Purchased power cost per kwh for supply month multiplied by the total kwh sales, adjusted for 15% system loss and company use and deducting from this amount the portion of this cost paid for by the subsidized kwh consumption through their generation charge.

Subsidizing Consumption = Total kwh sales less subsidized. kwh consumption.

The generation Charge Clause - allows MERALCO to pass on to customers increase or decrease in the cost of power purchased from National Power Corporation and other source.

The Currency Exchange Rate Adjustment - covers increase or decrease on operation and maintenance expenses due to changes in the exchange rate between the Philippine Peso and the U.S. dollar.

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POWER and ENERGY

FIGURES

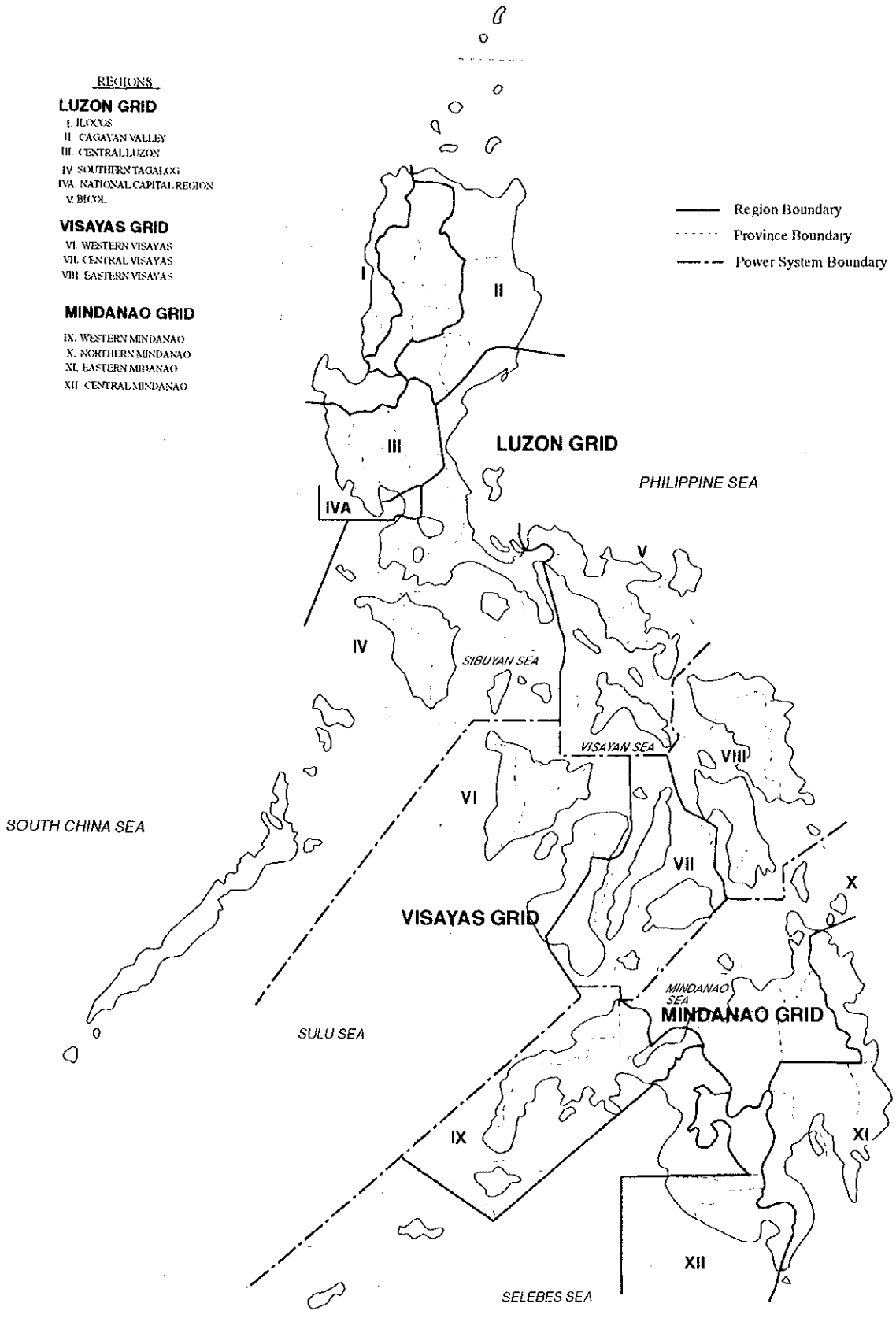


Figure 3.1
Regional Boundary of NPC Grid

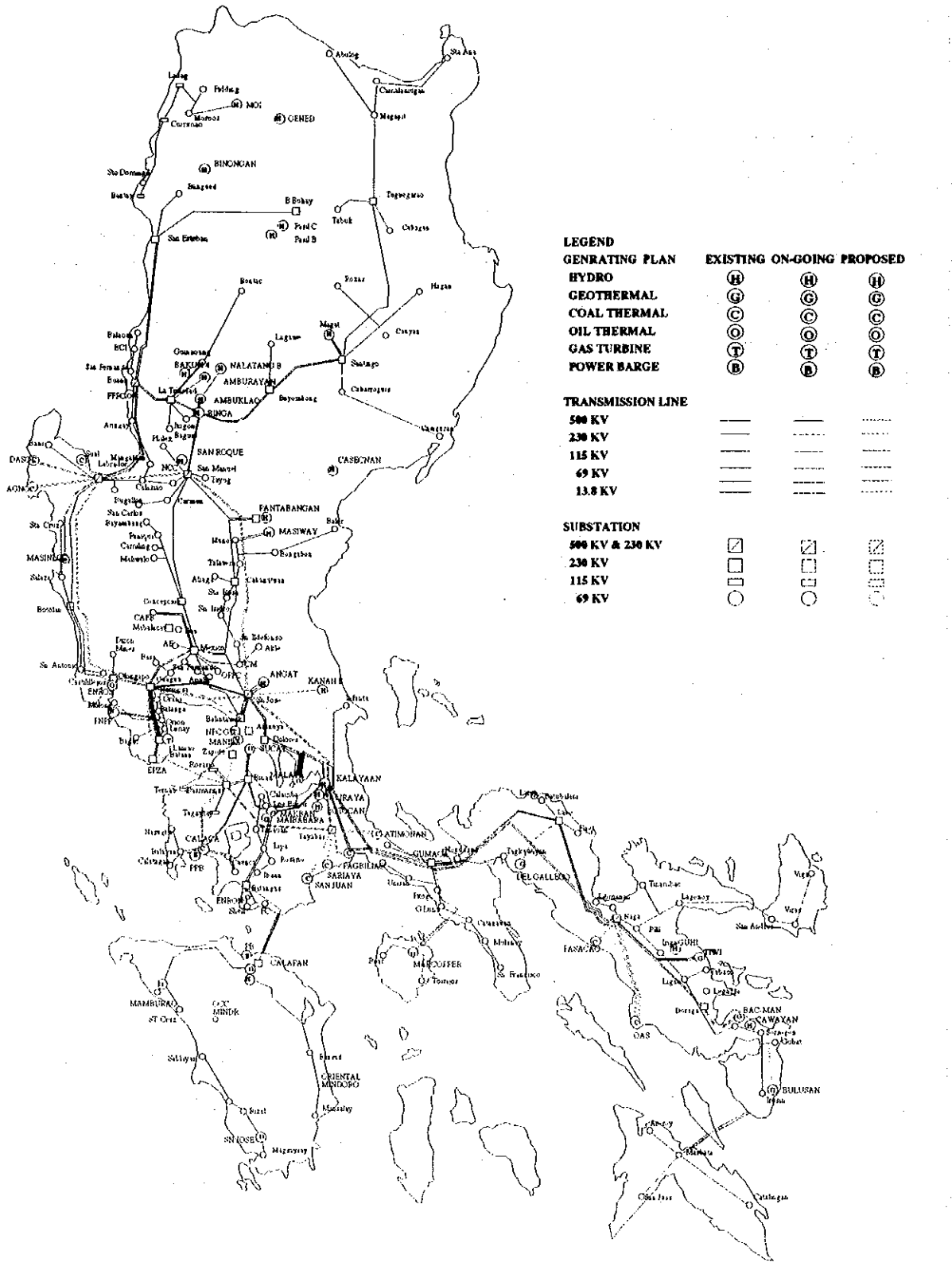
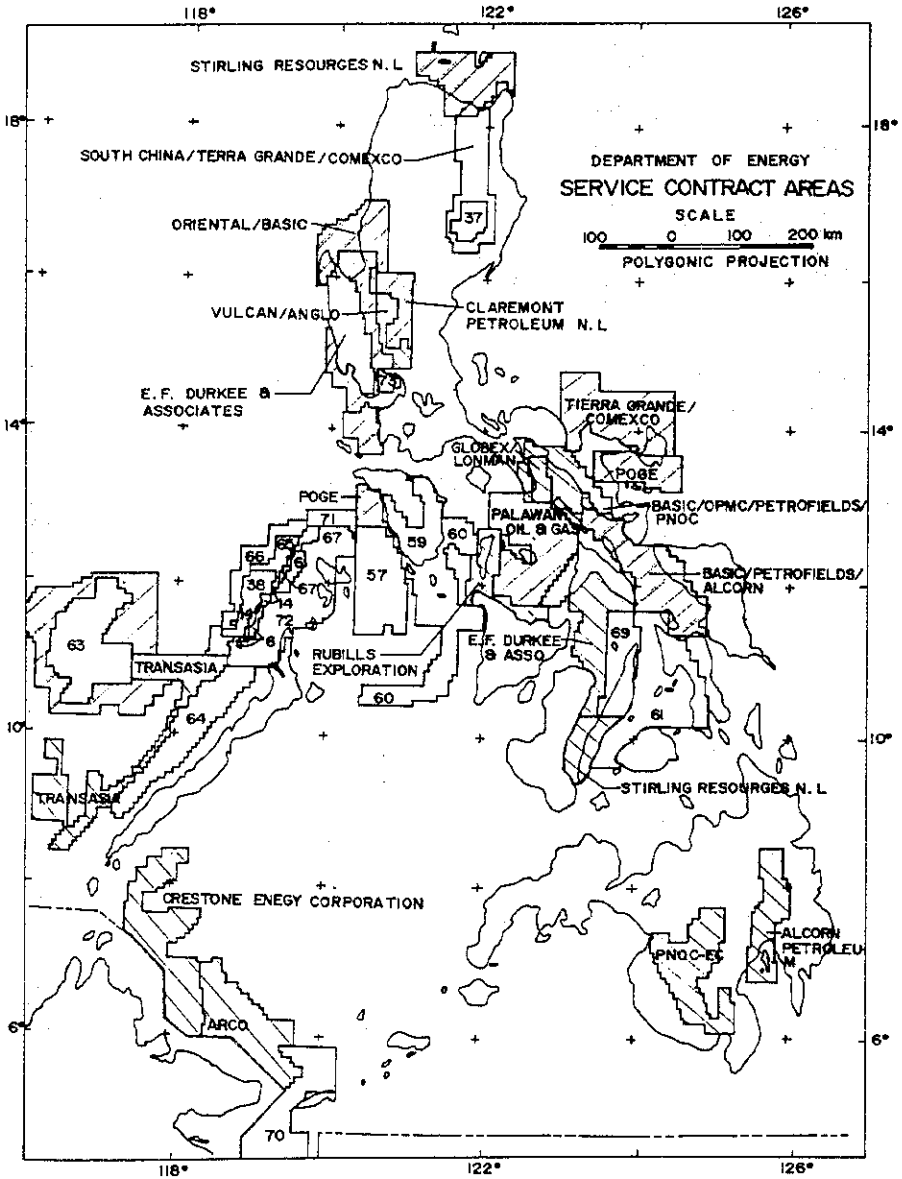


Figure 3.2
Power System Network of Luzon Grid



SERVICE CONTRACTS

6	PHILODRILL – NW Palawan
14	ALCORN – NW Palawan
37	PNOC – EC – Cagayan
38	SHELL / OCCIDENTAL – NW Palawan

EXCLUSIVE GEOPHYSICAL CONTRACTS

57	KIRKLAND – East Busuanga
59	PNOC-EC/ANDERMAN-SMITH/PHILODRILL – Mindoro
60	KR (Far East) ltd. – Offshore Mindoro
61	AMPOLEX – East Visayan Sea
73	COPLEX/E.F. DURKEE/PETROFIELDS-Manila Bay
63	KIRKLAND – Reed Bank
64	TRANSASIA – Southwest Palawan
65	OCCIDENTAL PETROLEUM – West Culion
66	PHILODRILL – NW Malampya
67	OCCIDENTAL PETROLEUM Alava Area
68	COPLEX – North Cebu
70	PHILODRILL – Sibutu
71	SOUTH CHINA – North Calamian
72	FLETCHER CHALLENGE – NW Palawan

GSEC UNDER APPLICATION

GEOPHYSICAL PERMITS

Figure 3.3

Geological Location and Contract of Oil Field

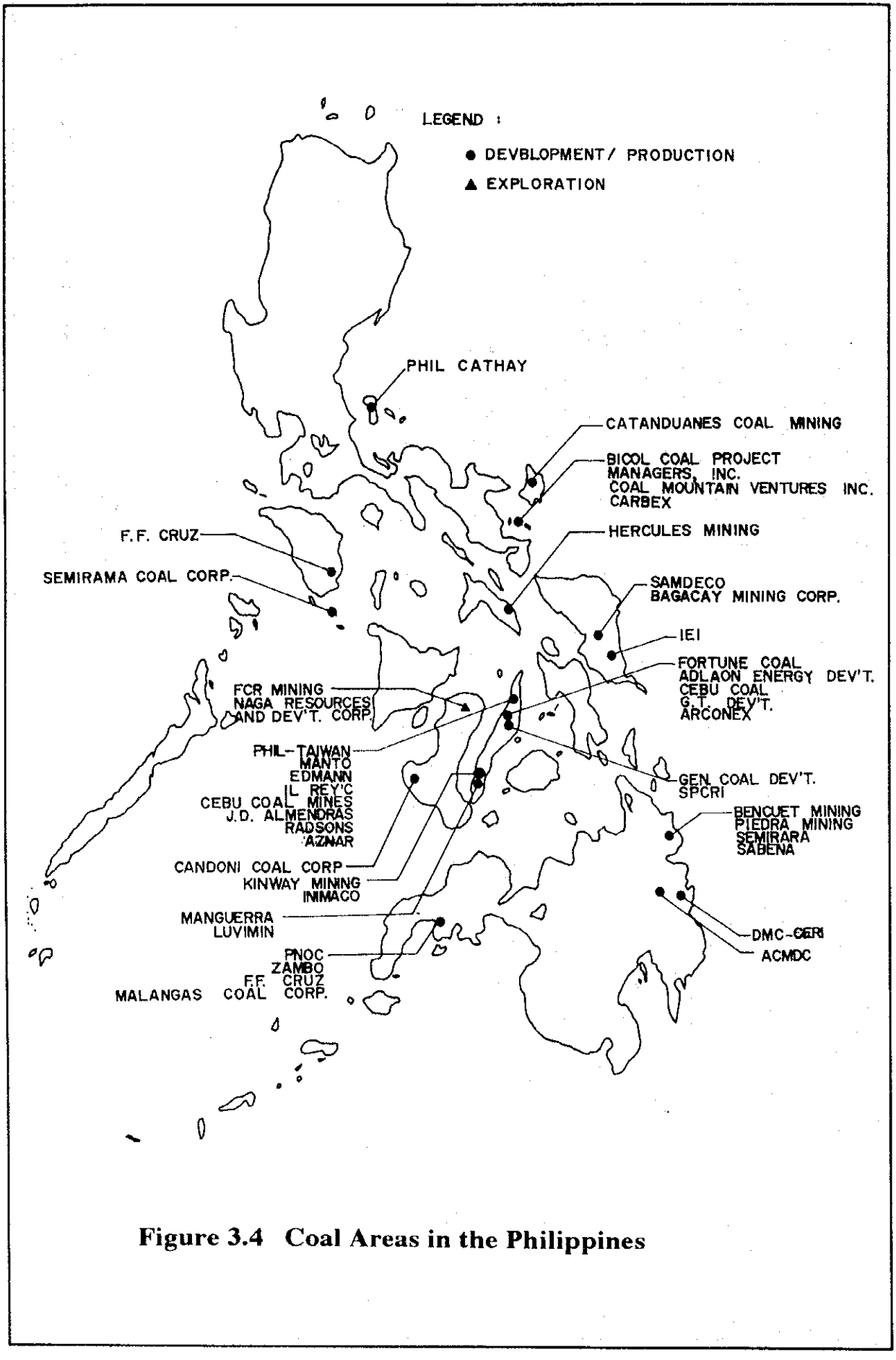


Figure 3.4 Coal Areas in the Philippines

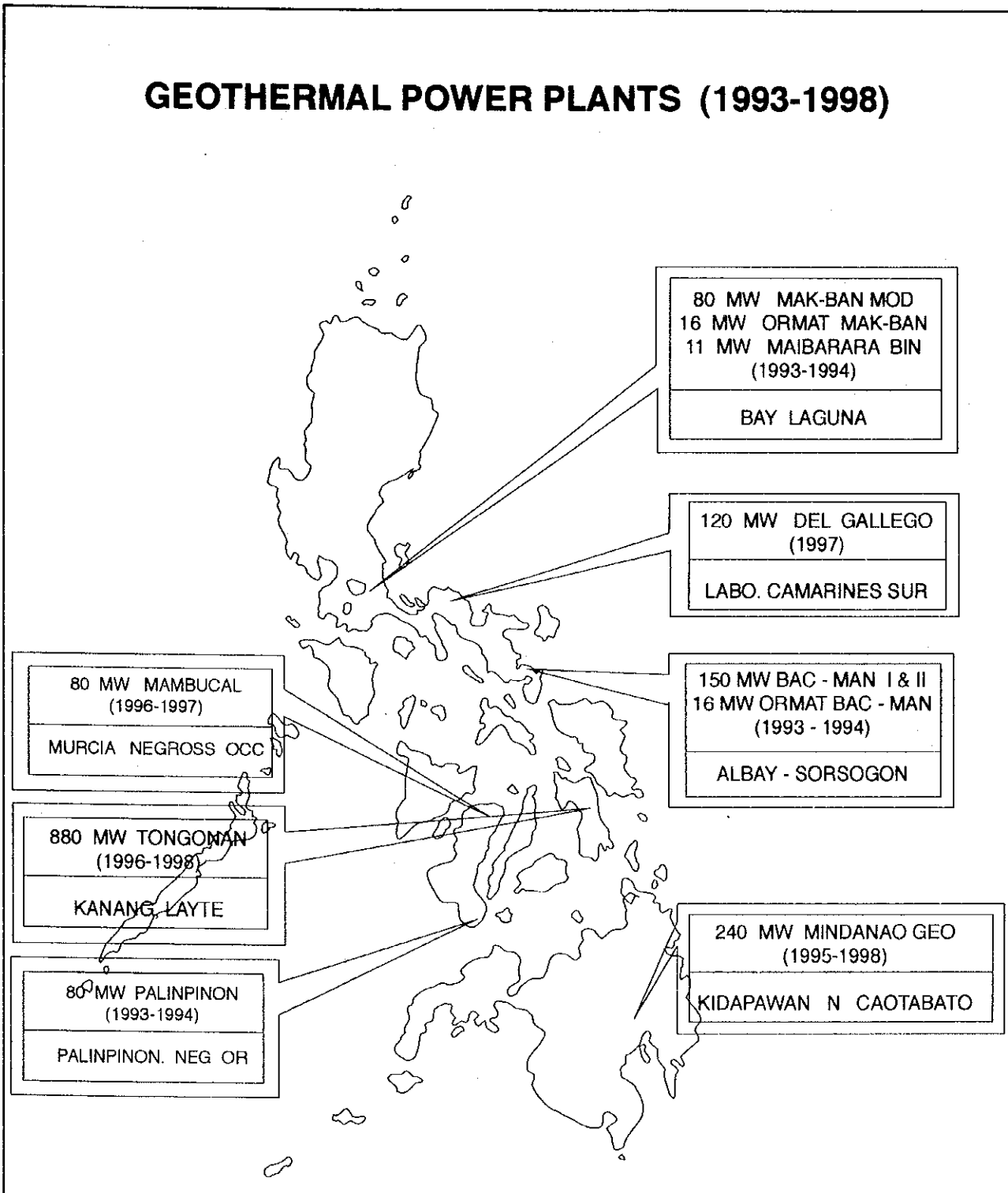


Figure 3.5 Geothermal Power Plants

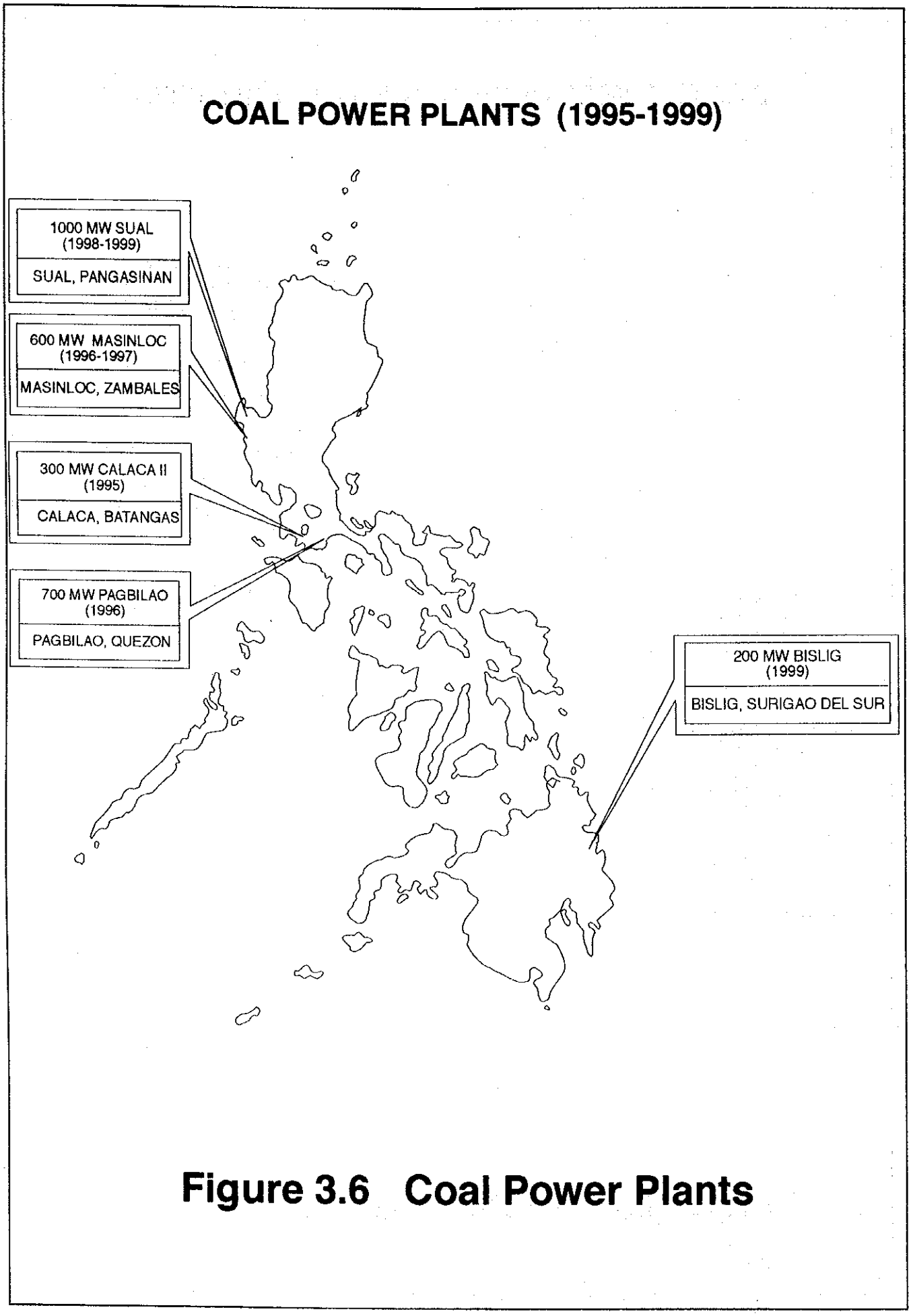


Figure 3.6 Coal Power Plants

HYDRO POWER PLANTS (1999-2005)

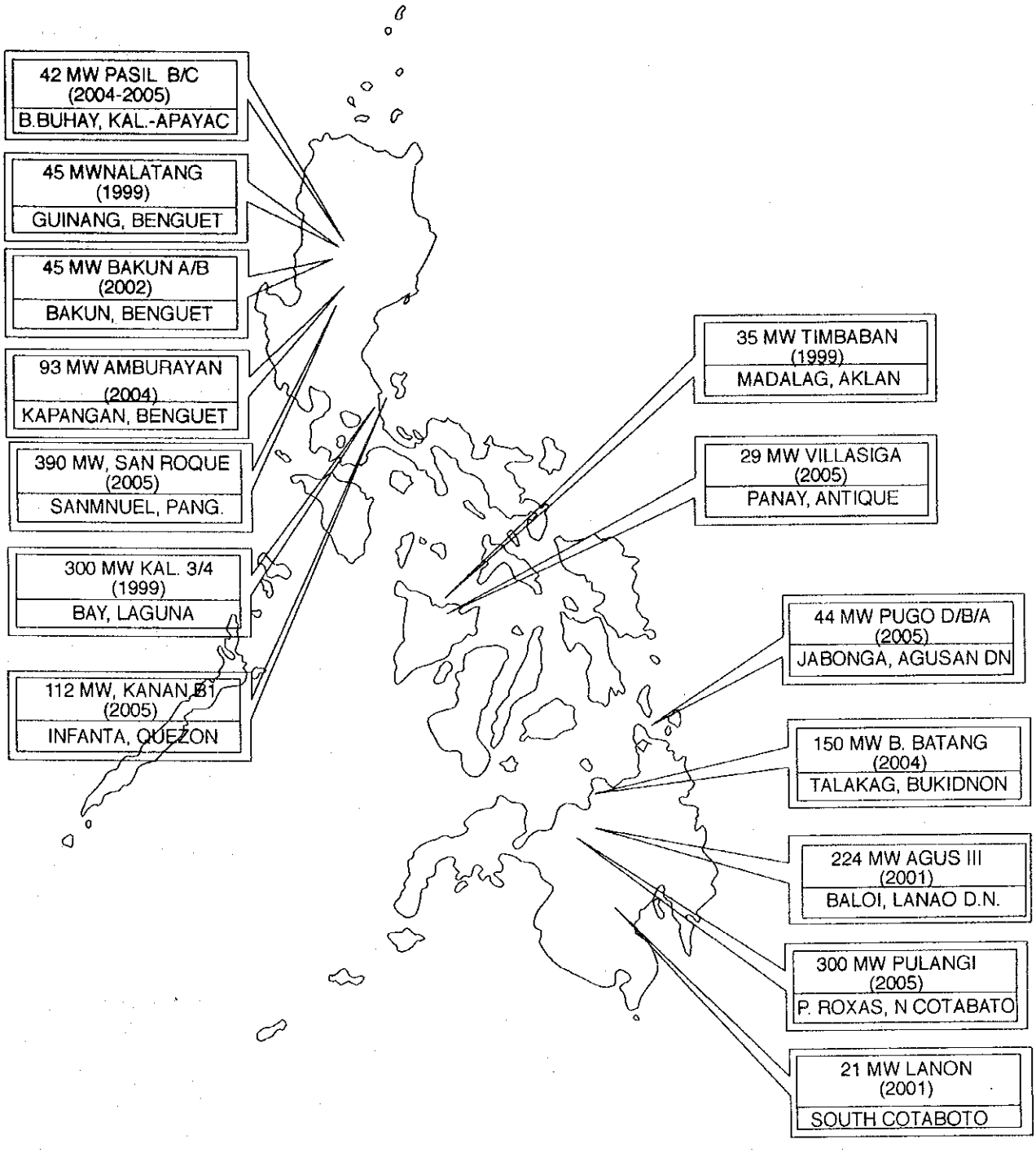
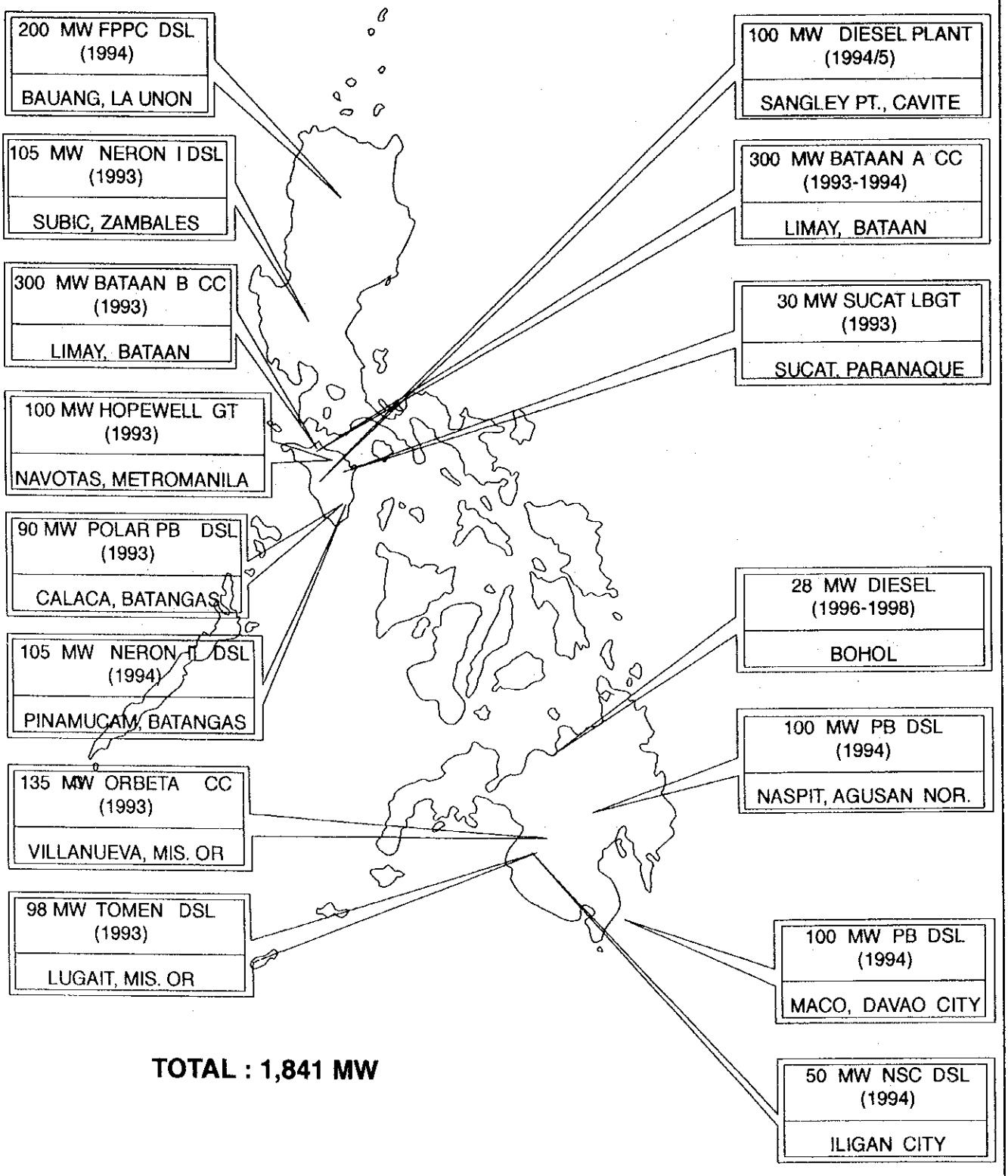


Figure 3.7 Hydro Power Plants

OIL POWER PLANTS (1993-1998)



TOTAL : 1,841 MW

Figure 3.8 Oil Power Plants

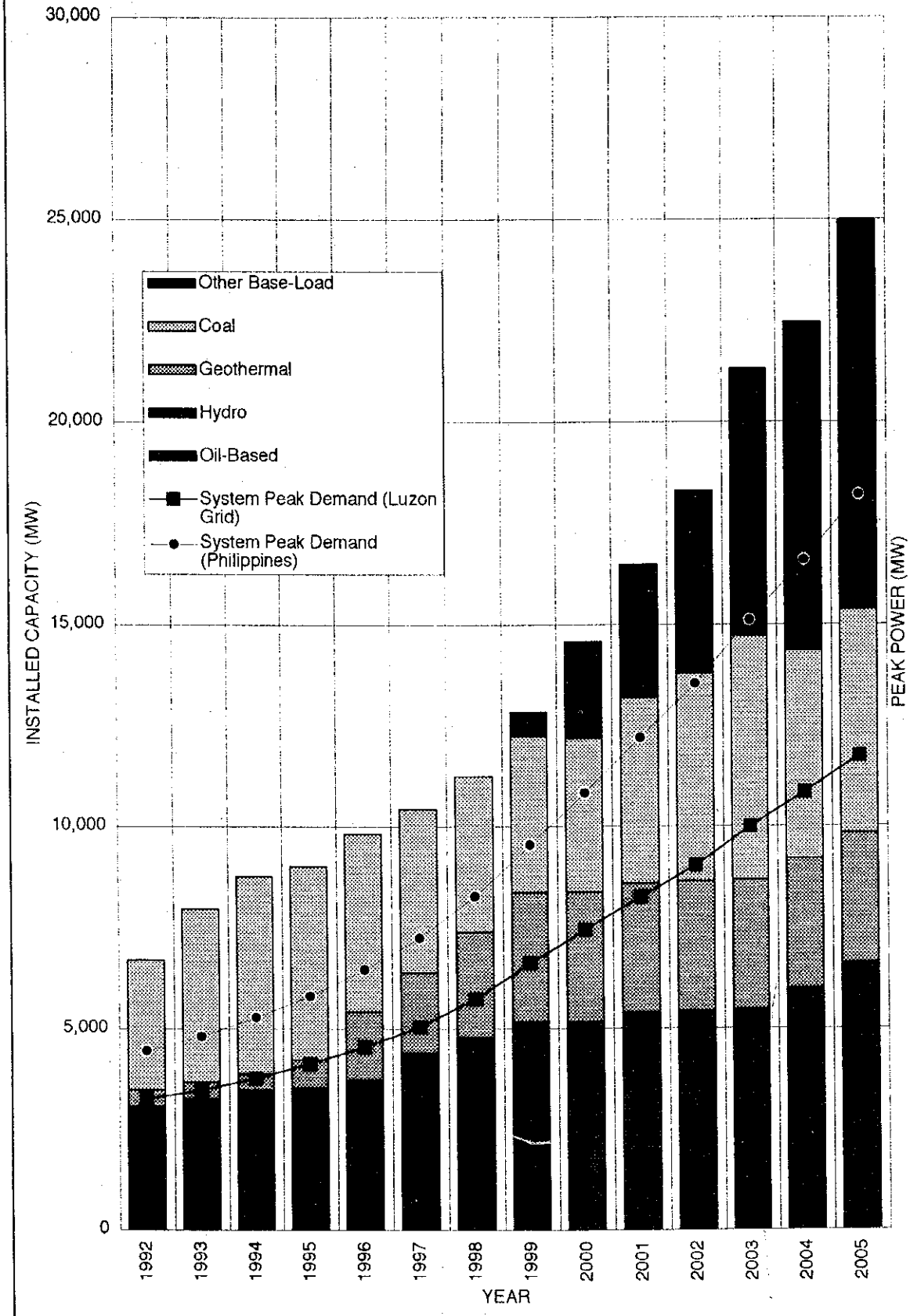


Figure 3.9 Peak Power Demand vs. Installed Capacity

Figure 3.10
Franchise Area of Cooperatives/Utilities

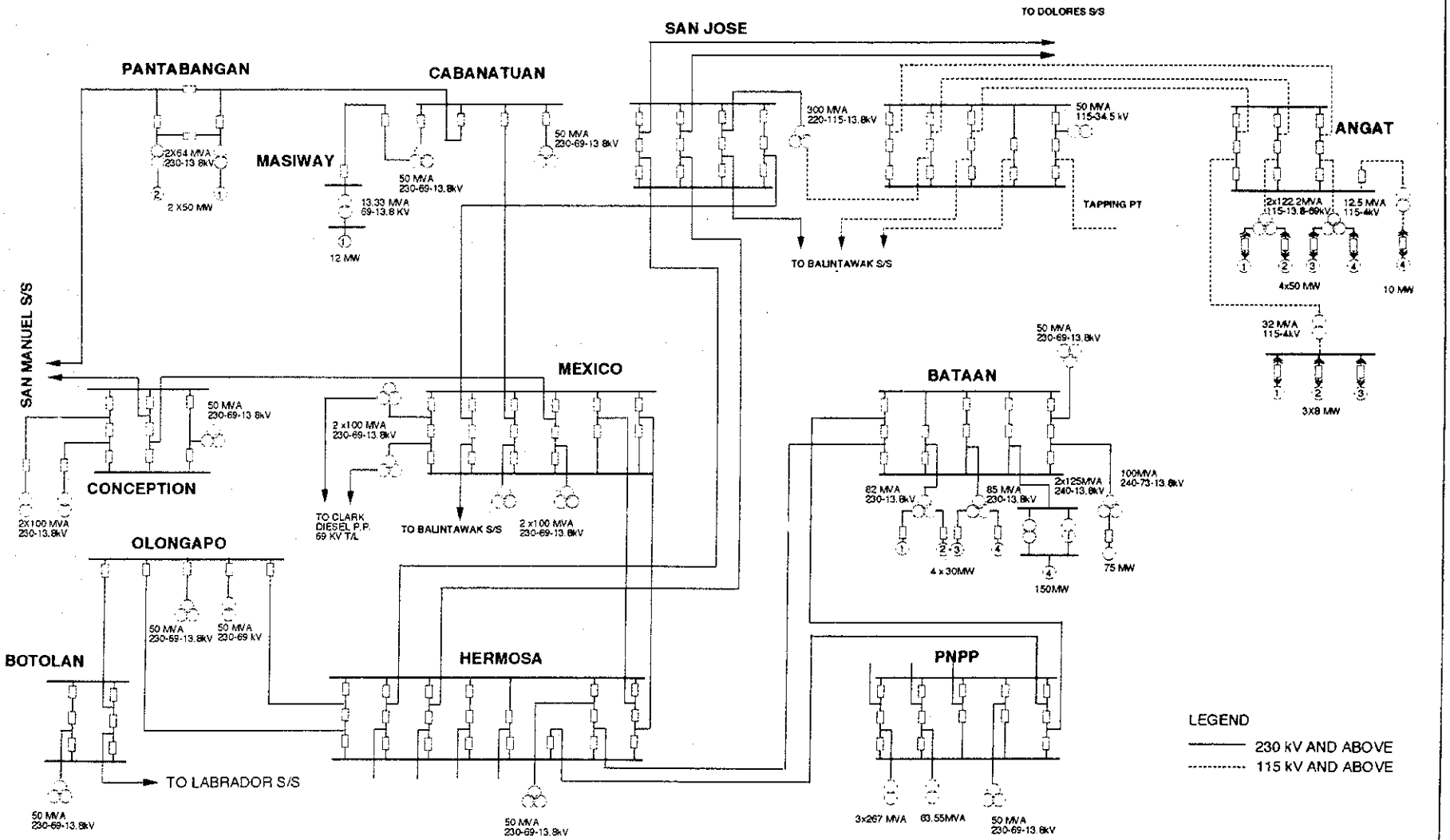


Figure 3.11
Single Line Diagram of Power Supply System in Cenetral Luzon (1992)

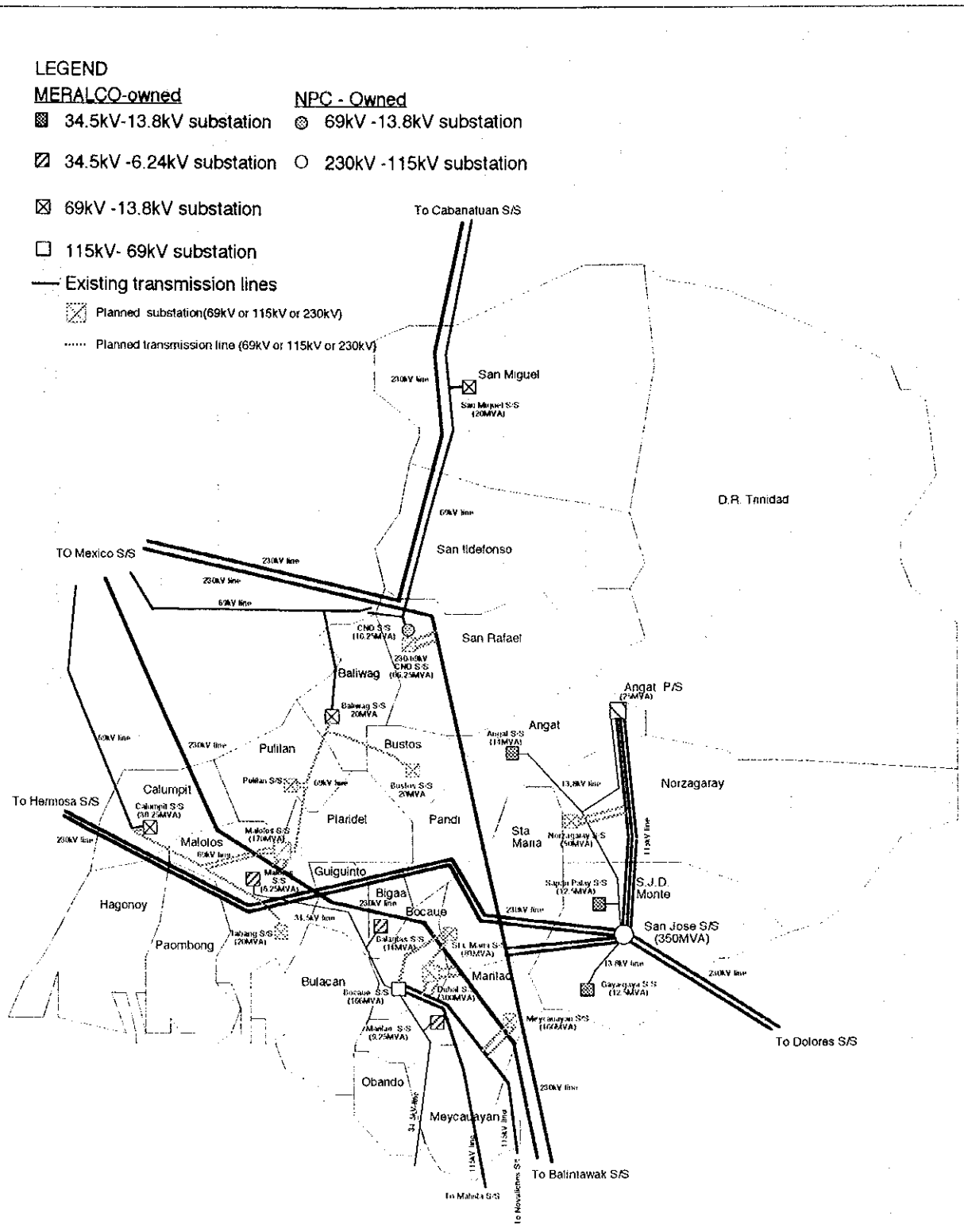
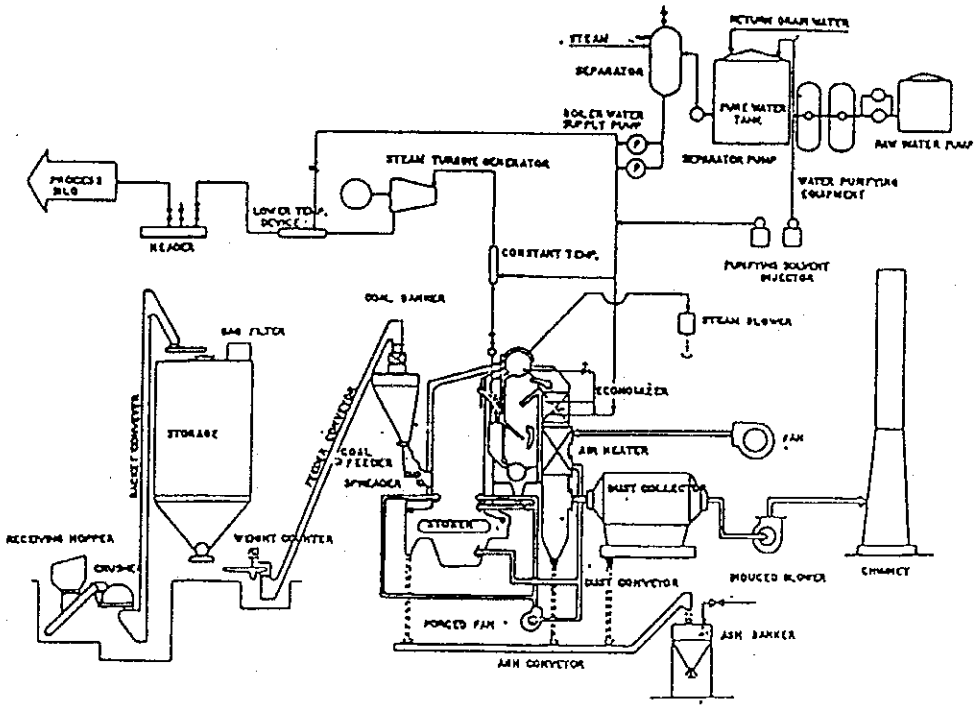
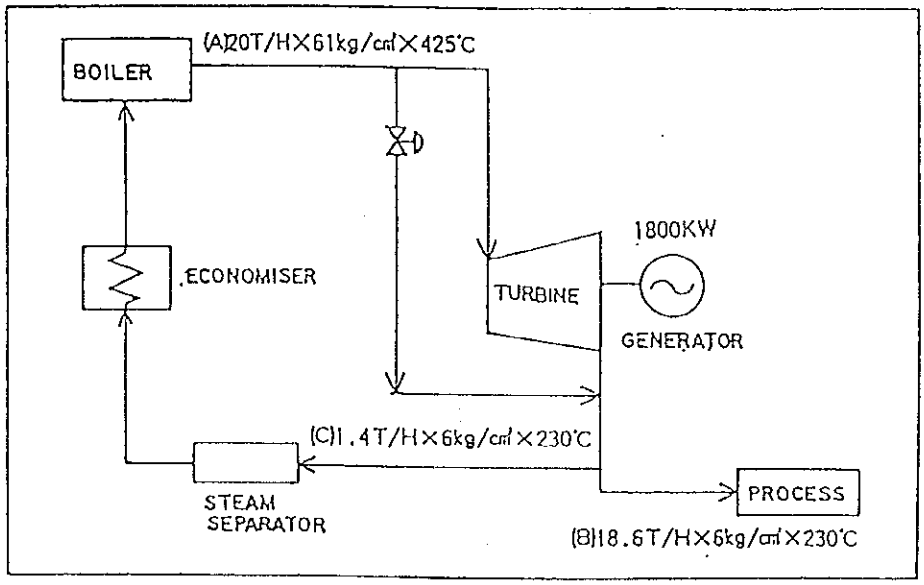


Figure 3.12
Development Plan of MERALCO System in Bulacan



OUTLINE OF POWER GENERATING SYSTEM
(EXAMPLE FOR STEAM & POWER SUPPLY BY COAL BURNING)



ENERGY FLOW

Figure 3.13 Outline of Generating System and Energy Flow

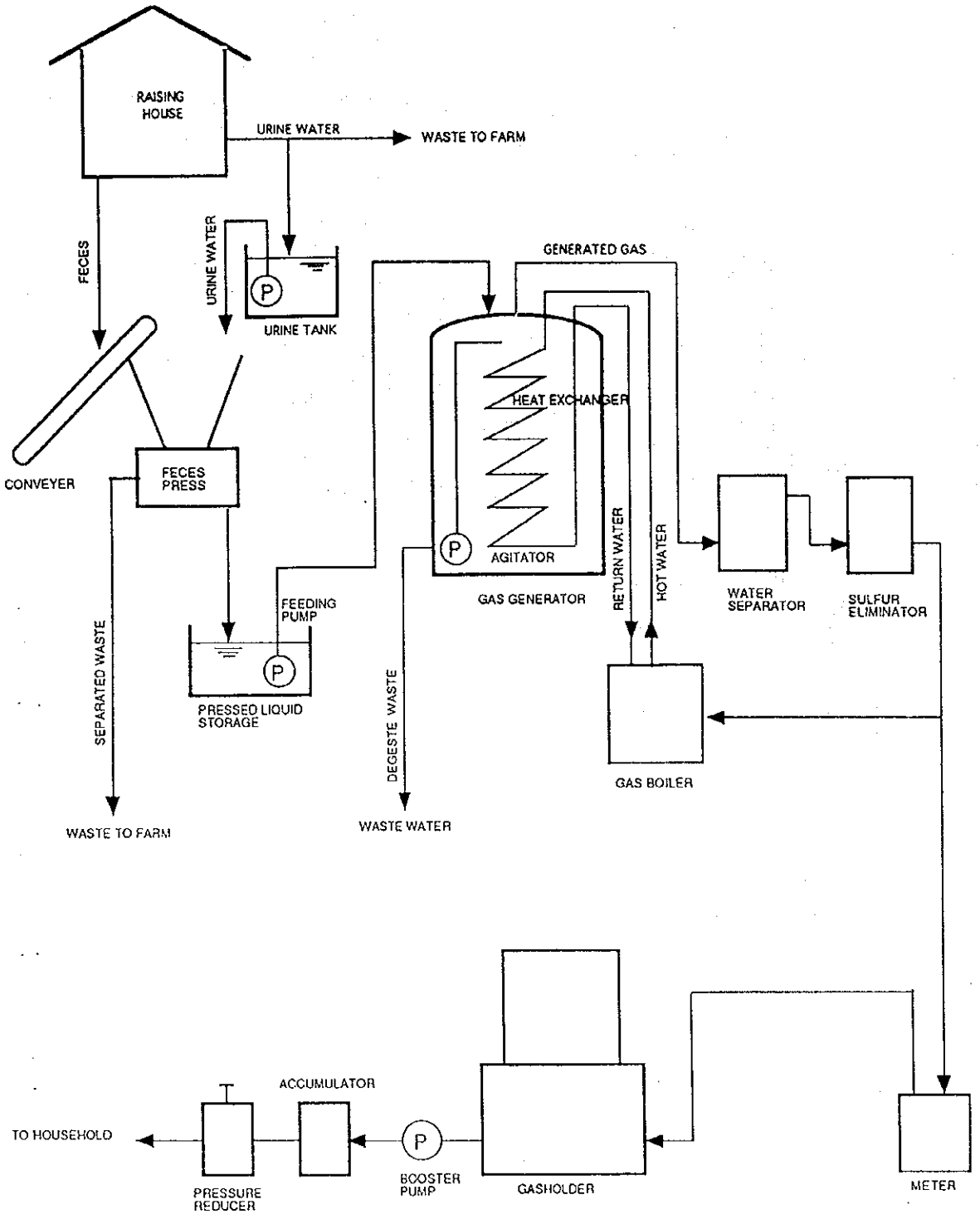


Figure 3.14 Biogas Generating System

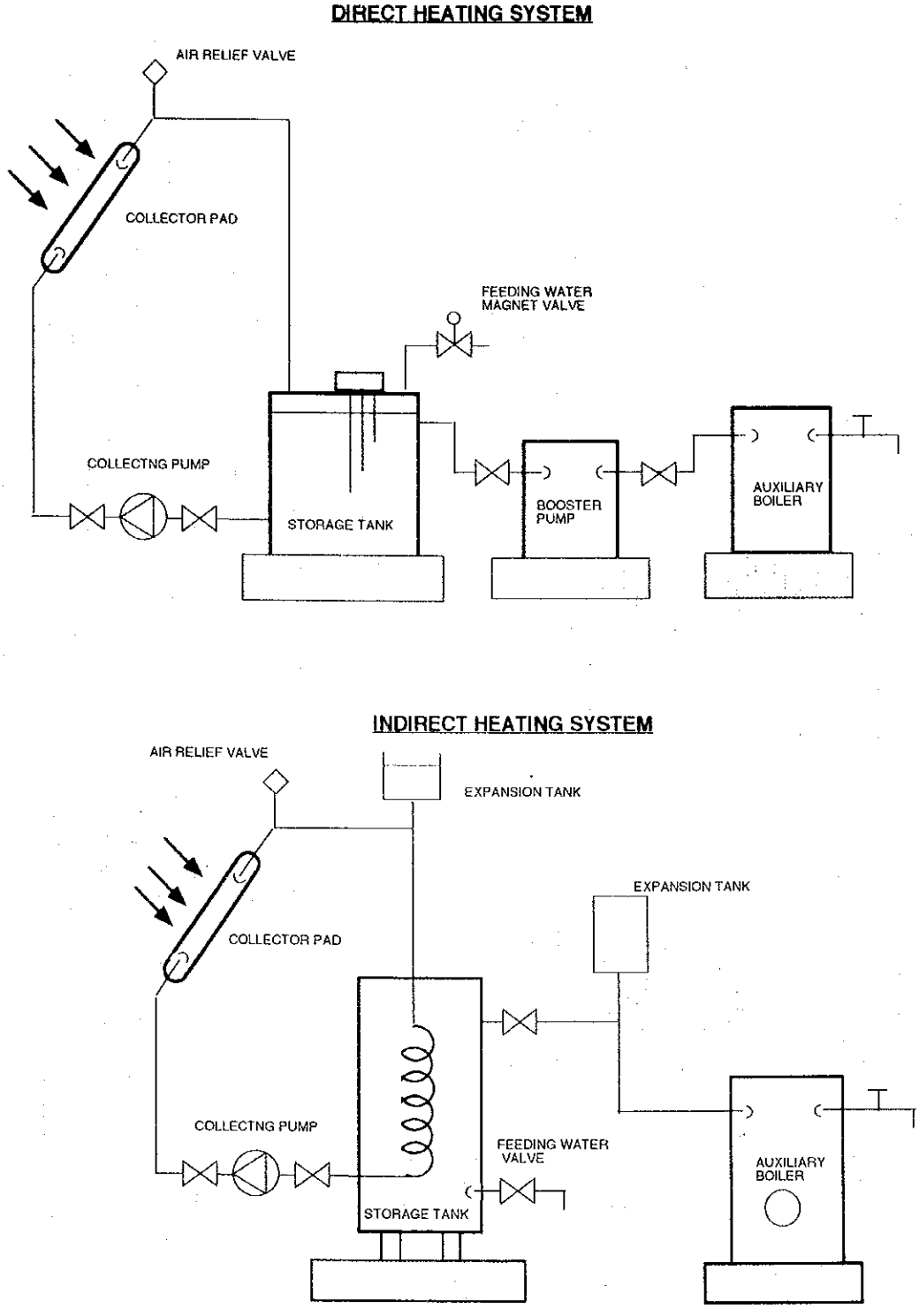


Figure 3.15
Solar Water Heating System

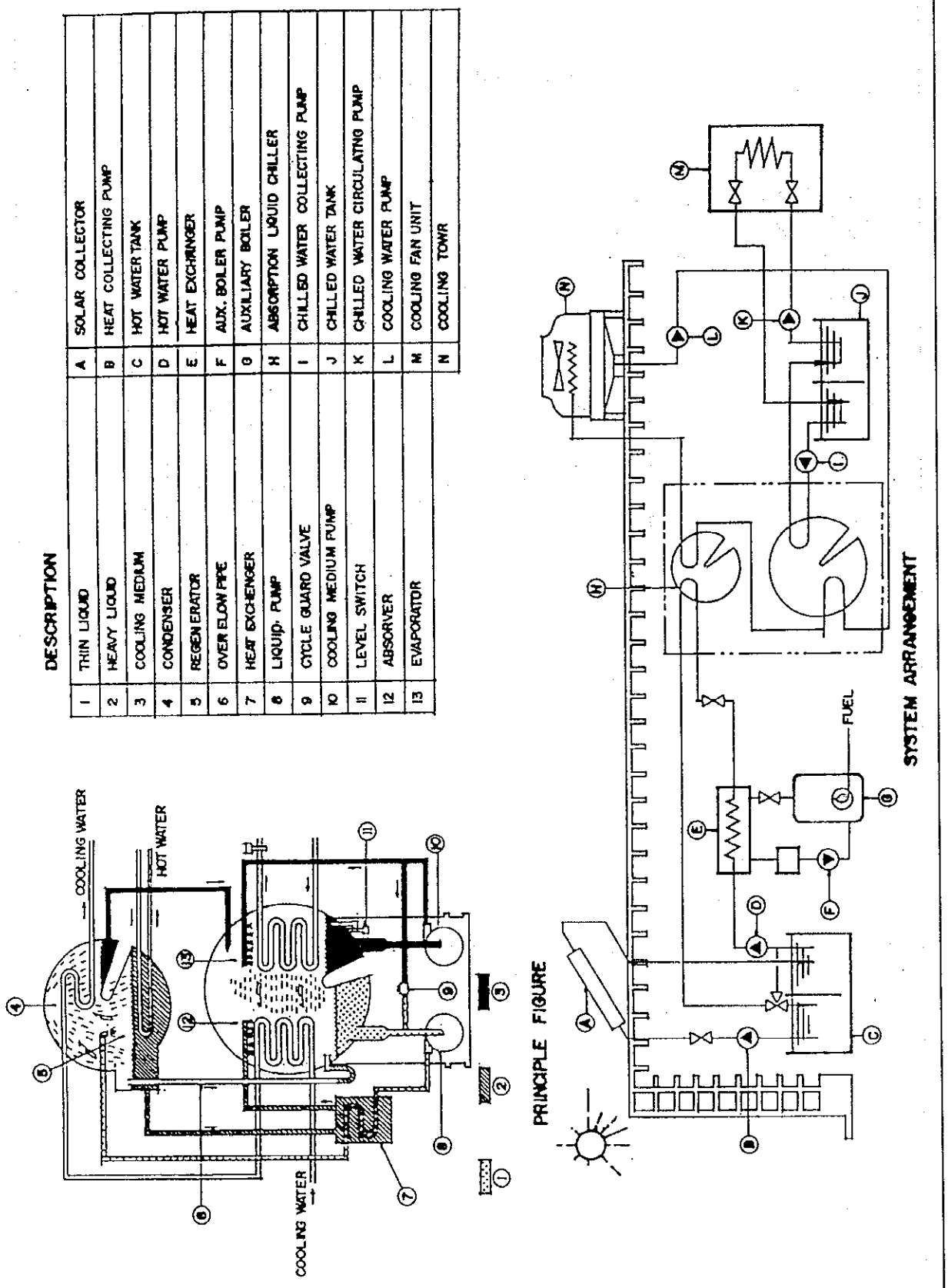


Figure 3.16 Solar Heat Absorption Liquid Chiller System

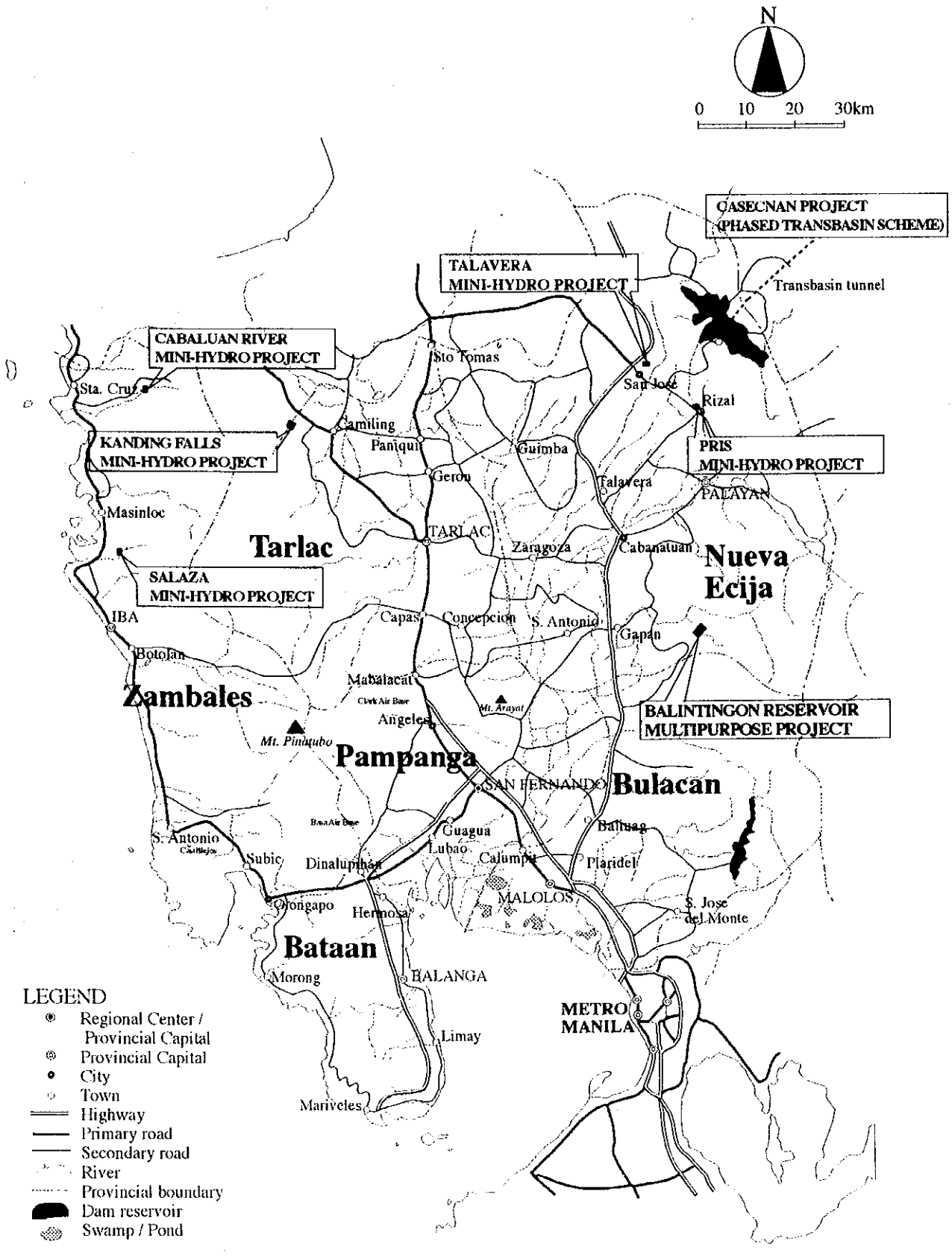


Figure 3.17
Location Map of Hydropower Projects

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Infrastructure

TELECOMMUNICATIONS

4. TELECOMMUNICATIONS

4.1 Present Conditions of Telecommunications in the Philippines

4.1.1 Telecommunication policies and government institutions

(1) National goals for telecommunications

The importance of telecommunications in social and economic development of the Philippines has been recognized by the Government especially since mid 1980's. Under the Philippine Development Plan, the telecommunications sector aims in general at more extensive communication network coverage, higher telephone density and the adoption, where appropriate, of new telecommunications technology, all to serve a wide range of people's needs in urban and rural areas.

The Department of Transportation and Communications (DOTC), in cooperation with other government agencies and the private sector, prepared the National Telecommunications Development Plan (NTDP) 1991-2010, issued in 1987 and revised in 1993. The NTDP envisions that by the year 2000 the Philippine telecommunications sector will be characterized by:

- more vigorous development through intensified private sector participation,
- more proactive industry that anticipates users' needs,
- healthier competitive environment,
- more widespread access to basic telecommunications services, and
- integrated and fully interconnected public telecommunications network with facilities satisfying prescribed national standards.

(2) Present policies for telecommunications

The Government encourages the maximum participation of the private sector by promoting an environment conducive to growth and development of the telecommunication sector through healthy competition. The Government continues to privatize government telecommunications assets and operations. Main roles of the Government are policy formulation, regulation and supports to the private sector.

The Government continues to seek improvements in the regulatory system to make it simpler yet more effective. The National Telecommunications Commission (NTC) ensures that

companies providing telecommunications services meet performance, technical and efficiency standards. NTC imposes sanctions on operators that fail to comply with such standards. NTC also institutes more efficient regulatory practices and procedures to ensure that proceedings are fair and expeditious.

The Government initiates or facilitates official development assistance (ODA) funded projects to be implemented by private or public operators. The Government may enter into appropriate arrangements for a private sector group to operate government-owned facilities to encourage private sector participation, while ensuring that the public interest is protected.

The Government continues to work toward the evolution of a national, integrated and interconnected telecommunications system which meets both national and international needs. It ensures that interconnection agreements will allow costs associated with local access to be adequately covered as well as timely implementation of the interconnection to be realized. Such interconnection arrangements apply also to cellular mobile telephone services, value-added network services and other emerging technologies as well.

The Government encourages mergers of small carriers when demand in their service areas is relatively small to ensure profitable operation by more than one firm. It also makes efforts to prevent unnecessary duplication of facilities and services.

The Government liberalizes any telecommunication services when this is considered to be in the public interest. It is noted that cellular mobile communications, record carrier services, radio paging and other radio-based services are already competitive, although the rates charged are still subject to NTC approval. The provision of customer premises equipment is now subject only to type approval.

(3) Government agencies for telecommunications

DOTC prepares policies for the telecommunications sector within the general framework for the national economic and development policies of the Government formulated by the National Economic Development Authority (NEDA). The Department of Trade and Industry (DTI)-Board of Investments (BOI) provides policy guidelines for any investments including telecommunications-related ones. NTC is the regulatory arm with quasi-judicial powers and the Telecommunications Office is the operating arm, both under DOTC. The Municipal Telephone Project Office, also under DOTC, implements the Government's municipal telephone programs.

The Congress and local governments are empowered to enfranchise private carriers, while NTC grants specific authorities to them. Also, broadcast franchises and frequency assignments are issued by NTC. The structure of the telecommunications sector is illustrated in Figure 4.1.

4.1.2 Present telecommunications services and facilities

(1) Telephone services

As of 1993, the telephone density in the Philippines stands at 1.40 main lines per 100 inhabitants. This may be compared to 62.5 in Hongkong, 52.6 in Japan, 45.5 in Singapore, 41.7 in Taiwan, 11.4 in Malaysia, 3.2 in Thailand, 0.7 in Indonesia and 0.2 in Vietnam. The density varies widely among regions ranging from 7.58 in National Capital Region (NCR) to 0.23 in Region II and Region VI (Table 4.1). The average density in Central Luzon is 0.70. Pampanga has the highest density at 1.42, followed by 0.84 in Tarlac, 0.77 in Zambales, 0.56 in Bataan and Bulacan, and the lowest 0.21 in Nueva Ecija.

Most exchangers are interconnected to the public switched telephone network (PSTN), but interconnection circuits are not sufficient. Authorized public telecommunications carriers are now required to interconnect to the PSTN to create a universally accessible and fully integrated nationwide telecommunications network and thereby encourage greater private sector investment in telecommunications.

Local exchange services

Local carriers include the Philippine Long Distance Telephone Company (PLDT), government carriers (local governments and Telecommunications Office (TELOF)), and small private carriers. More than 90% of main stations are operated by PLDT.

Long-distance services

National long-distance services are operated primarily by PLDT, which owns and operates an extensive nationwide backbone transmission network. Other carriers like Philippine Telegraph & Telephone Corporation (PT&T), Radio Communications of the Philippines, Inc. (RCPI), and Digital Telecommunications Philippines, Inc. (Digitel) operate public long-distance telephone calling booths in various parts of the Country, competing with enfranchised local operators. Eastern Telecommunications Philippines, Inc. (ETPI), and Philippine Global Communications, Inc. (PhilCom) have started international switching centers in the Philippines. ETPI and PhilCom, both international record carriers, hold and maintain telephone correspondence agreements with a number of countries and operate their own facilities.

The PSTN is being used to carry non-voice services such as facsimile and switched data. Dial-up data service is connected in the same way and access to packet-switched data networks is often accomplished via dial-up facilities. Private lines carrying voice, telegraph and data services are available using the PSTN and record carrier infrastructure.

Public mobile telephone and radio services

Cellular mobile telephone services are provided by Filipino Telephone Corporation (Piltel) and Express Telecommunications Company, Inc. (Extelcom) with a nationwide coverage. Public mobile radio communications services are provided by using public repeater networks or trunk repeater networks. Since carriers prefer to use the trunk repeater network system for its technical and economic advantages, NTC has given provisional authority (PA) to five carriers to operate trunk repeater networks. The market for the provision of radio paging services has now been provided by several radio paging service operators.

(2) Record carrier services

Domestic record services

Three domestic record carriers remain in the market after business selection. PT&T operations concentrate mainly in major urban centers and carry the largest volume of telex. RCPI operates extensively in rural areas, but also operates in some areas served by PT&T and TELOF. RCPI carries the biggest volume of telegraph traffic and TELOF provides telegraph service on a nationwide basis specially in areas not served by private firms.

A significant drop in traffic volume for telex and telegraph services has been noted. The drop in traffic volume can be attributed to the market's preference for facsimile services. The domestic record carriers operate under an environment of regulated competition. However, as there is little or no interconnection among the domestic record carriers, subscribers are forced to subscribe to two or more terminals if they wish to reach a wide range of businesses.

International record services

Four international record carriers - Capwire, ETPI, Globe Telecom and PhilCom - provide international data and record services and operate their own telex switching exchanges. All international record carriers allow interconnection with the domestic record carriers.

(3) Satellite services

Philippine Communications Satellite Corporation (Philcomsat) is an exclusive provider of international satellite services. Domestic Satellite Philippine Corporation(Domsat) offered only domestic satellite services until 1989. At that time Domsat was heavily indebted and unable to meet demands for additional service. Since then NTC has granted provisional authorities to Liberty Broadcasting Network Inc., Clavecilla Radio Systems Corporation, International Communications Corporation, Capital Wireless Inc., and PLDT to provide either Very Small Aperture Terminal (VSAT) services or carrier's carrier type services.

4.1.3 Current policy issues in telecommunications sector

Major problems of the telecommunication sector are inadequate access to telephone services, unbalanced urban-rural distribution, large unmet demand and poor quality of services. These are discussed below together with the privatization issue.

Inadequate access

Interconnection of facilities of telecommunications carriers to the PSTN is essential for integration of telecommunications networks and universal access. Most of local telephone exchanges are now interconnected with the toll exchanges, but circuits are insufficient for long distance and other services.

Urban-rural imbalance

Infrastructure development has been mostly concentrated in urban areas where operation is more profitable, as there is no rural service obligation of existing operators. Generally poor financial performance of small telephone companies does not allow service expansion into less lucrative areas without inter-sector cross subsidies. Over half of the revenues of the sector comes from international telephone services, and the growth in profits of the sector has been largely due to PLDT and larger international record carriers. A redistribution through more equitable toll revenue sharing and more compensatory local rates for rural carriers would be necessary.

Poor quality of services

Large unmet demand and poor service quality are due to inadequate infrastructure. This in turn is attributed to insufficient investment for expansion and upgrading of telecommunication facilities constrained by the financial performance as well as the insufficient interconnection outlined above.

Unsatisfactory privatization

The situations described above call for more active private sector investments and better supports by the Government. At present, the Government-owned systems of TELOF, Regional Telecommunications Development Projects (RTDP), National Telephone Program (NTP) and Municipal Telephone Project Office (MTPO) operate in less profitable areas. The Government's policy is to entrust the operation of public telecommunications throughout the Country to private carriers with TELOF being the interim operator until privatization is completed. The overall policy of privatization will require the change of all systems now operated by TELOF. The RTDP arrangement, Government-owned but operated by a private company, was unsatisfactory because of the absence of a commitment to efficiency on the part of the operator. More viable schemes need to be established.

4.1.4 Private sector constraints to development

The underdeveloped state of telecommunications in the Country is greatly amplified in telephone services. However, the recent liberalization of telecommunications has opened new avenues for private sector participation and contributed to the remarkable improvement in services.

With respect to the sector's investment environment, government's efforts in the form of executive orders and laws enacted by the Congress, collaboratively catered to the creation of a fair, healthy and competitive "playing field". As a result, eight operators were granted temporary operating authority to provide telecommunications service to the eleven service areas pre-determined by DOTC within a 5-year period. With this approach, development shall be balanced, without causing any undue bias to specific environments such as urban centers, to which current telecommunications infrastructure and investments are heavily concentrated.

Prior to all these, telephone services were provided generally by one major operator with minor support, particularly, in the rural areas by private telephone cooperatives and companies. These private operators have collectively united into an association known as the Philippine Association of Private Telephone Companies (PAPTELCO).

Role of PAPTELCO

PAPTELCO has been in the front-line in providing telephone services in the rural areas, which are usually not as lucrative when compared with the urban centers, in the last 18 years. Its principal objective is to collaborate with government agencies and other entities in the overall development of telecommunications. It has been fundamental in the negotiations and purchase of telephone equipment to upgrade and install additional telephone circuits to meet growing demand in unserved areas and in the formulation of national guidelines with regard to regulations on national facilities and services, determination of tariffs and rates, structures of interconnection, among others. To date, it has 46 member-firms with a coverage area of almost the entire Philippines.

Capital intensive investments

Despite its 18-year existence, PAPTELCO member-firms have been restrained to meet the growing demands for more telephone and upgraded services. Principally attributed to the lack of viable financing support from established institutions in both the government and the private sector, telephone equipment are highly capital intensive. High financing cost coupled by low return on investments are non-complementary and more often growth and development of telecommunications and public interests are the usual victims.

Highly regulated environment

Notwithstanding the recent rationalization policies such as mandating the private sector to interconnect facilities, cross-subsidization of services and the like, with corresponding penalties

for non-compliance, the sector may be further liberalized. Controlled return on investments of not more than 12% does not provide healthy market operations. Typical market determinants should be allowed to interplay to achieve an equilibrium meeting the demands of the populace and the requirements of the private sector.

Local manufacturing support and technology transfer

The entry of new firms and recent liberalization of the sector to meet local and national demand and requirements in the light of the NIChood vision of the Government creates an unprecedented need for state-of-the-art equipment. Government policies such as the Investment Priorities Plan have promoted the importation of telecommunications equipment through the lifting of import duties and taxes, among others. Foreign telecommunications equipment manufacturers based in the Philippines have benefited from such policies, as well through tax-shelters, foreign remittance allowances, etc. Yet, the burden of foreign currency outflows brought by the liberal import policies hamper the further development of the manufacturing sector. Technology transfer is limited to the equipment models produced locally. Higher technology such as the manufacture of switching systems should be introduced and developed.

Similarly, the existing curricula offered in universities and other technical training institutes do not match with the training and skills requirements of the manufacturers. Retraining of technicians can become an expensive overhead cost for manufacturers and perhaps, limiting the employment capabilities of new graduates. A complementary arrangement between the manufacturers and the academe may rectify this situation.

4.2 Existing Telecommunications Conditions in Central Luzon

4.2.1 Existing telecommunication facilities

Provision of telecommunications services is unbalanced in Central Luzon (Figure 4.2). Major industrial areas such as the Bataan Export Processing Zone, Subic and Clark Base have sufficient telephone lines to meet the demand. Other governmental institutes and facilities such as general hospitals, schools and polices suffer from insufficient telecommunications facilities. Followings are the observations.

Private telephone companies

Several PAPTELCO member companies operate telecommunications business in Central Luzon except Tarlac. As discussed above, the constraints on those smaller telephone companies are shortage of investments and lack of reliability of hardware for instance.

Hospitals

Fifty four government hospitals existed in Central Luzon in 1992. Only one or two trunk telephone lines are installed in each hospital due to their limited budgets rather than the limited

supply capacity. For better service delivery with inter-connections among hospitals, twenty trunk lines and thirty subscribers will be necessary at least for one hospital.

Schools

There are 2,480 public elementary schools in Central Luzon. Typically, at most one telephone line is installed in a school due to limited budgets.

Police offices

The Philippine National Police (PNP) has his own radio communications network. The facilities, however, need to be replaced with a new system. Decreased reliability due to the system deterioration is a major problem.

Telecommunications commission

For the national radio regulatory purpose, the National Telecommunications Commission (NTC) in Central Luzon has a function to monitor illegal transmission of radio wave. Their monitoring equipment, however, are very limited and mostly outdated.

Provincial governments

Some provincial governments have no telephone lines due to both budgetary constraint and insufficient public telephone lines.

Present telephone facilities in Central Luzon are summarized in Table 4.2.

4.2.2 Planned and on-going telecommunications projects

(1) DOTC/TELOF

The National Telephone Program, Phase I, Tranche I-1 Expansion will provide a fully digitized telephone system, data system, digital microwave links and interconnecting facilities with the provision of 14,000 lines in 31 municipalities and expansion in 13 municipalities in Regions III (Central Luzon), IV and V.

A "Project of Regional Telephone Service" (PRTS) is part of the Study on the Improvement and Optimization of Telecommunications Networks (IOTN) sponsored by JICA. This aims at increasing telephone density to 3.8 at least by 1998 from the present 1.4. The project has to be implemented by the private sector, but government initiative for financing arrangements is necessary, including ODA. This project covers primarily unserved provincial areas to provide telephone lines to meet the targets through 1998. According to the supply plan by 1998, as shown below, 631,000 lines are planned to be supplied in provincial areas which are 45% of coverage ratio of municipalities. Of this total, more than half have already been planned and implemented in specific projects including X-5C, X-6, RTDP, NTP, and other PAPTELCO projects. Other unserved areas' supply lines are provided by this project.

Area	Through 1998	Supplied 1998	Tear end total
NCR	600,000	1,185,000	1,785,000
Province	287,000	631,000	918,000
Total	887,000	1,816,000	2,703,000

The project would provide telephone lines in primarily unserved or inadequately served areas. Selection guidelines of project sites are municipalities which are assigned to be served in 1998 and their adjacent area.

The project would establish fully digitized telephone systems, digital microwave/fiber optic cable links and interconnection toll facilities with the provision of 286,200 telephone switching lines to 224 cities and municipalities. The number of local exchange sites and the switching capacity, and the estimated cost are shown below by region.

Project area	Number of Sites	Capacity (lines)
Region II	18	7,000
Region III	**6**	**5,000**
Region IV	25	37,300
Region V	28	11,800
Region VI	26	31,600
Region VII	32	41,400
Region VIII	19	9,300
Region IX	17	15,500
Region X	13	41,100
Region XI	25	69,800
Region XII	15	16,400
Total	224	286,200

Project area	Total	Forcign	Local (US$ Million)
Region II	22.6	14.5	8.1
Region III	**13.9**	**8.9**	**5.0**
Region IV	120.6	84.1	36.5
Region V	39.1	25.2	13.9
Region VI	77.2	48.9	28.3
Region VII	97.9	62.0	35.9
Region VIII	25.7	16.5	9.2
Region IX	45.7	29.4	16.3
Region X	81.5	51.4	30.1
Region XI	143.1	90.6	52.5
Region XII	43.2	27.4	15.8
Total	710.5	458.9	251.6

(2) PLDT

The Zero Backlog Program is a fast-track expansion program aiming to wipe out the Country's telephone backlog by 1996 estimated at 800,000 telephone lines nationwide. The X-6 Program will continue the digitalization thrust of the network, ushering in the ISDN, the provision of Value-Added Network Services (VANS), public digital paging services, and videoconferencing.

(3) DIGITEL

DIGITEL is one of the participants in the Government's Municipal Telephone Project, and assigned to install and maintain public calling offices (PCOs) in Bulacan, Pampanga, Zambales and Bataan. DIGITEL operates now 26 PCOs in five provinces: 10 in Bulacan, nine in Pampanga, three in Zambales, three in Bataan and one in Baguio City. A full range of domestic and international direct dial telephone, facsimile and international telex services are provided in each PCO. DIGITEL has been given also provisional authority for Angeles City.

(4) RCPI

RCPI maintains the widest selection of communication services such as long distance telephone, facsimile, Phone Plus, Message Plus, private networks, integrated toll network, and value-added services. Its five year expansion program through 1995 will cover the construction of a hybrid fiber optic and digital microwave backbone facility.

(5) PAPTELCO

In line with the NTDP, PAPTELCO has formulated a expansion plan for the target year 1996. The plan is to expand network coverage to serve 649 municipalities from a level of 238 municipalities and to increase the percentage of population served to 63.4% from 44.5%. This means 1,350,954 lines are added by 1996.

(6) Facilities at Subic

Telephone facilities in Subic are presently being served by PLDT and Piltel. There will be a joint venture between a private firm and Subic Telecommunications with the Subic Bay Metropolitan Authority (SBMA) as the regulatory body. The facilities will include two switches, one international gateway and one local gateway. The kind of services will be touch-tone dialing and switch, phone cards and high level of (a) clarity, (b) "service-level" wherein out of 100 dials only 1 will get a busy tone, and (c) phone company service which will compose of service connection, repair service and billing.

(7) Facilities at Clark

Telecommunications services inside the Clark Special Economic Zone (CSEZ) is being provided by PLDT. PLDT has an existing telecommunication toll exchange facility that is linked through microwave to existing commercial communication satellites for both domestic and overseas communication.

The telecommunication development plan for Clark has two phases: the short-term and the long-term. The short-term phase covers the provision of telecommunication service for a period of four years. Prior to the long-term phase, CDC will bid out the preparation of the Telecommunications Master plan for Clark aiming at the latest state-of-the-art technology. Upgrading and development of the telecommunication facility will be undertaken in the long-term phase. Once upgraded, investors, businessmen and residents will have access to an independent world class telecommunication gateway and facility.

4.3 Telecommunications Development Plan

4.3.1 National telecommunications development frameworks

(1) National Telecommunications Development Plan

For the long term development of the telecommunications sector in the Philippines, the National Telecommunications Development Plan (NTDP) was prepared in 1989. The Plan has established objectives and strategy for further development of the sector, but specific programs and projects have not been formulated in detail. The Plan provides a framework for the telecommunications development in Central Luzon.

Specifically, the Plan has set the following targets:

1) to increase telephone main station density to meet and stimulate demand,

2) to provide local exchange service in all municipalities,

3) to improve telephone service quality nationwide,

4) to improve public data access nodes,

5) to improve maritime communications,

6) to install/extend public call offices (PCOs) in and to all barangays,

7) to install a nationwide coverage of cellular mobile telephone service (CMTS), and

8) to introduce integrated services digital network (ISDN) technology.

Of the eight targets, seven are quantifiable while the remainder seeks to improve service quality of the telephone service. These targets are expected to be attained by the year 2010 as shown below.

National Targets for Telecommunications Development

Target Development	Current Status (%)	Target Status (%)	Target Year	Investment ($, M)
Telephone Main Station	1.4	10	2010	16,151.8
Local Exchange Service	20.6	100	2010	1,017.7
Public Data Network Service				151.5
a) switched	2.5	52	2010	
b) non-switched	12.0	57	2010	
Maritime Communications		100	1999	4.1
Public Calling Office Service	22.0	51	2010	2,786.6
Cellular Mobile Telephone		100	2010	7,859.4
Integrated Services Digital Network Trials	Operational in 1994 (MNL) / 1995 (CEB)			
Total				**26,974.6**

Additionally, projects related to the telecommunication development are expected to generate 159,528 job opportunities for both skilled and unskilled workers.

The NTDP further classifies the sector's development into four major categories: Telephone Projects, Public Data Network Services (PDNS), Projects Public Calling Office (PCO) Projects and Cellular Mobile Telephone System (CMTS) Projects.

Four approaches are adopted in the NTDP: (1) policy-related, (2) technical, (3) financial and (4) others.

Policy-related strategy

Policy-related strategy refers to regulatory matters and the conduct of competition and participation of the private sector and the Government, where applicable. Expanded provision of basic, interconnected and reasonably-priced telephone service to the public is the general objective of the Government. To date, there is an absence of policy obligating the provision of acceptable quality service and the extension of such service beyond the base rate area. Such development is precluded by the lack of investor-friendly incentives in the area of finance, corporate cooperative arrangements and franchising regulations. Simplification of regulations, without any repercussion on the service quality level shall create an environment that would encourage healthy competition among the operators. The Government, to the extent possible shall not participate directly in the extension of telecommunications services.

Thus, all government owned or controlled firms shall have to be immediately privatized. Local manufacturing of telecommunications equipment, supplies and accessories should also be encouraged.

Technical strategy

A fundamental constraint to rural telecommunications development is the lack of financial viability of investment. There are three ways to improve the financial viability: (1) to reduce costs, (2) to raise revenues and (3) to provide subsidies. Investment costs may be lowered through bulk/volume purchases of equipment, competitive procurement and service integration. The Government may facilitate in the canvassing, negotiations with and purchase of suppliers and manufacturers on behalf of small or rural operators to avail of volume discounts.

Effective service integration brings forth economies of scale, thereby minimizing expensive duplication of facilities and equipment. Government subsidies in other forms such as loan guarantees, low interest rates, tax and duty relief and combinations may be considered aside from direct capital contributions.

With respect to existing infrastructure and systems, modernization is paramount for economical and efficient service. Digital equipment shall replace analog systems using the Integrated Services Digital Network (ISDN).

Financial strategy

Government assistance and incentives such as facilitating official development assistance (ODA) and long-term, soft-loan packages from the World Bank, IMF or ADB and other international financing institutions through government financial intermediaries; tax holidays, reduced duties on the importation of capital equipment and reduced import taxes and deduction of net loss carry-over, among others shall facilitate in generation of private sector appreciation and response to the entire telecommunications development program.

Tariff levels and user-charges have to remain at relatively low levels to stimulate the demand. However, in highly urbanized areas, where consumer income propensities are greater, higher installation charges may be introduced including the implementation of the "time-based" toll approach and subsidizing local and/or rural operations with the introduction of higher long-distance and international toll rates.

Other financial strategies would be the modification of return on rate base (RORB) and foreign currency adjustment mechanisms which would allow more reasonable tariff adjustments attributed to the fluctuations of the local currency in the foreign currency market. Tariff structures should be reviewed to evaluate alignment relationship between other

telecommunications services, i.e., telephone service versus telex versus telegraphs and also, in relation with other rates applied in other Asian counties.

Other strategy

The dynamic interplay of Government and the private sector-operators shall be paramount in the overall success of the Plan. Policy formulation shall be the responsibility of the Government while detailed facility planning shall be handled by the private sector. Institutional strengthening through operations streamlining, technical assistance and financial support are required to achieve the goals of the Plan.

The Plan shall generate new and additional technical and non-technical employment. A Telecommunications Training Institute shall be an important training facility to support the additional manpower requirement and to upgrade technology and training of those in the pipeline.

In addition, the Government should provide an "information center" where current and prospective operators may access to technical, operational and financial support and information. The Telecommunications Development Office is a viable, uniting office which could handle the integration, coordination of the Plan with other internal and external agencies.

Financial viability of the NTDP shall be determined using government approved and accepted benchmark of 5% (the difference between the long-term interest of treasury bonds presently at 14% less the inflation rate of 9%). Additionally, the following NEDA derived cut-off rate should apply:

WCC<FIRR where, WCC is weighted cost of borrowed capital and FIRR is a financial internal rate of return.

The financial projections and evaluation used in the NTDP conform with existing legal, regulatory, financial and operating conditions on the one hand, and the demand forecasts and development targets recommend therein.

Private sector led investments and overseas development assistance shall be the primary financial sources of the NTDP. The total investment required under the Plan is P1.8521 trillion, at 1992 prices, broken down into a 50/50 split between local currency and foreign currency components. Telephone projects and cellular mobile telephone service shall receive the majority share of the investments at 62.9% and 28.6%, respectively. Collective investments for public data network services (PDNS) and public calling offices (PCOs) shall be 8.5% broken down at 0.4 percent for PDNS and 8.1% for PCOs.

It is estimated that the new facilities shall generate a total revenue of P1.6554 trillion with international toll services contributing the largest share at 51. 5% of total revenues.

A collective FIRR was computed at 11.0% while WCC was at 10.6%, providing a margin of 0.5 percent favoring the FIRR, thus conforming to existing government benchmarks. However, financial evaluation on a per project approach are not encouraging, as presented hereunder.

Financial Internal Rate of Return, by Project

(Unit: %)

Project	IRR	WCC
All Projects	11.0	10.6
Telephone Projects	11.6	11.2
PDNS Projects	7.4	8.7
PCO Projects	-1.8	5.3
CMTS Projects	14.8	4.7

An economic internal rate of return (EIRR) is an index used in the determination of economic desirability of a project. In the Philippine context, the EIRR hurdle-rate of 15% was established by NEDA and the inter-agency Investment Coordinating Committee. For the NTDP, the EIRR computation only took into consideration quantifiable variables derived by the financial analyses. Other variables such as money values were not included, although their inclusion may have significantly improved economic desirability. Notwithstanding, the computed EIRR of the proposed development under the NTDP is calculated at 20.9%.

The full development of the telecommunications sector shall create a resounding impact in the over-all attainment of the County's NIChood vision. Aside from the computed benefits that shall be derived from the Plan, socio-economic benefits shall be multi-dimensional and non-mutually exclusive, affecting both the marginal and mainstream sectors of the society as outlined below.

1) The investments that would be generated by the various projects considered in the Plan shall have backward and forward linkages. Such projects shall generate employment opportunities and improve the performance of existing industries such as wholesale and retail trade, banking and finance, electrical machinery, storage and warehousing, transportation, hotel and restaurant, and other private services.

2) With the recent opening of world markets, international toll rates are expected to increase. Correspondingly, foreign exchange earnings will be generated from transnational communications and business.

3) Efficient telecommunications may partially reduce the need for unplanned transport trips. In effect, the reduction in transport costs accrues to energy savings for business enterprises and the nation as a whole.

4) The concept of "telemarketing" in the Philippines shall take a new meaning, with a comprehensive telecommunication system in place. Telecommunications as a marketing media shall be a new area which would optimize distribution systems and channels.

5) The multi-sector need and use of telecommunications cannot be overstressed. The agriculture and the industry sectors, in addition to services as mentioned above, shall be benefited from the development of telecommunications.

6) Development of international trade may be tied with the increase in foreign exchange earnings, where efficient international service would spur internation trade transactions.

7) Effective telecommunications shall hasten the Government's drive to disperse industries in areas outside Metro Manila. The distance factor between headquarters, regional offices and factories shall be negated through telecommunications.

8) Public administration relies heavily on coordination between national agencies (central, regional and provincial), local government units, local legislators, etc. An expanded telecommunications system shall facilitate the delivery of basic services and programs to the masses.

9) A subscriber to telecommunications has an inherent, potent multiplier. The expansion of the sector shall automatically increase the subscriber base more than the sector (multiplier effect).

10) Telecommunications facilitate contact between human communities and individuals, strengthen family and social ties, and enhance family and community life.

(2) Study on Improvement and Optimization of Telecommunications Networks

A study has been conducted to formulate a master plan up to the year 2010, taking into consideration the interconnection of networks among operators for the establishment of an integrated, efficient and reliable network throughout the Country and providing new

technologies and services. This study on the Improvement and Optimization of Telecommunications Networks (IOTN) covers the whole of the Republic of the Philippines. The result of the study is expected to be used as guidelines for the implementation by the Government and the private sector, and as a tool for administrative guidance for DOTC and NTC.

In the Philippines, many telecommunications operators are providing the diversified telecommunications services with their own local networks in each franchised area. The problem related to interconnections and time difference of facilities renovation among operators often result in the deterioration of qualities of the telecommunications network. The interconnection among operators is essential to provide good and economical telecommunications services throughout the country.

From the viewpoint of the future development of telecommunications in the Philippines, many kinds of telecommunications system with new technologies such as the terrestrial digital microwave, optic fiber, satellite, mobile and submarine cable system, etc. should be introduced to establish a more economical, efficient and flexible network.

The study supplements the NTDP which was formulated in 1989 and reviewed by DOTC in July 1993. The NTDP provides a framework of government policies, objectives and strategy for development of the telecommunications sector up to 2010, centering on privatization and competition. In line with the NTDP's objectives, the IOTN study focuses on network development planning including demand forecast, traffic forecasts and facilities plan.

According to the Plan, telephone main station density is planned to be increased from 1.4 main stations per 100 inhabitants in 1992 to the following targets.

Targets for Telephone Main Station Density

Year	Density	Main station	Demand
1992	1.4	887,000	
1998	3.8	2,703,000	3,950,000
2004	6.3	5,038,000	6,343,000
2010	10.0	8,768,000	9,769,000

Future demand in Central Luzon is given in Table 4.3. The service coverage ratio of local exchanges is set at 100% in 2010; i.e. all the municipalities will have local exchanges.

The IOTN study proposes project packages covering primarily unserved provincial areas to supply telephone lines to meet the supply targets through 1998. According to this supply plan, a total of 631,000 lines are planned to be supplied in provincial areas with 45% of

coverage ratio of municipalities. Of those 631,000 lines, more than half are already planned in specific projects including X-5C, X-6, RTDP, NTP, and other PAPTELCO projects.

In Central Luzon, there are 122 municipalities and 103 of them are already served or planned to be served (84%). NTP Tranche 1-1 is on-going and expansion of NTP Tranche 1-1 is planned. Six municipalities in Nueva Ecija province with comparatively low telephone density have been selected for this project.

The switching capacities and the transmission route plan are shown in Table 4.4 and Figure 4.3, respectively.

4.3.2 CLDP telecommunications plan with strategic projects

A CLDP telecommunications plan is formed in line with the NTDP. The plan, however, reflects also characteristic conditions in Central Luzon including hazardous conditions caused by Mt. Pinatubo. Also it supports the new development paradigm pursued by the CLDP Master Plan, emphasizing social services and development. Another proposal unique to the plan is a conception of optic fiber network which will greatly contribute to the development in Central Luzon in the long-run.

(1) Directions for telecommunications development

The telecommunication systems in Central Luzon share the same problems facing the Philippine telecommunications sector as a whole. Vigorous efforts need to be made to improve the situation to meet the challenge of the Philippine 2000 and go beyond it. Such efforts, however, would better be more focused in line with the development paradigm that Central Luzon would pursue. The paradigm emphasizes social development and environmental management as well as economic efficiency for international competitiveness.

Development of the telecommunication systems in Central Luzon should aim at the following.

1) To equip local people and communities with essential information necessary for development management by self-help efforts; information necessary for resource management, environmental monitoring and evaluation, and agricultural marketing would be among the most important;

2) To facilitate communication between government agencies and local people and communities as well as among the latter for effective planning, implementation and management of various development activities; and

3) To establish an information base for communication with neighboring countries and economies in Asia to market products and services, to promote trade and other

transactions, and to lead in value formation for new international order in the twenty-first century.

(2) Components of the CLDP telecommunications plan

The CLDP telecommunications plan is represented by three main projects: 1) project of Central Luzon optic super highway (CLOSH), 2) regional telephone project, and 3) urgent telecommunications improvement project for the social sector.

CLOSH

The project of "Central Luzon Optic Super Highway (CLOSH)" is to establish an optic fiber network in view of the multimedia which will be broadly introduced in coming one or two decades. Central Luzon should be a pilot case for the project because the connection between Central Luzon cities and Metro Manila provides an ideal setting. Unlike an industrial society, an information-oriented society has a good possibility for small urban cities to lead the development because service industry thrives there making the best use of cultural accumulation. Preliminary design for CLOSH is included in the Project Report (separate volume).

The project is to install 140 Mbits fiber optic transmission for trunk lines. Equipment such as optical line terminal and multiplexer will be installed in existing main telephone offices. This system of optic fiber network will improve communications among governmental offices not only through voice and data communications but also by image transmission, which symbolizes multimedia societies. The system will allow two way communications.

Regional Telephone Project

The "Regional Telephone Project" is a project proposed by the IOTN study. This original project consists of packages by region covering primarily unserved provincial areas to provide telephone lines to meet the supply targets through 1998.

Of the 122 municipalities in Central Luzon, 103 has already served or planned to be served. Six municipalities of Lianera, G.M. Natividad, Gabaldon, Lupao, Pantabangan in Nueva Ecija will be covered by the project to increase the coverage of telephone services from 84% to 89% (Figure 4.5). According to the IOTN, 5000 lines of switching capacity will be newly installed by 1998 to improve the telephone density from 1.4 stations per 100 inhabitants at present to more than 3.8.

Government subsides are essential for the implementation of the project. At present, several private telephone companies are serving rural areas, but they are too small to invest by themselves into facilities improvement and service expansion. Access by these companies to foreign loans/grants should be facilitated.

Telecommunications for social sectors

The "Telecommunications Improvement Project for Social Sector" is proposed for improving communications conditions for some social sectors. Targets are schools, hospitals, Philippine National Police (PNP), National Telecommunications Commission (NTC), and Provincial Government in Central Luzon. There exist 54 governmental hospitals in Central Luzon in 1992. All of them are suffering from insufficient number of telephone lines, far below a general standard. These hospitals can immediately increase the number of their telephone lines. This means that the shortage of telephone lines results mainly from hospital budgetary constraint itself. Same conditions are applied to governmental schools. This project aims at providing patients and students with better chances to medical services and education by immediate increase of telephone lines. It shall apply to the provincial government.

This project aims at improvement of present extremely few number of telephone lines in hospitals and schools by budgetary assistance for installing new telephone lines. In addition to the newly increase the telephone lines, a set of satellite communications system shall be introduced with software for some representative hospital, and a set of satellite receiving system for a model elementary school. Those should be a model cases for the Philippines. For PNP and NTC, they will need new facilities for their administration.

This project consists of four packages as follows.

a) For governmental hospitals (Package A)

Package A is to install a satellite earth station in a model hospital in Central Luzon for linking a hospital in developed countries. A feasibility study including selection of proper hospitals outside the Country and installation of hardware equipment shall be covered. In addition, some budgetary support to increase telephone lines for better communications among hospitals shall be included. Approximately US$ 10 million will be required for the package.

b) For governmental schools (Package B)

Package B is to install a satellite broadcasting receiving antenna and TV sets in major elementary schools in Central Luzon for value education. This will drastically improve the present condition lacking audio visual materials. In addition, telephone lines shall be provided to major elementary schools. Roughly US$ 2 million will be required for the package.

c) For PNP (Package C)

Package C is to replace existing radio communications network with a new system by HF, VHF and UHF. PNP in Central Luzon has their own radio network for command and administration. The system is used also in the case of emergency such as natural calamities. The system, however, is beyond the life time, and deterioration is remarkable. Therefore urgent replacement will be necessary. It will cost about US$ 3 million for the package (Figure 4.6).

d) For NTC (Package D)

Package D is to provide radio monitoring receivers and test equipment replacing existing function-limited equipment, which will enable NTC to strengthen their monitoring functions against illegal radio transmission. It is estimated to cost US$800,000 for the package.

4.3.3 Other measures

In addition to the strategic projects described in the previous subsection, the following measures should be taken.

(1) It is recommended that mobile telephones or so called "cellular phones" should be introduced at an early stage to remove non-telephone municipalities, as the installation of conventional telephone lines in all municipalities will have to wait until 2010. Cellular phones allow more flexible expansion of the telephone network without laying cable. Comparatively high costs for cellular phones can be borne commonly by communities.

(2) VSAT communications are highly recommended from a viewpoint of establishing easy access even under difficult terrains. VSAT communications perform well in case of disasters such as volcanic eruptions. No damage on transmission routes is one of advantages as well as coverage of isolated areas which are widely dispersed.

(3) A satellite earth station for overseas communications should be installed in Central Luzon so as to directly connect Central Luzon to developed countries.

(4) Smaller private telephone companies should be assisted and protected by the Government to be transformed into more effective and competitive service deliverers.

(5) Isolated barangays should consider to install radio telephone lines, as they have extremely poor accessibility by roads. Once some disaster occurs, they have very limited way to communicate to outside the barangays if they do not have telephone

lines. To install telephone lines into the isolated barangays, a Multiple Access Subscriber System (MASS) by digital radio will be a proper way with small project costs.

(6) The Philippine National Police (PNP) is highly concerned with their radio communications systems which have become obsolete. They should be urgently replaced with new facilities consisting of HF, VHF and UHF.

(7) Radio monitoring functions by the National Telecommunications Commission (NTC) should be strengthened further. Fixed and mobile radio monitoring receiver and mobile radio monitoring equipment need to be newly installed.

(8) It is recommended that planned projects for telecommunication should strongly push up to be implemented. An implementation plan for regional telephone services mentioned in subsection 4.2.1 should be implemented as scheduled.

4.3.4 Phasing of telecommunications development

Two development measures for telecommunications are particularly important. One is to increase the number of telephone lines particularly in rural areas. The other is to establish a optic fiber network to serve multipurpose communications in the future. Timing of implementing these measures is indicated below.

Phase I (up to 1998)

Several projects for improvement of conventional telephone lines will be completed and most municipalities can have better access for voice and FAX communications. Meanwhile the design for CLOSH will be completed .

Phase II (1999 to 2004)

Installation of optic fiber network for multipurpose communications will complete during this period.

Phase III (2005 to 2010)

Integrated computers and communications networks for multi-media will be completed for better social activities in Central Luzon. All municipalities will have conventional telephone lines that make 10 telephone lines per 100 inhabitants.

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T A B L E S

Table 4.1 Telephone Densities, Number of Telephones and Main Telephone Lines

With Respect to Number of Telephones

Region	No. of Telephones (per 100 person)	Population (x 1,000)	Population Share (%)	No. of Telephones	Telephone Share (%)
Homeless Population		3			
Filipinos in Phil. Embassies/ Consulates & Mission Abroad		2			
NCR	12.75	7,928	13.1	1,010,532	74.0
CAR	0.00	1,146	1.9		
Region 1	0.75	3,551	5.9	26,503	1.9
Region 2	0.42	2,341	3.9	9,922	0.7
Region 3	0.82	6,199	10.2	50,524	3.7
Region 4	0.82	8,266	13.6	68,066	5.0
Region 5	0.23	3,910	6.4	9,083	0.7
Region 6	0.79	5,393	8.9	42,362	3.1
Region 7	1.66	4,593	7.6	76,395	5.6
Region 8	0.28	3,055	5.0	8,647	1.4
Region 9	0.47	3,159	5.2	14,856	1.1
Region 10	0.43	3,510	5.8	14,961	1.1
Region 11	0.56	4,457	7.3	25,070	1.8
Region 12	0.27	3,171	5.2	8,409	0.6
Philippines	2.25	60,684	100.0	1,365,330	100.0

With Respect to Number of Main Lines

Region	No. of Main Telephone Lines (per 100 person)	Population (x 1,000)	Population Share (%)	No. of Main Telephone Lines	Main Telephone Lines Share (%)
Homeless Population		3	0.0		
Filipinos in Phil. Embassies/ Consulates & Mission Abroad		2	0.0		
NCR	7.58	7,928	13.1	600,626	67.7
CAR		1,146	1.9		
Region 1	0.95	3,551	5.9	33,619	3.8
Region 2	0.23	2,341	3.9	5,361	0.6
Region 3	0.70	6,199	10.2	43,160	4.9
Region 4	0.48	8,266	13.6	39,990	4.5
Region 5	0.23	3,910	6.4	9,050	1.0
Region 6	0.76	5,393	8.9	40,870	4.6
Region 7	0.93	4,593	7.6	42,700	4.8
Region 8	0.30	3,055	5.0	9,150	1.0
Region 9	0.32	3,159	5.2	10,250	1.2
Region 10	0.58	3,510	5.8	20,455	2.3
Region 11	0.51	4,457	7.3	22,548	2.5
Region 12	0.30	3,171	5.2	9,450	1.1
Philippines	1.46	60,684	100.0	887,229	100.0
Region 3					
Bataan	0.56	426	6.9	2,390	5.1
Bulacan	0.56	1,505	24.3	8,380	17.9
Nueva Ecija	0.21	1,313	21.2	2,786	5.9
Pampanga	1.42	1,533	24.7	21,720	46.4
Tarlac	0.84	859	13.9	7,250	15.5
Zambales	0.77	563	9.1	4,330	9.2
Total	0.76	6,199	100.0	46,856	100.0

Source : DOTC

Table 4.2 Telephone Facilities in Central Luzon

Province	Town/ Municipality	Operator	Type of Exchange	Capacity (Lines)
BATAAN	Balanga	PLDT	XB	1064
	Bataan EPZA	PLDT	DIGITAL (SPC)	114
	Dinalupihan	TELOF	XB (SEL)	300
	Mariveles	PLDT	XB (AKD-860)	48
	Orani	BATTLEX (D. PAPA)	MANUAL	200
	Orion/Limay	PLDT	SXS	570
	Sub-Total			**2296**
BULACAN	Angat	TELOF	XB (NEC)	300
	Balagtas	BALAGTAS TEL. SYS.	XB	320
	Balagtas	DIGITEL	RSU/MEYCAUAYAN	
	Baliwag	PLDT	CXP-5	340
	Bocaue	RADIO CITY TEL. SYS.	MANUAL	700
	Bocaue	DIGITEL	RSU/MEYCAUAYAN	
	Bulacan	PLDT	SXS	180
	Calumpit	DATELCOM CORP.	CXP	400
	Guiguinto	PLDT	CABLEX	
	Hagonoy	PLDT	EMD	340
	Malolos/Plaridel	PLDT	CXP-5	850
	Marilao	RADIO CITY TEL. SYS.	MANUAL	700
	Marilao	DIGITEL	RSU/MEYCAUAYAN	
	Meycauayan	RADIO CITY TEL. SYS.	MANUAL	1200
	Meycauayan	DIGITEL	DIGITEL (GEC)	2000
	Pandi	TELOF	SXS	450
	Plaridel	PLDT	CABLEX/MALOLOS	
	Pulilan	DATELCOM CORP.	SXS	400
	San Miguel	PLDT	XB (AKD-860)	225
	Sta. Maria	RADIO CITY TEL. SYS.	MANUAL	250
	Sta. Maria	DIGITEL	RSU/MEYCAUAYAN	
	Sub-Total			**8655**
NUEVA ECIJA	Cabanatuan City	PLDT	XB	1152
	Gapan	PLDT	SXS	510
	Munoz	PLDT	XB (AKD-860)	225
	San Jose City	SAN JOSE TEL. SYS.	SXS	100
	Sta. Rosa	TELOF	XB (SEL)	300
	Sub-Total			**2287**
PAMPANGA	Angeles City	EVANGELISTA TEL. CO.	SXS	7400
	Angeles City	DIGITEL	DIGITAL	2000
	Apalit	DATELCOM CORP.	SXS	1000
	Bacolor	PLDT	CABLEX	
	Floridablanca	PLDT	SXS	285
	Guagua	PLDT	EMD	1800
	Lubao	PLDT	SXS	304
	Mabalacat	DATELCOM CORP.	SXS	2000
	Macabebe	PAMPANGA TEL. CO.	MANUAL	600
	Magalang	DATELCOM CORP.	SXS	1000
	Masantol	PAMPANGA TEL. CO.	MANUAL	200
	Porac	DATELCOM CORP.	SXS	1000
	San Fernando	PLDT	DIGITAL (EWS)	3800
	Sta. Rita	PLDT	CABLEX	
	Sto. Tomas	PLDT	CABLEX	
	Sub-Total			**21389**
TARLAC	Bamban	PLDT	XB (AKD-860)	48
	Camiling	PLDT	XB (AKD-860)	238
	Capas	PLDT	XB (AKD-860)	143
	Concepcion	PLDT	SXS	570
	Gerona	PLDT	CABLEX/PANIQUI	
	Moncada	PLDT	CABLEX/PANIQUI	
	Paniqui	PLDT	SXS	380
	Tarlac	PLDT	SXS	2744
	Tarlac	PLDT	EMD	380
	Sub-Total			**4503**
ZAMBALES	Iba	TELOF	SXS	600
	Olongapo City	PILTEL	DIGITAL	3000
	Subic	PILTEL	MANUAL	430
	Sub-Total			**4030**
	GRAND TOTAL			**43160**

Source : NTC

Table 4.3 Demand Forecast in Central Luzon (1/2)

(Unit : no. of main stations)

Province	Municipality	1998	2004	2010
Bataan	Abucay	1,187	2,100	3,699
	Bagaca	811	1,434	2,526
	Balanga	2,289	4,050	7,134
	Dinalupihan	2,585	4,573	8,056
	Hermosa	1,539	2,723	4,796
	Limay	1,450	2,565	4,519
	Mariveles	2,700	4,777	8,415
	Morong	762	1,349	2,376
	Orani	1,933	3,419	6,023
	Orion	1,567	2,772	4,883
	Pilar	1,122	1,985	3,496
	Samal	977	1,729	3,045
	Total	**18,922**	**33,476**	**58,968**
Bulacan	Angat	1,533	2,712	4,777
	Balagtas	1,896	3,354	5,908
	Baliuag	3,987	7,053	12,425
	Bocaue	2,988	5,286	9,312
	Bulacan	2,167	3,834	6,754
	Bustos	1,554	2,749	4,842
	Calumpit	2,624	4,642	8,177
	Dona Remedios Trinidad	383	677	1,193
	Guiguinto	1,979	3,501	6,167
	Hagonoy	4,009	7,092	12,493
	Malolos	5,563	9,841	17,335
	Marilao	2,505	4,431	7,805
	Meycauayan	5,509	9,747	17,170
	Norzagaray	1,488	2,632	4,637
	Obando	2,059	3,643	6,418
	Pandi	1,451	2,567	4,521
	Paombong	1,424	2,520	4,439
	Plaridel	2,353	4,163	7,333
	Pulilan	2,142	3,789	6,675
	San Ildefonso	2,648	4,685	8,254
	San Jose del Monte	6,312	11,167	19,672
	San Miguel	4,049	7,164	12,619
	San Rafael	2,201	3,894	6,859
	Sta. Maria	4,065	7,191	12,667
	Total	**66,889**	**118,334**	**208,452**
Nueva Ecija	Aliaga	1,796	3,178	5,598
	Bongabon	1,760	3,114	5,486
	Cabanatuan City	7,691	13,605	23,967
	Cabiao	2,171	3,840	6,765
	Carranglan	1,158	2,049	3,610
	Cuyapo	1,915	3,389	5,969
	Gabaldon	966	1,709	3,011
	Gapan	3,132	5,541	9,762
	Gen. Tinio	1,310	2,318	4,084
	Gen. Mamerto Natividad	977	1,728	3,044
	Guimba	3,260	5,767	10,160
	Jaen	2,104	3,722	6,557
	Laur	954	1,687	2,972
	Licab	764	1,352	2,382
	Llanera	1,035	1,831	3,225
	Lupao	1,221	2,160	3,806
	Munoz	2,238	3,959	6,974
	Nampicuan	374	662	1,167
	Palayan City	906	1,603	2,824
	Pantabangan	815	1,442	2,540
	Penaranda	911	1,612	2,839
	Quezon	1,136	2,010	3,542
	Rizal	1,732	3,064	5,397
	San Antonio	2,303	4,073	7,176
	San Isidro	1,526	2,700	4,757
	San Jose City	3,681	6,512	11,472
	San Leonardo	1,766	3,124	5,503
	Sta. Rosa	1,797	3,179	5,600
	Sto. Domingo	1,594	2,819	4,967
	Talavera	3,433	6,073	10,699
	Talugtog	624	1,103	1,944
	Zaragosa	1,277	2,260	3,981
	Total	**58,327**	**103,185**	**181,780**

Table 4.3 Demand Forecast in Central Luzon (2/2)

(Unit : no. of main stations)

Province	Municipality	1998	2004	2010
Pampanga	Angeles City	10,518	18,607	32,778
	Apalit	2,772	4,903	8,638
	Arayat	3,252	5,754	10,136
	Bacolor	2,989	5,288	9,314
	Candaba	3,028	5,357	9,437
	Floridablanca	2,939	5,200	9,160
	Guagua	3,923	6,941	12,227
	Lubao	4,431	7,838	13,808
	Mabalacat	5,382	9,521	16,773
	Macabebe	2,466	4,364	7,687
	Magalang	1,953	3,454	6,085
	Masantol	1,865	3,299	5,811
	Mexico	3,086	5,459	9,617
	Minalin	1,546	2,735	4,819
	Porac	3,031	5,363	9,447
	San Fernando	7,014	12,409	21,860
	San Luis	1,418	2,509	4,420
	San Simon	1,371	2,425	4,272
	Santa Ana	1,446	2,558	4,506
	Santa Rita	1,257	2,224	3,919
	Santo Tomas	1,480	2,619	4,613
	Sexmoan	940	1,663	2,929
	Total	**68,107**	**120,490**	**212,256**
Tarlac	Anao	353	625	1,102
	Bamban	1,584	2,802	4,936
	Camiling	2,787	4,930	8,685
	Capas	2,720	4,812	8,476
	Concepcion	4,584	8,109	14,284
	Gerona	2,643	4,676	8,238
	La-paz	1,864	3,298	5,809
	Mayantoc	941	1,664	2,932
	Moncada	1,852	3,276	5,771
	Paniqui	2,886	5,106	8,995
	Pura	801	1,418	2,497
	Ramos	603	1,066	1,879
	San Clemente	394	698	1,229
	San Jose	910	1,610	2,837
	San Manuel	767	1,357	2,390
	Santa Ignacia	1,354	2,395	4,220
	Tarlac	9,275	16,409	28,905
	Victoria	1,882	3,330	5,866
	Total	**38,200**	**67,581**	**119,051**
Zambales	Botolan	1,582	2,799	4,931
	Cabangan	682	1,206	2,124
	Candelaria	824	1,457	2,567
	Castillejos	1,189	2,103	3,705
	Iba	1,298	2,297	4,047
	Masinloc	1,439	2,545	4,483
	Olongapo City	8,591	15,198	26,773
	Palauig	959	1,696	2,988
	San Antonio	1,197	2,118	3,731
	San Felipe	694	1,228	2,164
	San Marcelino	1,626	2,877	5,068
	San Narciso	1,017	1,800	3,170
	Santa Cruz	1,834	3,245	5,716
	Subic	2,085	3,689	6,499
	Total	**25,017**	**44,258**	**77,966**

source : IOTN

Table 4.4 Expansion Plan of Local Switching in Central Luzon (1/2)

Province	Municipalities Name	Operation & Facilities		Exist	1988			2004			2010		
		Operators Name	Switching Type	Switching Capabilities	SW Type	Added Capacity	TOTAL Capabilities	SW Type	Added Capacity	TOTAL Capabilities	SW Type	Added Capacity	TOTAL Capabilities
Bataan	Abucay					0		RSU	1,300	1,300	RSU	1,800	3,100
Bataan	Bagac				RSU	500	500	RSU	400	900	RSU	1,200	2,100
Bataan	Balanga	PLDT	XB-C2IB	1,120	LS	600	1,720	LS	1,400	3,120	LS	3,600	6,720
Bataan	Dinalupihan	PLDT	XC	300	LS	1,300	1,600	LS	1,200	2,800	LS	3,900	6,700
Bataan	Hermosa				RSU	1,000	1,000	RSU	700	1,700	LS	2,300	4,000
Bataan	Limay				RSU	1,100	1,100	RSU	900	2,000	LS	2,300	4,300
Bataan	Mariveles	PLDT	AKD-860	170	LS	2,100	2,270	LS	2,000	4,270	LS	4,600	8,870
Bataan	Mariveles (BEPZA)	PLDT	SYS-12			0	0			0			0
Bataan	Morong					0	0	RSU	900	900	RSU	1,100	2,000
Bataan	Orani	BATTLEX	MANUAL	200	LS	1,000	1,200	LS	900	2,100	LS	2,900	5,000
Bataan	Orion	PLDT	SXS	600	LS	600	1,200	LS	1,000	2,200	LS	2,400	4,600
Bataan	Pilar					0	0	RSU	1,300	1,300	RSU	1,600	2,900
Bataan	Samal					0	0	RSU	1,100	1,100	RSU	1,500	2,600
				2,390	0	8,200	10,590	0	13,100	23,690	0	29,200	52,890
Bulacan	Angat	BUTEL	XB	300	LS	700	1,000	LS	700	1,700	LS	2,300	4,000
Bulacan	Balagtas	BALAGTAS	XB	320	LS	900	1,220	LS	900	2,120	LS	2,800	4,920
Bulacan	Baliuag	PLDT	CXP-5	400	LS	2,900	3,300	LS	3,000	6,300	LS	6,700	13,000
Bulacan	Bocaue	RADIO CIT	MANUAL	700	LS	1,800	2,500	LS	2,200	4,700	LS	5,100	9,800
Bulacan	Bulacan	PLDT	EWSD(RSU	200	RSU	1,200	1,400	RSU	1,000	2,400	LS	3,200	5,600
Bulacan	Bustos				RSU	1,000	1,000	RSU	700	1,700	LS	2,300	4,000
Bulacan	Calumpit	DATELCON	SXS	400	LS	1,500	1,900	LS	1,700	3,600	LS	4,100	7,700
Bulacan	Dona R. Trinidad					0	0		0	0	RSU	1,000	1,000
Bulacan	Guiguinto	PLDT	EWSD(RSU	454	RSU	800	1,254	RSU	900	2,154	LS	3,000	5,154
Bulacan	Hagonoy	PLDT	EWSD(RSU	392	LS	2,100	2,492	LS	1,800	4,292	LS	6,100	10,392
Bulacan	Malolos	PLDT	EWSD	1,652	LS	3,000	4,652	LS	4,100	8,752	LS	9,400	18,152
Bulacan	Marilao	RADIO CIT	MANUAL	700	LS	1,400	2,100	LS	1,800	3,900	LS	4,300	8,200
Bulacan	Meycauyan	RADIO CIT	MANUAL	1,200	LS	3,400	4,600	LS	4,000	8,600	LS	9,400	18,000
Bulacan	Norzagaray				RSU	900	900	RSU	700	1,600	LS	2,300	3,900
Bulacan	Obando				RSU	1,500	1,500	RSU	1,400	2,900	LS	3,200	6,100
Bulacan	Pandi	BUTEL	SXS	450	LS	500	950	LS	700	1,650	LS	2,100	3,750
Bulacan	Paombong					0	0	RSU	1,600	1,600	LS	2,100	3,700
Bulacan	Plaridel	PLDT	ESCD(RSU	312	RSU	1,200	1,512	RSU	1,100	2,612	LS	3,500	6,112
Bulacan	Pulilan	DATELCON	SXS	400	LS	900	1,300	LS	1,000	2,300	LS	3,300	5,600
Bulacan	San Ildefonso				RSU	1,700	1,700	RSU	1,200	2,900	LS	4,000	6,900
Bulacan	San Jose del Monte				LS	3,900	3,900	LS	2,900	6,800	LS	9,500	16,300
Bulacan	San Miguel	PLDT	AKD-860	250	LS	2,700	2,950	LS	2,600	5,550	LS	6,300	11,850
Bulacan	San Rafael				RSU	1,400	1,400	RSU	1,000	2,400	LS	3,300	5,700
Bulacan	Sta. Maria	RADIO CIT	MANUAL	250	LS	3,200	3,450	LS	2,900	6,350	LS	6,900	13,250
Bulacan	Valenzuela					0	0		0	0		0	0
				8,380		38,600	46,980		39,900	86,880	0	106,200	193,080
N. Ecija	Aliaga				RSU	1,100	1,100	RSU	900	2,000	LS	2,700	4,700
N. Ecija	Bongabon				RSU	1,100	1,100	RSU	800	1,900	LS	2,700	4,600
N. Ecija	Cabanatuan City	PLDT	XB-SF	1,536	LS	4,900	6,436	LS	5,600	12,036	LS	13,100	25,136
N. Ecija	Cabiao				RSU	1,400	1,400	RSU	1,000	2,400	LS	3,200	5,600
N. Ecija	Carranglan					0	0	RSU	1,300	1,300	RSU	1,700	3,000
N. Ecija	Cuyapo				RSU	1,200	1,200	RSU	900	2,100	LS	2,900	5,000
N. Ecija	Gabaldon					0	0	RSU	1,100	1,100	RSU	1,400	2,500
N. Ecija	Gapan	PLDT	SXS	600	LS	1,700	2,300	LS	2,000	4,300	LS	4,900	9,200
N. Ecija	Gen. Tinio				RSU	800	800	RSU	700	1,500	LS	1,900	3,400
N. Ecija	Gen. M. Natividad					0	0	RSU	1,100	1,100	RSU	1,500	2,600
N. Ecija	Guimba				RSU	2,400	2,400	LS	2,100	4,500	LS	5,000	9,500
N. Ecija	Jaen				RSU	1,300	1,300	RSU	1,000	2,300	LS	3,200	5,500
N. Ecija	Laur				RSU	600	600	RSU	500	1,100	RSU	1,400	2,500
N. Ecija	Licab				RSU	500	500	RSU	400	900	RSU	1,100	2,000
N. Ecija	Llanera					0	0	RSU	1,200	1,200	RSU	1,500	2,700
N. Ecija	Lupao					0	0	RSU	1,400	1,400	RSU	1,800	3,200
N. Ecija	Munoz	PLDT	ADK-860	250	LS	1,200	1,450	LS	1,000	2,450	LS	3,400	5,850
N. Ecija	Nampicuan					0	0		0	0	RSU	1,000	1,000
N. Ecija	Palayan City				RSU	600	600	RSU	400	1,000	RSU	1,400	2,400
N. Ecija	Pantabangan					0	0	RSU	900	900	RSU	1,200	2,100
N. Ecija	Penaranda				RSU	600	600	RSU	400	1,000	RSU	1,400	2,400
N. Ecija	Quezon				RSU	700	700	RSU	600	1,300	RSU	1,700	3,000
N. Ecija	Rizal				RSU	1,100	1,100	RSU	800	1,900	LS	2,600	4,500
N. Ecija	San Antonio				RSU	1,400	1,400	RSU	1,100	2,500	LS	3,500	6,000
N. Ecija	San Isidro					0	0	RSU	1,700	1,700	LS	2,300	4,000
N. Ecija	San Jose City	SAN JOSE	SXS	100	LS	2,600	2,700	LS	2,400	5,100	LS	5,700	10,800
N. Ecija	San Leonardo				RSU	1,100	1,100	RSU	800	1,900	LS	2,700	4,600
N. Ecija	Sta. Rosa	BUTEL	XB	300	LS	800	1,100	LS	900	2,000	LS	2,700	4,700
N. Ecija	Sto. Domingo				RSU	1,000	1,000	RSU	800	1,800	LS	2,300	4,100
N. Ecija	Talavera				LS	2,100	2,100	LS	1,600	3,700	LS	5,200	8,900
N. Ecija	Talugtog					0	0		0	0	RSU	1,700	1,700
N. Ecija	Zaragosa				RSU	800	800	RSU	600	1,400	RSU	1,900	3,300
				2,786	0	31,000	33,786	0	36,000	69,786	0	90,700	160,486

Table 4.4 Expansion Plan of Local Switching in Central Luzon (2/2)

Province	Municipalities Name	Operation & Facilities		Exist	1988			2004			2010		
		Operators Name	Switching Type	Switching Capabilities	SW Type	Added Capacity	TOTAL Capabilities	SW Type	Added Capacity	TOTAL Capabilities	SW Type	Added Capacity	TOTAL Capabilities
Pampanga	Angeles City	EVANGELISTA	SXS	9,400	LS	0	9,400	LS	7,000	16,400	LS	17,900	34,300
Pampanga	Angeles City	DIGITEL	DIGITAL				0			0			0
Pampanga	Apalit	DATEL CON.	SXS	1,000	LS	1,000	2,000	LS	1,800	3,800	LS	4,300	8,100
Pampanga	Arayat				RSU	2,000	2,000	LS	1,500	3,500	LS	4,900	8,400
Pampanga	Bacolor				RSU	1,900	1,900	LS	1,300	3,200	LS	4,500	7,700
Pampanga	Candaba				RSU	1,900	1,900	LS	1,400	3,300	LS	4,500	7,800
Pampanga	Floridablanca	PLDT	SXS	300	LS	1,500	1,800	LS	1,400	3,200	LS	4,400	7,600
Pampanga	Guagua	PLDT	EMD-R	1,900	LS	1,400	3,300	LS	2,900	6,200	LS	6,600	12,800
Pampanga	Lubao	PLDT	SXS	320	LS	3,400	3,720	LS	3,200	6,920	LS	7,600	14,520
Pampanga	Mabalacat	DATELCON	SXS	2,000	LS	2,500	4,500	LS	3,900	8,400	LS	9,200	17,600
Pampanga	Macabebe	PAMPANGA	MANUAL	600	LS	900	1,500	LS	1,200	2,700	LS	3,700	6,400
Pampanga	Magalang	DATELCON	SXS	1,000	LS	200	1,200	LS	900	2,100	LS	3,000	5,100
Pampanga	Masantol	PAMPANGA	MANUAL	200	LS	1,200	1,400	LS	1,200	2,600	LS	2,900	5,500
Pampanga	Mexico				RSU	1,900	1,900	LS	1,500	3,400	LS	4,600	8,000
Pampanga	Minalin				RSU	1,000	1,000	RSU	700	1,700	LS	2,300	4,000
Pampanga	Porac	DATELCON	SXS	1,000	LS	900	1,900	LS	1,400	3,300	LS	4,500	7,800
Pampanga	San Fernando	PLDT	EWSA	4,000	LS	1,800	5,800	LS	5,200	11,000	LS	11,900	22,900
Pampanga	San Luis				RSU	900	900	RSU	700	1,600	LS	2,100	3,700
Pampanga	San Simon				RSU	900	900	RSU	600	1,500	LS	2,100	3,600
Pampanga	Santa Ana				RSU	900	900	RSU	700	1,600	LS	2,200	3,800
Pampanga	Santa Rita				RSU	800	800	RSU	600	1,400	LS	1,900	3,300
Pampanga	Santos Tomas				RSU	900	900	RSU	700	1,600	RSU	2,300	3,900
Pampanga	Sexmoan				RSU	0	0	RSU	1,100	1,100	LS	1,400	2,500
				21,720	0	27,900	49,620	RSU	40,900	90,520	RSU	108,800	199,320
Tarlac	Anao					0	0		0	0	RSU	1,000	1,000
Tarlac	Bamban	PLDT	AKD-860	50	LS	1,000	1,050	LS	700	1,750	LS	2,400	4,150
Tarlac	Camiling	PLDT	AKD-860	250	LS	2,100	2,350	LS	2,000	4,350	LS	4,800	9,150
Tarlac	Capas	PLDT	AKD-860	150	LS	1,500	1,650	LS	1,300	2,950	LS	4,100	7,050
Tarlac	Concepcion	PLDT	SXS	600	LS	2,700	3,300	LS	3,000	6,300	LS	7,100	13,400
Tarlac	Gerona				RSU	1,600	1,600	RSU	1,300	2,900	LS	3,900	6,800
Tarlac	La-paz				RSU	1,200	1,200	RSU	800	2,000	LS	2,800	4,800
Tarlac	Mayantos				RSU	600	600	RSU	500	1,100	RSU	1,400	2,500
Tarlac	Moncada				RSU	1,200	1,200	RSU	800	2,000	LS	2,800	4,800
Tarlac	Paniqui	PLDT	SXS	400	LS	1,700	2,100	LS	1,900	4,000	LS	4,500	8,500
Tarlac	Pura					0	0	RSU	900	900	RSU	1,200	2,100
Tarlac	Ramos				RSU	400	400	RSU	300	700	RSU	900	1,600
Tarlac	San Clemente				RSU	300	300	RSU	200	500	RSU	600	1,100
Tarlac	San Jose					0	0	RSU	1,000	1,000	RSU	1,400	2,400
Tarlac	San Manuel					0	0	RSU	900	900	RSU	1,100	2,000
Tarlac	Santa Ignacia				RSU	900	900	RSU	600	1,500	LS	2,000	3,500
Tarlac	Tarlac	PLDT	SXS	5,800	LS	1,900	7,700	LS	6,800	14,500	LS	15,800	30,300
Tarlac	Tarlac	PLDT	EWSD				0		0	0			0
Tarlac	Victoria				RSU	1,200	1,200	RSU	900	2,100	LS	2,800	4,900
				7,250	0	18,300	25,550	0	23,900	49,450	0	60,600	110,050
													0
Zambales	Botolan						0	RSU	1,700	1,700	LS	2,400	4,100
Zambales	Cabangan						0		0	0	RSU	1,800	1,800
Zambales	Candelaria						0	RSU	900	900	RSU	1,300	2,200
Zambales	Castillejos				RSU	800	800	RSU	500	1,300	RSU	1,800	3,100
Zambales	Iba	BUTEL	SXS	600	LS	400	1,000	LS	800	1,800	LS	2,000	3,800
Zambales	Masinloc				RSU	900	900	RSU	700	1,600	LS	2,100	3,700
Zambales	Olongapo City	PILTEL	DIGITEL	3,000		4,100	7,100	LS	6,300	13,400	LS	14,600	28,000
Zambales	Palauig					0	0	RSU	1,100	1,100	RSU	1,400	2,500
Zambales	San Antonio					0	0	RSU	1,300	1,300	RSU	1,800	3,100
Zambales	San Felipe				RSU	500	500	RSU	300	800	RSU	1,000	1,800
Zambales	San Marcelino	PLDT	SXS	300	LS	700	1,000	LS	800	1,800	LS	2,400	4,200
Zambales	San Narciso				RSU	700	700	RSU	400	1,100	RSU	1,600	2,700
Zambales	Santa Cruz				RSU	1,400	1,400	RSU	1,100	2,500	LS	2,900	5,400
Zambales	Subic	PHILTEL	MANUAL	430	LS	900	1,330	LS	1,000	2,330	LS	3,100	5,430
				4,330		10,400	14,730		16,900	31,630	0	40,200	71,830

source : IOTN

Table 4.5 Telephone Supply Plan in Central Luzon (1/2)

Province	Municipality	NCR	MUC	KDC	SUPPLY 1998	SUPPLY 2004	SUPPLY 2010
BATAAN	Abucay				0	1,155	2,774
	Bagaca				446	789	1,895
	Balanga			1	1,488	2,835	6,064
	Dinalupihan				1,422	2,515	6,042
	Hermosa				846	1,497	3,597
	Limay			1	942	1,796	3,841
	Mariveles		1		2,025	3,821	7,994
	Morong				0	742	1,782
	Orani				1,063	1,881	4,517
	Orion			1	1,019	1,941	4,151
	Pilar				0	1,092	2,622
	Samal				0	951	2,284
	Total	**0**	**1**	**3**	**9,251**	**21,015**	**47,563**
BULACAN	Angat				843	1,491	3,583
	Balagtas				1,043	1,844	4,431
	Baliuag		1		2,990	5,643	11,804
	Bocaue		1		2,241	4,229	8,847
	Bulacan				1,192	2,109	5,065
	Bustos			1	855	1,512	3,632
	Calumpit				1,705	3,249	6,950
	Dona Remedios Trinidad				0	0	895
	Guiguinto				1,088	1,925	4,625
	Hagonoy				2,205	3,901	9,370
	Malolos		1		4,172	7,873	16,469
	Marilao		1		1,878	3,545	7,415
	Meycauayan		1		4,132	7,797	16,311
	Norzagaray				818	1,448	3,478
	Obando			1	1,339	2,550	5,456
	Pandi				798	1,412	3,391
	Paombong				0	1,386	3,329
	Plaridel				1,294	2,290	5,500
	Pulilan				1,178	2,084	5,006
	San Ildefonso				1,457	2,577	6,190
	San Jose del Monte				3,472	6,142	14,754
	San Miguel			1	2,632	5,015	10,727
	San Rafael				1,210	2,141	5,144
	Sta. Maria		1		3,048	5,753	12,034
	Total	0	6	3	41,590	77,916	174,406
NUEVA ECIJA	Aliaga				988	1,748	4,199
	Bongabon				968	1,713	4,115
	Cabanatuan City		1		5,768	10,884	22,769
	Cabiao				1,194	2,112	5,074
	Carranglan				0	1,127	2,707
	Cuyapo				1,053	1,864	4,477
	Gabaldon				0	940	2,258
	Gapan			1	2,036	3,879	8,297
	Gen. Tinio				721	1,275	3,063
	Gen. Mamerto Natividad				0	951	2,283
	Guimba			1	2,119	4,037	8,636
	Jaen				1,157	2,047	4,918
	Laur				525	928	2,229
	Licab				420	744	1,787
	Llanera				0	1,007	2,418
	Lupao				0	1,188	2,854
	Munoz				1,231	2,177	5,230
	Nampicuan				0	0	875
	Palayan City				498	882	2,118
	Pantabangan				0	793	1,905
	Penaranda				501	886	2,129
	Quezon				625	1,106	2,656
	Rizal				952	1,685	4,048
	San Antonio				1,266	2,240	5,382
	San Isidro				0	1,485	3,568
	San Jose City			1	2,393	4,558	9,751
	San Leonardo				971	1,718	4,128
	Sta. Rosa				988	1,749	4,200
	Sto. Domingo				877	1,551	3,725
	Talavera				1,888	3,340	8,024
	Talugtog				0	0	1,458
	Zaragosa				702	1,243	2,985
	Total	**0**	**1**	**3**	**29,841**	**61,857**	**144,266**

Table 4.5 Telephone Supply Plan in Central Luzon (2/2)

Province	Municipality	NCR	MUC	KDC	SUPPLY 1998	SUPPLY 2004	SUPPLY 2010
PAMPANGA	Angeles City		1		7,888	14,886	31,139
	Apalit			1	1,802	3,432	7,342
	Arayat				1,789	3,165	7,602
	Bacolor				1,644	2,908	6,986
	Candaba				1,665	2,946	7,078
	Floridablanca				1,617	2,860	6,870
	Guagua		1		2,943	5,553	11,616
	Lubao		1		3,323	6,271	13,117
	Mabalacat		1		4,036	7,617	15,934
	Macabebe				1,357	2,400	5,765
	Magalang				1,074	1,900	4,564
	Masantol			1	1,212	2,309	4,940
	Mexico				1,697	3,002	7,212
	Minalin				850	1,504	3,614
	Porac				1,667	2,949	7,085
	San Fernando		1		5,261	9,928	20,767
	San Luis				780	1,380	3,315
	San Simon				754	1,334	3,204
	Santa Ana				795	1,407	3,380
	Santa Rita				692	1,223	2,939
	Santo Tomas				814	1,440	3,460
	Sexmoan				0	914	2,197
	Total	**0**	**5**	**2**	**43,660**	**81,328**	180,126
TARLAC	Anao				0	0	826
	Bamban				871	1,541	3,702
	Camiling		1		2,090	3,944	8,251
	Capas				1,496	2,646	6,357
	Concepcion			1	2,979	5,676	12,142
	Gerona				1,454	2,572	6,178
	La-paz				1,025	1,814	4,357
	Mayantoc				517	915	2,199
	Moncada				1,018	1,802	4,328
	Paniqui			1	1,876	3,574	7,645
	Pura				0	780	1,873
	Ramos				332	587	1,409
	San Clemente				217	384	922
	San Jose				0	886	2,127
	San Manuel				0	746	1,793
	Santa Ignacia				745	1,317	3,165
	Tarlac		1		6,956	13,127	27,460
	Victoria				1,035	1,832	4,400
	Total	**0**	**2**	**2**	**22,611**	**44,143**	**99,134**
ZAMBALES	Botolan				0	1,539	3,698
	Cabangan				0	0	1,593
	Candelaria				0	802	1,926
	Castillejos				654	1,157	2,779
	Iba			1	844	1,608	3,440
	Masinloc		1		791	1,400	3,363
	Olongapo City				6,443	12,159	25,434
	Palauig				0	933	2,241
	San Antonio				0	1,165	2,799
	San Felipe				382	676	1,623
	San Marcelino				894	1,582	3,801
	San Narciso				559	990	2,378
	Santa Cruz			1	1,192	2,271	4,858
	Subic				1,147	2,029	4,874
	Total	**0**	**1**	**2**	**12,906**	**28,311**	**64,807**

source : IOTN

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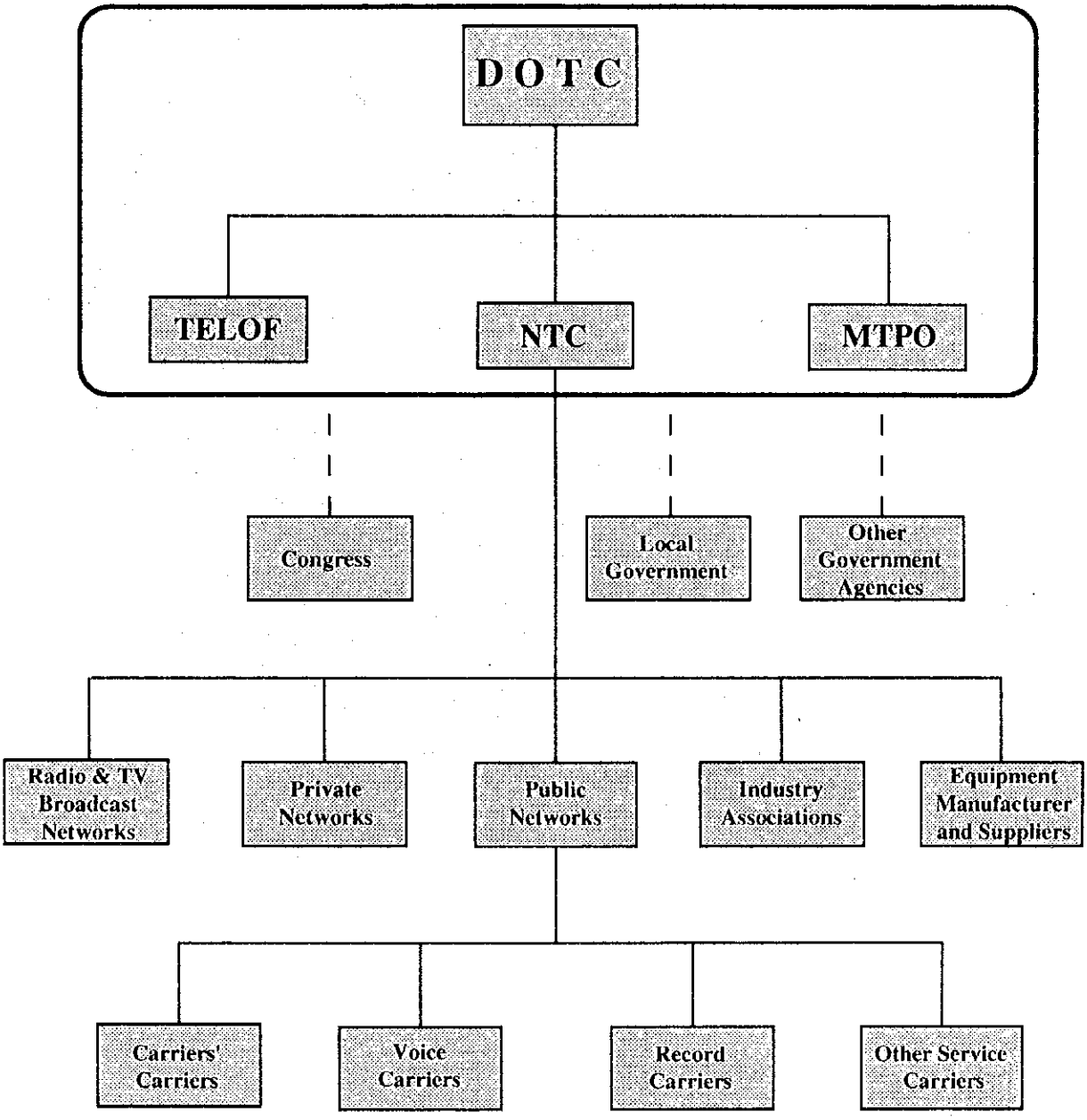
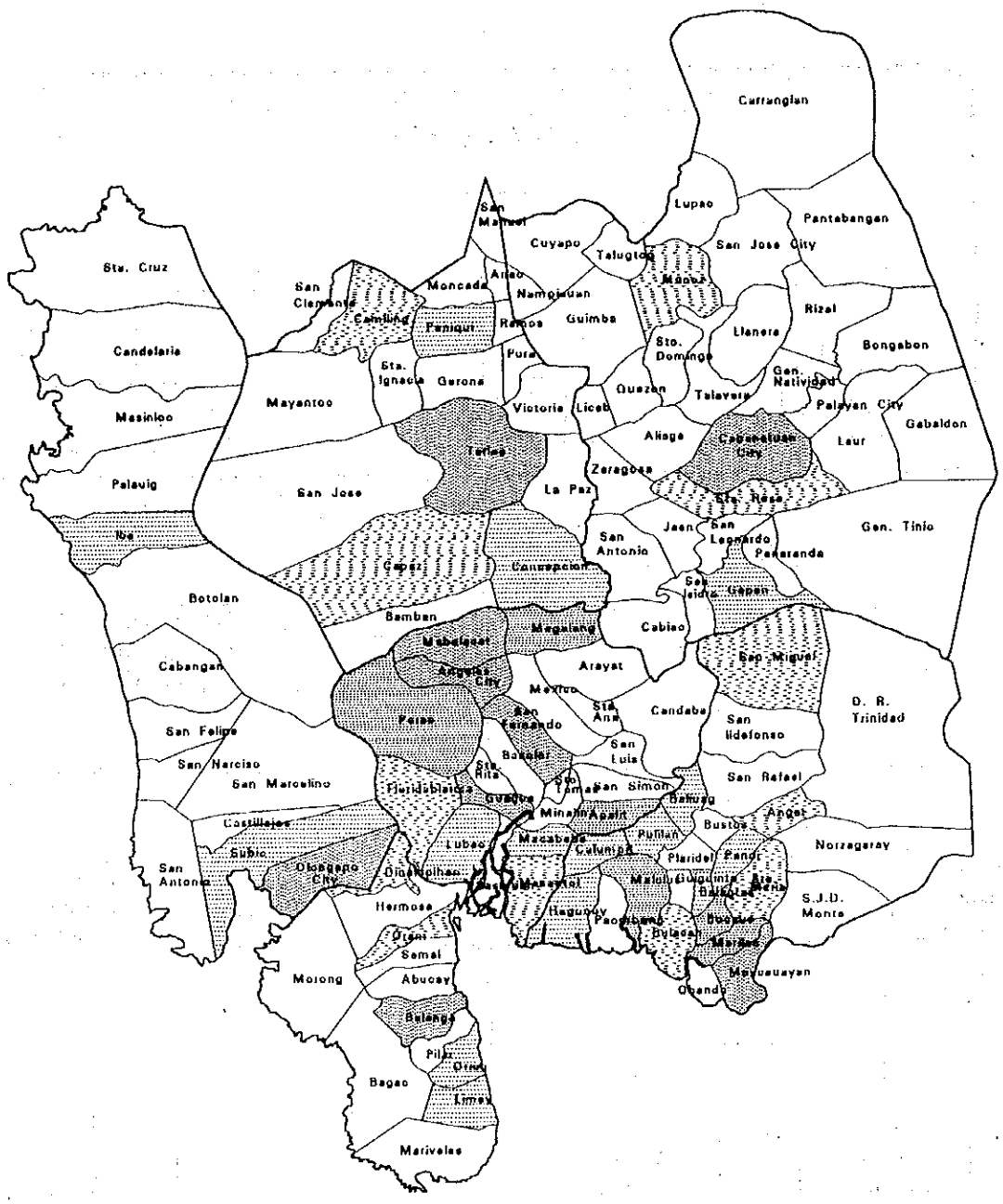
TELECOMMUNICATIONS

F I G U R E S



DOTC : Department of Transportation & Communications
MTPO : Municipal Telephone Projects Office
NTC : National Telecommunications Commission
TELOF: Telecommunications Office

Figue 4.1 Structure of Telecommunications Sector



Legend

Provincial Boundary

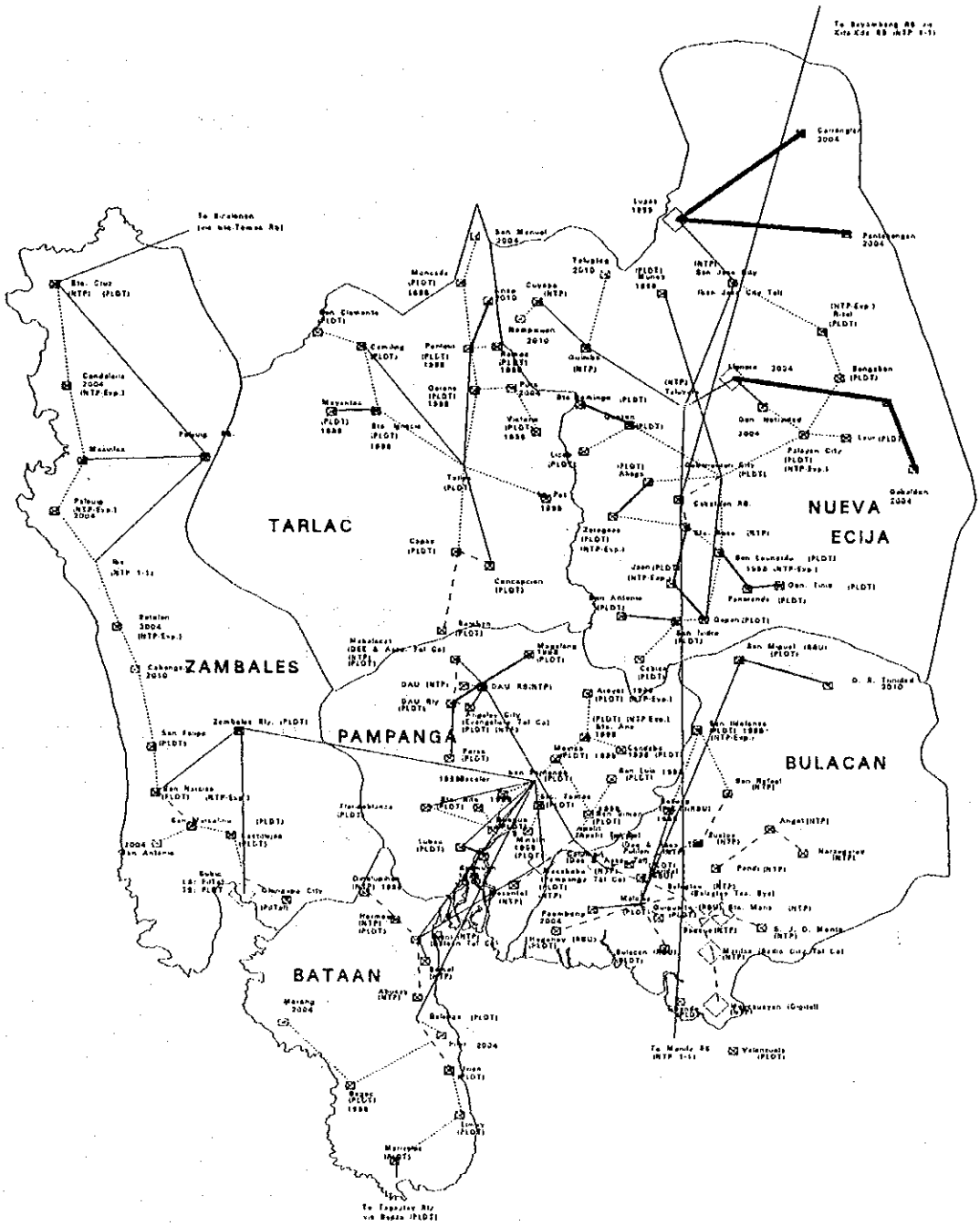
Telephone Capacity (Lines)

- 0 - 100
- 100 - 300
- 300 - 600
- 600 - 1000
- 1000 - 9400

Meter

0 50000 100000

Figure 4.2 **Municipalities with Telephone Facilities and Corresponding Capacity**



Legend

- Repeater Station
- Existing and Planned Combined (Toll and Local) Exchanges
- Existing and Planned Local Exchanges
- Existing and Planned Pure Toll Exchanges
- Existing and Planned RSU
- New Local Exchanges
- New RLU
- New RSU
- Non Served Municipalities after 1998

- Existing Radio Link
- Existing Cable Link
- New Digital Radio Link (1998)
- New Optical Fiber Link (1998)
- New Digital Radio Link (after 2004)
- New Optical Fiber Link (after 2004)

Meter

0 50000 100000

Figure 4.3 Planned Provincial Network by 2010

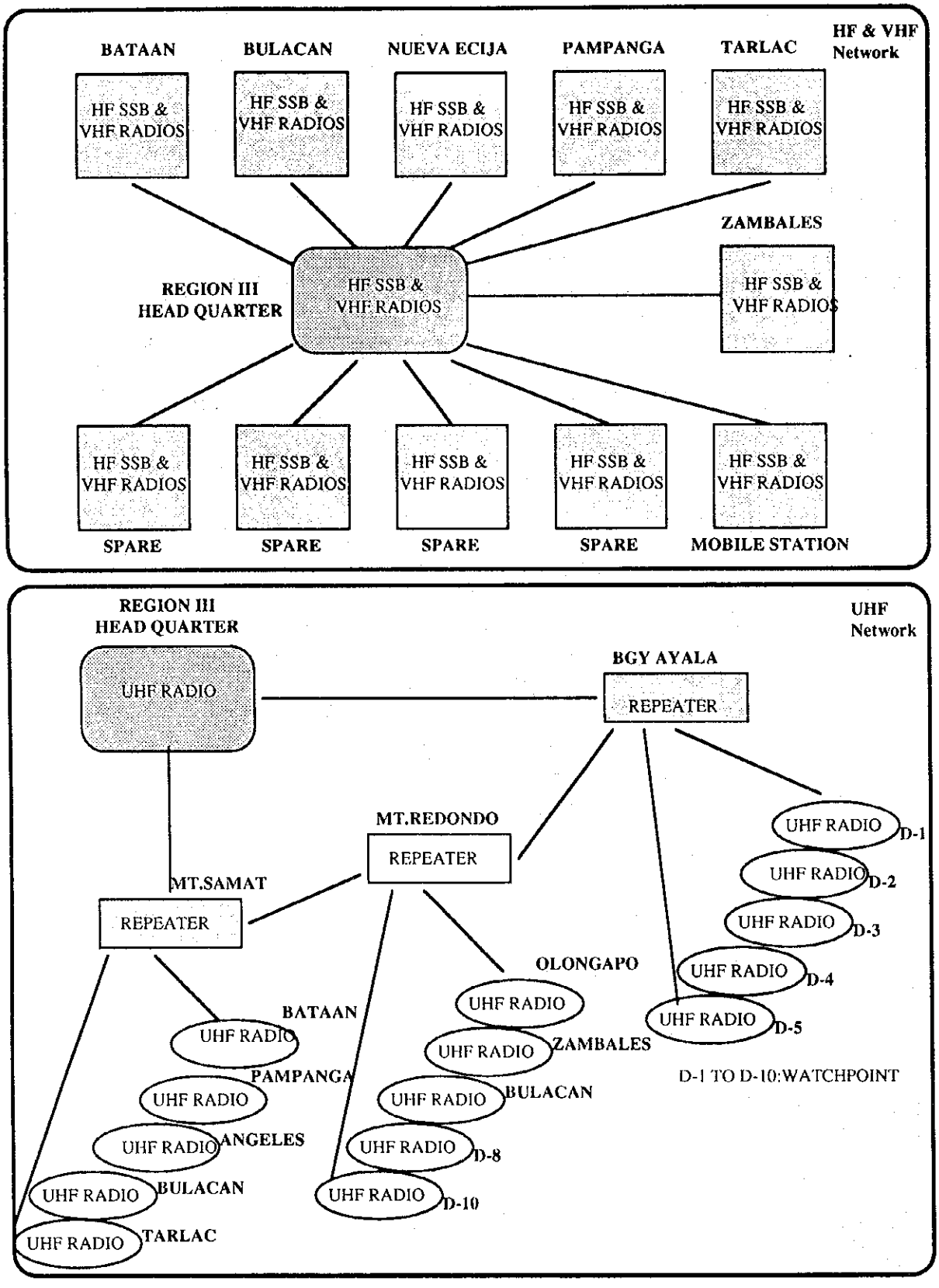


Figure 4 .4 Proposed Radio Network for PNP

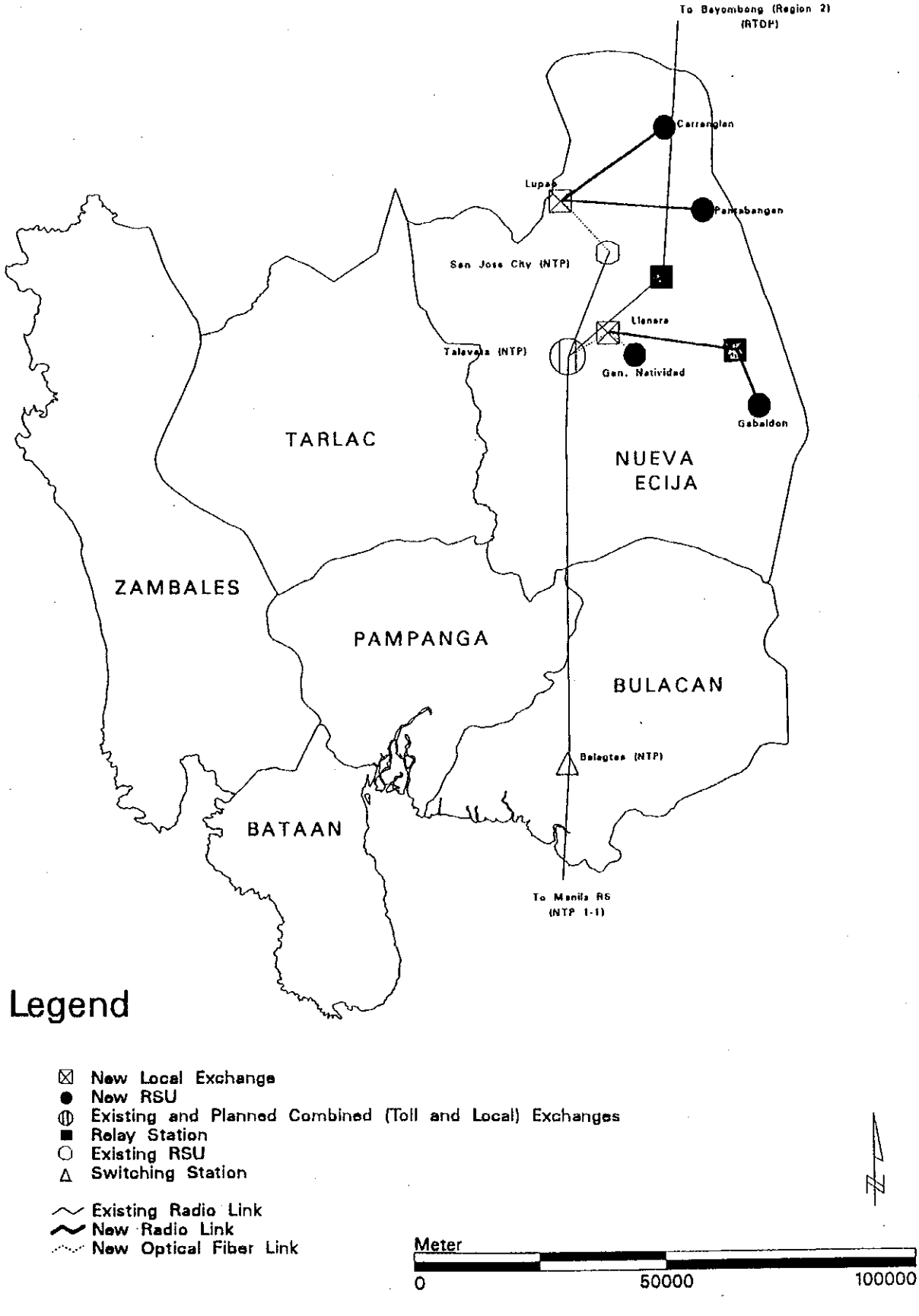


Figure 4.5 Transmission Route Plan

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Infrastructure

URBAN SYSTEM

5. URBAN SYSTEM

5.1 Existing Conditions of Urban Development

5.1.1 Urban development policies and institutions

(1) Urban development policies

A notable feature of the current Medium Term Philippine Development Plan (1993-98) is apparent lack of urban development policies. In fact, urban development policies in the Philippines are embedded in regional or rural development policies, which in essence encourage industrial dispersal or promotion of industries in areas other than Metro Manila.

A general consensus exists among relevant government agencies that selected urban centers having superior industrial potential and/or better infrastructure should be encouraged for accelerated industrial development. NEDA and DTI have respectively designated regional centers as the focal points in industrial dispersal.

Among the policies in the current Medium Term Plan for the infrastructure sector are the following related more to growth centers and urban infrastructure.

- Strengthen infrastructure support to socially depressed areas and to growth centers and areas with the highest growth potential;
- Adopt the integrated area development approach in the planning, programming and implementation of complementary support infrastructure (e.g. roads, irrigation facilities, water supply, etc.) for regional growth centers, tourism areas, and identified poverty areas; and
- Give priority to appropriate sanitation infrastructure facilities (e.g. toilets, water supply and sewerage) in Metro, Manila and other urban centers, especially in depressed area.

In all the policy statement above, socially depressed areas are designated together with urban/growth centers. Another reflection of this rural orientation even in the urban development is the renaming of the Regional Industrial Center Program launched at DTI in 1988, which is now called the Regional Agro-Industrial Growth Center Program.

The 1991 LGC has developed numerous central government functions to LGUs and give in greater roles to NGO's and the private sector in urban development and urban services delivery. It empowers a city and municipality to carry out the following:

1) to approve ordinances and pass resolution necessary for an efficient and effective local government,

2) to generate and maximize the use of resource and revenues for the development plan, program objectives and priorities of local government with particular attention to agro-industry development and local government-wide growth and progress,

3) to enact ordinances granting franchises and authorize the issuance of permission or licenses, upon such conditions and for such purposes intended to promote the social welfare of the inhabitants,

4) to regulate activities related to land use, building, and structure within cities and municipalities in order to promote social welfare for said purpose,

5) to approve ordinances which shall ensure the efficient and effective delivery of basic services and facilities, and

6) to exercise such other power and to perform such other duties and functions as may be prescribed by law and ordinance.

(2) Primary agencies for urban development

NEDA and its regional offices are responsible for preparing spatial development plans for the Country and all the regions. NEDA has established a regional hierarchical classification of urban centers and designated regional centers with a view to accelerating the growth of less developed regions radiating development impact of the designated centers.

There are two major institutions dealing with urban development: the Housing and Urban Development Coordination Council (HUDCC) and the National Land Use Committee (NLUC), an inter-agency committee headed by NEDA concerned mainly with preparation of the National Physical Framework Plan (NPFP). This long term plan has four main components of production, protection, settlement and infrastructure proposals.

Various line agencies such as DPWH, implement urban related programs and projects at the national level. LGUs formulate local policies pertaining to urban development and are responsible for implementation of local programs and projects.

Regarding human settlement development, HUDCC is charged with a main function of coordinating activities of government agencies to ensure the accomplishment of the National Shelter Program.

This agency provides the structure for housing policy formulation and program coordination among the four housing related agencies: the National Housing Authority (NHA), the National Home Mortgage Finance Corporation (NHMFC), the Housing and Land Use Regulatory Board (HLURB) and Home Insurance and Guaranty Corporation (HIGC). Other related agencies supporting settlement development are the National Economic and Development Authority (NEDA), the Department of Budget and Management (DBM), the Department of Finance (DOF), the Department of Public Works and Highway (DPWH) and the Development Bank of the Philippines.

5.1.2 Current urbanization

(1) Definition of urban area

The concept of an urban area refers to a limited geographical area inhabited by relatively dense population. Urban areas are specified in Philippines as follows:

1) All cities and municipalities having a population density of at least 1,000 person per km^2;

2) Central districts or Poblacions of cities and municipalities which have a population density of at least 500 persons per km^2 and

3) Central districts and poblacions not included in 1) and 2) regardless of the population density size which have the following:

   - street pattern or street network in either parallel or right angle orientation;
   - at least six establishments (commercial, manufacturing, recreational and/or personnel services);
   - at least three of the following:

     a town hall, church or chapel with religious service at least once a month;

     a public plaza, park or cemetery,

     a market place or building, where trading activities are carried on at least once a week, and

     a public building, like a school, hospital, puericulture and health center, or library.

   - barangays having at least 1,000 inhabitants which meet the condition set forth above and where the occupation of the inhabitants is predominantly non-farming nor fishing.

(2) Urbanization trend

Urbanization in the Philippines

Urbanization in the Philippines was from the onset characterized by the primacy of Metro Manila, which is still increasing. The ratio of urban population to the total was 30% already in 1948 and increased steadily to 37.4% in 1970 and 48.5% in 1990, among the highest in Asian countries.

Urbanization is accelerating in the Philippines, and the average growth of the national urban population reached 5.0% per annum during 1980-90. Higher growth rates are observed in Central Luzon, Southern Tagalog and regions in Mindanao, exceeding 6.0% per annum in the same period. The ratio of urban population exceeds 50% only in Central Luzon and Southern Tagalog coterminous with Metro Manila (Table 5.1).

Urbanization in Central Luzon

Due to its vicinity to Metro Manila, the development of Central Luzon has been strongly influenced by the growth of this capital region. Population concentrates along the highways leading from Metro Manila, and the ratio of urban population is the highest at 80% in Bulacan owing to spillover effects from Metro Manila.

Angeles City has the largest urban population with 236,000 in 1990, followed by Olongapo City (193,000), San Fernando (157,000) Cabanatuan City (135,000), Malolos (125,000) and Meycauayan (124,000). The largest concentration of urban population is observed along the Manila North road, especially between Meucauayan and Malolos, and San Fernando and Angeles City. Another concentration is between San Fernando and Lubao along the road to Dinalupihan (Figure 5.1). Urban population in Central Luzon is summarized in Table 5.2 by municipality or city together with other related data.

5.1.3 Existing urban centers and services in Central Luzon

(1) Angeles City

Angeles City in Pampanga with 33 barangays has the largest population of 237,000 in 1990. Population density is the highest at 3,925 per km^2, compared to the regional average of 339 per km^2 and the provincial average of 703 per km^2. The population growth was 3.79% per annum during 1970-80, but declined to 2.28% in 1980-90.

The unemployment ratio increased from 4.3% in 1989 to 8.2% in 1990 reflecting the Mt. Pinatubo eruption, and further to 8.5% in 1991 after the closure of the Clark Air Base. About 80% of the total employment opportunities are in non-agricultural sector.

The average annual income of Angeles City declined drastically from ₱54,791 in 1985 to ₱47,996 in 1988. Still this is much higher than the regional average of ₱41,510 or the national average of ₱35,799. The city collected the average local government revenue of ₱58.7 million during 1987-90, making it the first class city.

The Division of Public Services in the city collects an average of 400 m^3 solid waste daily, which is disposed at a 3 ha dump site in barangay Cayuayan. The capacity of the site is sufficient for another 15 years. Shortages of dump trucks are pointed out.

Two large industrial estates exist: Angeles Livelihood Village and the Clark field. The northeastern part of the city and Margot and Anumas along the Aracan river have been recently designated as industrial areas.

(2) Cabanatuan City

Cabanatuan City situates at the strategic location as the gateway to the Cagayan Valley, resource rich Aurora and the fairly progressive north-eastern Pangasinan. The advantageous location makes it a natural commercial interchange point, processing raw materials from North to final destination point of Metro Manila and acting as a distribution center. There are two universities, five colleges and 12 high schools as higher educational facilities including both public and private schools in the city. Cabanatuan City is thus characterized as a primary trade center and educational center.

Cabanatusn City is composed of 88 barangays with population of 173,000 in 1990. Among those barangays, 40 barangays belong to poblacion (urban area). the urbanization is slow, and the average growth rate was 2.28%, compared to the regional growth rate of 2.58% during 1980-90. The population density was 898 persons persq. m of 1990. The urban population account for 78%.

There were 3,410 business establishments in the city in 1989. The agricultural sector is still the leading sector in term of employment and income generation. Whole sail and retail establishment account for 46% followed by business services of 21%, eateries of 11% and manufacturing industry of 5%. The Cabanatuan agro-industrial trading center is proposed for agro-industry oriented activities including commercial center, slaughter house and cold storage with the site area of 60 ha endorsed by the city.

Flooding in the city proper along the Pampanga river is one of main problems during the rainy season. Severe traffic congestion occurs during the peak hours in the morning and evening because of high degree occupation of tricycles within the city proper and lack of the traffic control system. In addition, the Cagayan Valley road (Maharlica highway), a main trunk road, passes the poblacion inter- and intra provincial traffic flow are mixed on the road.

About 49% of a total households are served by waterworks system and the present average consumption per connection is 42.2 m^3 per month. The City Water District supplies the service only for the pobracion area excluding the four surrounding barangays.

(3) Olongapo City

Olongapo City is located at the southernmost part of Zambales and lies 127 km northeast of Manila. It shares borders with Subic in Zambales in the north, Dinalupihan in the west and Morong in the south. The city is composed of 17 barangays with population of 193, 300 in 1990. The Average population growth rate slowed down to 2.14% during 1980-90 from 3.79% during 1970-80. The population density is 613 persons per km^2 as of 1990.

The total population of 15 years old over and above is 125,624, and the unemployment is 9.7% in 1990. Non-agriculture sector accounts for 93.4% of the total labour force in 1990.

The average family income of ₱72,973 in the city is the highest among the cities and municipalities in Central Luzon as of 1988. In term of 1985 constant price, the income in 1988 had decreased slightly from ₱72,600 in 1985.

After the closure of US navel base , the employment situation in the city became worse. About 66,000 were employed by the Subic base. In 1992, the Bases Conversion Development Authority (BCDA) was established for the implementation of the conversion project. The operation and implementation arm of BCDA in developing the Subic Bay Freeport Zone (SBZ) into self-sustained industrial, commercial, financial and investment center is the Subic Bay Metropolitan Authority (SBMA).

(4) Urban services in other urban centers

Over 95% of urban households are already provided with improved water supply. The service coverage varies only slightly among provinces ranging from 98.7% in Tarlac to 92.7% in Zambales in 1990. Sewerage services are practically nil in Central Luzon.

In practically all dominantly urban municipalities, where the share of urban population exceeds 70%, electricity is available for over 80% of households. In most urban municipalities, over 90% of households are supplied with electricity. Water toilet facilities are used by more or less 50% of households in the dominantly urban municipalities.

Garbage collecting services are not popular even among the urban municipalities. The ratio of households served are 76.9% in Olongapo City, 49.6% in Angeles City and 25.2% in Cabanatuan City as of 1990. Other urban municipalities relatively well served are Mariveles (34.3%) and Balanga (19.2%) in Bataan, Bocaue (33.6%) and Maycauayan (30.6%) in Bulacan and Mabalacat (28.2%) in Pampanga.

Telephone availability is by far the lowest of all the urban services, and more than 4% of households receive telephone service only in Balanga in Bataan, Bocaue, Malolos, Marilao and Maycauayan in Bulacan, Cbanatuan City in Nueva Ecija, Angeles City, Guagua and SabFernando in Pampanga, and Olongapo City in Zambales. Service levels of utilities are summarized in Table 5.3 by municipality or city.

5.1.4 Existing conditions of housing in Central Luzon

(1) On-going housing programs and projects

The current development policy for housing emphasizes mainly construction of socialized low cost housing and improvement or alleviation of squattered areas in urban areas.

The current housing program consists of the Slum Improvement, the Relocation and Resettlement , the Site and Services, the Completed Housing, the Medium-rise Housing, the Emergency Housing Assistance and the Community Mortgage Programs associated with the private sector for low to middle income families. However the lower 30% of target beneficiaries are not adequately served. This could be attributed to the relatively low productivity and budget constraints.

Under the above circumstance, NHA has 13 housing projects (12 on-going and 1 completed in 1990) in Central Luzon. The majority of these projects are located in major urban centers and densely inhabited areas like Angeles City (5 projects), Cabanatuan City in Nueva Ecija, Dinalupuan and Limay in Bataan (2 projects), Tarlac municipality (2 projects) and other areas in Pampanga. The total cost of these projects is ₱114.5 million and the social security system has extended a total of ₱ 3.51 million for the housing repair and improvement loans during 1988 to 1992 in the region.

A total of 37,701 units in 37 project areas has been produced in the region. A bulk of disaster families were generated by the earthquake in 1990 and the Mt. Pinatubo eruption in 1991 with 62,000 victims. The Emergency Housing Assistance Program is being carried out in the region through NHA by the Mt. Pinatubo Commission (MPC).

A total of 34 resettlement sites are located: 15 sites in Pampanga, six in Tarlac, eight in Zambales, three sites in Nueva Ecija and two off-sites in Bukidnon and Mindoro. These sites are classified broadly into 21 lowland and 13 upland resettlements. The resettlement and livelihood project is being implemented by MPC upto 1998.

(2) Housing needs in Central Luzon

During 1980-90, the average population growth rate in the Philippines was 4.56% in urban areas and 1.58% in rural areas. Accordingly pressure of housing need in urban areas is

increasing rapidly by immigrants from rural areas as well as natural increases especially in NCR, Region III and Region IV.

Areas suitable for low cost housing are gradually decreasing due to high land prices caused by recent population concentration and land speculation in Metro Manila and main urban centers in Central Luzon. Especially, the supply of low cost housing is facing a difficulty within a 20-30 km radius from the Central Business District (CBD) of Metro Manila in the southern part of Bulacan by the spillover from Metro Manila.

Undesirable housing conditions are observed in double-up houses where two or more households occupy the same dwelling unit with substandard facilities. There are 27 squatter areas with 94,135 population in Central Luzon in 1990, which account for 3 % of the total in the Philippines.

According to the medium term development plan by NHA, the annual housing needs amount to 71,300 in Central Luzon and 108,400 in NCR, accounting respectively for 11.1% and 16.9% of the nation's needs, 642,200 during 1993-1998. Total housing needs during 1993-98 including those to be satisfied by the private sector are summarized in Table 5.4

Bulacan and Pampanga account for 55 % of the backlog in the region largely due to their proximity to NCR and advantage of hosting the major and highly populated areas like Angeles City, San Fernando, Baliuag and Meycauayan. Substandard housing requiring replacement or upgrading increased from 24,756 units in 1980 to 215,485 units in 1990. Of these housing units 70 % are in urban areas, and Tarlac and Nueva Ecija account for 36 % of the total unacceptable housing units.

5.1.5 Existing plans for special development areas

(1) Clark Air Base

Background and objectives

The Clark base is located 80 km north of Metro Manila and 70 km north-east of Subic Metropolitan Area. Metro Manila, Clark and Subic would form the national triad growth centers.

The closure of the former Clark air base caused unemployment of workers and relocation of related business. A master plan for the base conversion was prepared by the Clark Development Corporation (CCDC).

The central piece project of the Clark air base conversion is to establish a civil aviation complex as an premier international airport in the Philippines. The existing Ninyoi Akino International

Airport (NAIA) is already close to the saturation point in terms of capacity during peak periods, and its expansion is difficult due to land acquisition problems.

The Clark base is designated as a Special Export Zone and Freeport (SEZF) with main features of tax and duty-free importation of raw materials, goods and equipments, and exemption of local and national taxes except for 5 % corporate tax on gross income earned.

Development components

According to the master plan by CDC, the development comprises a total area of 4,440 ha for the initial phase consisting civil aviation area, industrial area, housing area, and tourism and commercial area. Light to medium industry and agro-industry developments are proposed for the expansion phase in 23,600 ha within the base area.

Development components are summarized below.

1) Initial phase

- Civil aviation area		1,620 ha
- Industrial area		1,020 ha
	Industrial estates 1	Export-oriented and airport linked industries (320ha)
	Industrial estates 2 and 3	Large scale, high technology, assembly type of industries and agro-industry processing plants (130 ha, 270 ha)
	Industrial estate 4	High-tech computer /software, electronics, pharmaceutical and other light industry (300 ha)
- New town area		1,000 ha
- Institutional area (university, hospital and others)		800 ha
- Total		4,440 ha

2) Expansion phase

The expansion phase would be developed for agro-industry oriented and light to medium industry with 23,600 ha of land area. There are three agro-industry zones of 7,205 ha, 3,052 ha and 13,344 ha in the area

Related transport and infrastructure development

1) Extension of North Luzon Expressway

The San Fernando-Mabalacat road section (29 km) would be implemented through expansion of the North Luzon expressway to reduce travel time from Metro Manila.

2) Access road construction

The Mabalacat and the Angeles bypasses would be constructed to improve access to the international airport.

3) Rapid mass transit system construction

A rapid mass transit system is proposed using the right of way of the existing north railway for shortening time from Manila to the international airport.

4) Power supply

Construction and operation of an additional 100 MW unit is proposed under a BOT scheme.

5) Telecommunication

A telecommunication master plan will be carried out by a foreign consulting firm.

6) Water supply and distribution system

A feasibility study will be conducted for the water supply system by a Malaysian firm.

7) Sewerage treatment plant

A feasibility study of sewerage treatment plant is being conducted as of the end of August in 1994.

8) Solid waste disposal and management

A feasibility study on the viability/suitability of sanitary disposal of solid wastes will be carried out.

Development schedule

According to the Executive Order No. of 174 of 28 April 1994, the international airport would start operating with an initial capacity of 14 million passengers in 1998. CDC expects that

implementation of the initial area (core area) as a special economic zone would be fully developed within next five years.

Current investments

As of June 30, 1994, 25 lease agreements had been signed for 14 industrial projects(123 ha), seven commercial project(11 ha), two aviation-oriented projects(36 ha), a service-oriented project(0.4 ha) and a tourism estate project(152 ha). The total area of the land lease is 322 ha, and the total employment is expected to be 24,700 workers within next five years.

(2) Subic Bay Metropolitan Area

Background and objectives

Subic Bay has a natural deep-sea and shelter port with advantageous location close to Taiwan, Honkong, Singapore, Japan and other Southeast Asian countries. After the closure of the US navel base, support infrastructure facilities inside of the zone are available such as water supply system, sewerage system, telecommunication system, power system, airstrip, pier and berth. With the available large accumulation of skilled labours employed by the former US Navy and existing infrastructure and other facilities, industrial and commercial firms can be easily established.

Master plan

According to the initial master plan, the following components are proposed.

1) Industrial estates

The existing warehouse area is designated as industrial estates of 100 ha and 320 ha for the initial stage up to the year 2000. Additional industrial estate with land area of 2,760 ha is proposed for the second stage. Preferred industries in the Subic industrial estate include light to medium industries.

2) Tourism area

There are proposed tourism areas along the coast of the Subic bay, Redondo peninsular, and Pecuene and Mayanaga islands. These areas have existing facilities for golf, fishing, scuba diving, nature trails and other water sports.

The core area for beach resort with land area of 5 ha including a resort hotel is located at the Mabay beach. Some 10,700 ha land area is designated as reservation and wild life sanctuary.

3) Housing

New low cost housing will be provided along the periphery of industrial estates, and new executive housing and condominium area will be located along the Kalaklan and Bajac rivers.

4) Commercial development

The commercial development area has 150 ha of land area along the main boulevard of the waterfront as a muiti-use zone. Various facilities are planned for tourism and trade related purposes including a hotel, convention center, trade center and water related facilities such as aquarium and aqua sport facilities.

5) Container port

Existing port facilities at the navel supply depot might be developed for commercial general cargo with 70 ha of land area. The purpose is to serve for feeder vessels, container handling and off-shore supplies and anchors.

The general cargo port at the navel supply depot may have a function of the saturation point. In accordance with the future demand, a new international cargo port would be developed at the Binanga port , Bataan, at an entrance of the Subic bay.

Related transport and infrastructure development

1) Manila-Subic Bay/Olongapo coastal road

The coastal road is expected to be developed as a BOT project.

2) Ferry services

Manila-Subic bay ferry services are proposed to link the Subic area with Grande, Pecuene and Mayangana islands.

3) Airport

The existing airport would be upgraded to handle both domestic and international flights.

4) Water supply system

The water supply system would be developed extensively to meet the future demand of all industries in the area.

5.2 Urban Development Issues in Central Luzon

5.2.1 Issues and constraints related to urban development

Current constraints of the urban area in Central Luzon is summarizes as inefficient land utilization, deterioration of urban environment, and of living conditions and high unemployment rate due to lack of urban development implementation system and the calamity of the Mt. Pinatubo eruption and the with drawal of US army at Clark and Subic Base in 1991.

(1) Urban development administration

There is no distinct major body which is responsible for urban development within the existing administrative structure in the nation. While various agencies have certain urban related functions, these functions are either limited or applied within the context of broader sectoral goals which do not specifically target the urban development.

Philippine cities have zoning ordinances, but they are often ignored or circumvented by commercial and housing development. Spatial development of cities and towns is in principle to be guided by physical components of local development plans. LGUs, however, have no adequate capability to accomplish this function.

(2) Planning and management capability

The Local Government Code was enacted in 1991 for devolution, but LGUs have very limited experience in integrated urban development planning. Such a multi-dimensional planning would have to deal with 1) interpretation of the national and regional policy frameworks, 2) sector linkages, 3) intra- and inter-regional economic activities, 4) relations among development institutions and administration, and 5) time-framework for priority projects/programs implementation.

There exist no effective planning review and monitoring system for development projects. Developers often overbuild to the edge of property lines, disregard pedestrian rights of way, and avert required provision of adequate car parking areas. Results are poorly planned, chaotic urban spaces.

Shortages of budget allotments are observed at various administration levels. Major revenue sources of a municipality or a city are real property tax and internal revenue allotment (IRA). Other potential resources are revenue to be generated from licenses and fees and other local taxes such as amusement taxes and corporate taxes that municipality and city are authorized to levy under the Local Government Code. Regarding the tax collecting system, administration costs to collect these revenue are high.

(3) Urban hierarchy

An urban center plays important roles to collect and distribute goods, services and information in its hinterland. The center induces the accumulation of additional economic and social activities. Functions of an urban center may be listed as follows:

- to link with other urban areas and between urban and rural areas,
- to provide a distribution center for goods,
- to serve social activities such as higher education and medical and health services,
- to create employment opportunities for rural migrants, and
- to stimulate development of basic infrastructure such as solid waste disposal, telecommunications, electricity, high quality water supply and market facilities to rural areas.

Linkages between urban centers and rural areas in Central Luzon have not been developed to attain these functions. A stronger urban hierarchy needs to be established.

5.2.2 Housing development issues

(1) Affordability

Along with the urbanization in Central Luzon, land prices for housing are gradually increasing especially in areas along arterial roads. More serious housing related problems occur in urban areas than in rural areas. Affordable levels of housing have decreased without income increases.

Unorderly urbanization is proceeding with ribbon type development and linear type development along main arterial roads by the private sector in Bulacan and other areas without rational land use plans. Low cost housing supply is limited in urban areas.

The existing mortgage system is not adequate to serve housing loan requirements of low to medium income families. While massive housing backlog for improving existing housing units exists in rural areas as well, the purchase capability is low in rural areas compared with that of urban areas.

(2) Budget constraints

Various housing schemes adopted by NHA cover housing needs of the urban population to the 50th percentile income distribution. The annual production capacity of low cost housing by

NHA increased from 12,274 units during 1975-1985 to 28,867 units during 1991-1993. However the aggregate contribution of NHA in low income housing covers only about 30 to 40% of housing needs of the sector due to low purchase capability and production level.

Both production capacity and availability of resources are indicative of the service level of the program. The shelter program aims to increase its service level, and in particular NHA aims to expand the program coverage to include all urban centers in the Country. The basic difficulty in program expansion is the lack of long-term funding. Therefore improvement of financing system is required for the sustainable implementation of the shelter program.

(3) Substandard residential units and facilities

The average floor area is 30-40 m^2 per residential unit. In urban areas, many residential areas lack basic facilities such as paved access road, water supply and toilet facilities.

5.2.3 Urban environment issue

Increasing population and industrial growth in urban centers is spawning causing a range of environmental problems such as solid waste, water pollution, air pollution and noise pollution, and traffic congestion. Various policies are being issued to promote healthy urban environment. They include the Philippine Strategy for Sustained Development (PSSD) which addresses the urban ecosystem as a key area concerned. A specific focus is placed on urban industrial pollution as well as congestion. Likewise the Local Government Code, the Forestry Master Plan and the National Physical Framework Plan include provision for environmental concern. The need to incorporate geological consideration in planning and zoning activities is being promoted.

5.3 Strategy and Frameworks for Urban Development

5.3.1 Strategy for urban development

The urban system in Central Luzon should be streamlined to serve people in urban and rural areas better. For this, first the structure of urban centers should be strengthened by clarified characteristics and functional division of major urban centers, and second links between these major urban centers and other urban and rural centers should be improved. This would call not only for selective improvement of infrastructure and utilities but also for establishment of a better delivery system of basic services in line with the decentralization policy of the Government.

In the envisioned structure of urban centers, one urban agglomeration may attain a special status. This is the area from San Fernando via Angeles to Mabalacat along the Manila North Road. Combined urban population of these urban centers was 504,000 in 1990, by applying

the average growth rate of this region's urban population or 6.0% per annum, the urban population in this area could be over 1.6 million by the year 2010, much larger than the present population of Metro Cebu (1.27 million in 1990).

Financial and administrative capacities of LGUs need to be much expanded to realize a better urban structure with an appropriate service delivery system and to substantiate the devolution of various functions. In particular planning capabilities of cities and municipalities need to be upgraded not only to anticipate and guide future extension of urban areas but also to effect better management of urban environment. Also, the local tax system needs to be reformed to improve the financial base of LGUs.

Coherent urban development policies need to be established, as close to 50% of people now live in urban areas generating some 70% of the GDP through industrial and service activities. Such policies should define clear objectives and priorities in national development and strategy in relation to rural development. Functional division among various related agencies should be clarified under such policies.

5.3.2 Hierarchical structure of urban centers

(1) National Triad Growth Centers

The urban pattern in Central Luzon is more concentrated. The three broad areas of urban population concentration are defined as follows.

Subic Bay Metropolitan Area

This area covers Olongapo City, Zambales where the Subic Bay Metropolitan Authority has its headquarters and its neighboring areas. Special economic zones may be expanded to Donalupihan, Hermosa and Morong , Bataan as well as Subic, Zambales. The combined population of these municipalities and the city was 350,000 in 1990 of which 312,000 or 89% was urban.

San Fernando - Angeles Metropolitan Area

This area extends along the Manila North road and Northern Luzon expressway from San Fernando, through Angeles city to Mabalacat. The neighboring municipalities of St.Tomas, Mexico and Bacolor may also be included The combined population of these municipalities and the city was 686,000 in 1990, of which 620,000 or 90% was urban.

Bulacan conurbation

This is the area in Bulacan directly affected by the spill-over from Metro Manila. It includes 15 municipalities along main highways radiating from Metro Manila, but those in the eastern

mountainous area and the fishery municipality of Hagonoy are not included. The total population was 1,013,000 in 1990, of which 923,000 or 90% was urban.

(2) Definitions of urban centers

Urban centers are classified based on economic functions. Characterization and functions of urban centers at different tiers of urban hierarchy are summarized as follows.

National capital	Highly specialized service functions including not only national administrative function but also high-ordered functions of finance, information, higher education, research and development, and head offices of companies
Regional center	Large multi-functional urban center with high-order functions serving the whole region, including regional administration, regional financial service, higher educational center, regional medical center, regional commercial service and regional industrial center
Regional sub-center	Multi-functional urban center with relatively high order functions serving the sub-region
Main urban center	Medium sized multi-functional urban center with sub-regional business center functions, sub-regional service center functions sub-regional educational function and industrial area
Service urban center	Urban center serving the rural hinterland with distribution functions of agricultural input, commercial functions dealing with agricultural products, agricultural supporting facilities, agro-processing center function, and social services
Rural center	Rural urban center with basic urban services such as town hall, schools, and markets for neighboring rural communities

(3) Criteria for urban hierarchy

Urban centers are classified with respect to delivery capacity and effectiveness of various urban services. Factors to be considered for the determination of a hierarchical structure of urban centers are described below.

Existing accumulation of urban population and economic activities

A city/municipality with certain scale of population has already accumulation of multi-functions especially administration, commerce and manufacturing activities. Urban centers are classified based on combination of the population scale, number of employment in manufacturing and number of banking institutes by municipality and city.

Population factor	
Regional center	more than 150,000
Regional sub-center	more than 100,000
Major urban center	more than 80,000

Present and expected administrative and other specialized functions

Locational conditions determine largely the ability of any urban center to collect and distribute goods and services. In a highly urbanized city, economic and social activities of the city might spill over to neighboring areas. A large scale strategic development area especially Special Economic and Freeport Zone(SEFZ) might create employment opportunities, commercial, and tourism functions.

Resource potentials and constraints

An urban center is basically a settlement site for people and their activities, and desired basic natural physical features of the urban center include suitable land for various facilities with adequate drainage and ample water resources. Potential areas for commerce and business purposes are expected to have productive rural areas, ecologically sound hinterland, easy access, existence of coastal areas for deep waterway and tourism attractions. Topography is another crucial factor as well as existing infrastructure.

Social service facilities

Existing education and health facilities and access to education, health and other social services are also factors to be considered.

(4) Proposed urban hierarchy

A hierarchical structure of urban centers in Central Luzon has been analyzed based on the present distribution of population and urban centers, distribution of manufacturing and service establishment, land capability, existing infrastructure and urban facilities as outlined above. A proposed urban hierarchy is shown in Figure 5.2.

Regional center

San Fernando is the regional center strategically located in relation to other provincial capitals and within the national growth centers. In addition to administrative functions with regional

and provincial offices, a variety of industrial and service activities are accumulating. Population growth was among the highest of all the municipalities and cities at 3.65% per annum during 1980-90. In terms of population alone, it is qualified as a regional center with 1990 population of 158,000.

Sub-regional centers

Considering the spatial extent of Central Luzon, three sub-regional centers may be designated. Cabanatuan City with the 1990 population 173,000, Olongapo City with 193,000 and Malolos with 125,000 are all qualified with over 100,000 population. Malolos has been selected due to its dominant commercial and administrative functions, at present and expected. Olongapo City is expected to serve the western part of Central Luzon as an industrial, trade and tourism center. Cabanatuan City may be a primary center situated at a strategic point between the Northern Luzon and Metro Manila, and serve the northeastern part of Central Luzon with multiple functions. The latter includes higher education as the city has two universities, five colleges and 12 high schools.

Major urban centers

Eleven major urban centers may be designated to extend main urban services coverage to the entire region. These centers are Playan City, San Jose City and Gapan in Nueva Ecija, Tarlac, Meycauayan and Baliuag in Bulacan, Angeles City in Pampanga, Dinalupihan, Balanga and Mariveles in Bataan and Iba in Zambales. All of those centers are expected to have population in 2010 exceeding the qualification threshold of 800,000 except Palayan City and Iba. The latter are qualified for their administrative functions.

These are medium sized multi-functional centers with functions of sub-regional business/service center, sub-regional education center and industrial area. These centers are also equipped with some specialized functions, depending on locational and resource characteristics. These centers and their specialized function are summarized in Table 5.5 .

Service urban centers

Under the major urban centers, 23 service urban centers may be designed: four in Pampanga, five in Nueva Ecija, five in Tarlac, two in Bulacan, four in Zambales and three in Bataan. These centers serve rural hinterlands with distribution functions of agricultural input and output, agricultural support facilities, agro-processing and social services delivery functions.

Rural centers

Further down the tier are rural centers, which provide basic urban services to their rural neighborhood with a town hall, schools and local markets. All the remaining municipality capitals fall in this category.

The hierarchical structure of urban centers in Central Luzon with the National Triad Growth Centers is given in Figure 5.3. Characterization of urban centers in upper tiers of the urban hierarchy is summarized in Table 5.5.

5.3.3 Population distribution under Glocalization

The population in Central Luzon is projected to the year 2010 by municipality separately for urban and rural populations. The projection of urban population is in line with the hierarchical structure of urban centers, which reflects present accumulation of urban population and services, existing and expected functions of urban centers, and locational condition. Rural population is assumed at present levels, indicating the loss of rural population would stop due to revitalization of rural economy. Projected urban and rural population by municipality are adjusted to fit to trend increase and to reflect the land use plan under the Golocalization and distribution of potential urban/industrial areas.

Projection results for major urban centers and provinces are given in Table 5.6 and illustrated in Figure 5.4. Projected urban and rural populations are summarized below by province.

Projected Urban and Rural Population by Province in Central Luzon

(1990-2010 growth rate p.a. in parenthesis)

	1990			2010		
Province	Urban	Rural	Total	Urban	Rural	Total
Bataan	317,528	108,275	425,803	680,000 (3.91)	114,000 (0.26)	794,000 (3.19)
Bulacan	1,199,906	305,313	1,505,219	2,446,000 (3.62)	270,000 (0.61)	2,716,000 (3.00)
Nueva Ecija	511,549	801,131	1,312,680	1,119,000 (3.99)	799,000 (0.01)	1,918,000 (1.910
Pampanga	1,079,806	452,809	1,532,615	2,356,000 (3.75)	427,000 (0.29)	2,783,000 (3.03)
tarlac	256,594	603,114	859,708	597,000 (4.31)	669,000 (0.52)	1,266,000 (1.950
Zambales	365,690	197,302	562,992	832,000 (4.20)	186,000 (0.29)	1,018,000 (3.00)
Central Luzon	3,733,797	2,467,944	6,201,741	8,034,000 (3.91)	2,465,000 (0.00)	10,499,000 (2.67)

Urban population in the national triad growth centers is calculated from Table 5.6 as follows.

Urban population in National Triad Growth Centers in 2010

National Triad Growth Center	Constituents	Urban Population (1,000)
Subic Bay Metropolitan Area	Olongsapo city, Subic	545,000
with Extension	Dinalipihan, Hermosa, Morong	744,000
San Fernando-Angeles Metropolitan Area	San Fernando, Angeles city Mabalacat, Magalang, St. Thomas, Mexico, Guagua	1,568,000
Bulacan-Metro Manila Conurbation	15 Municipalities in Bulacan	1,899,000

Combined population of the national triad growth centers, if the extension area of Dinalupihan, Hermosa and Morong is included, would be 4,211,000 in 2010, accounting for 52% of the total urban population in Central Luzon.

5.4 Urban Development Projects and Programs

To support the Central Luzon regional development to the year 2010, a number of urban projects need to be implemented. Some projects planned by various implementing agencies of the Central Government and LGUs are endorsed by the CLDP Master Plan for early implementation. More projects need to be derived through further studies.

5.4.1 Urban development projects and programs

The following eight projects and programs are essential for the Central Luzon regional development.

(1) Integrated Urban Development Program,
(2) Urban Land Readjustment Program,
(3) Urban Renewal and Industrial Modernization,
(4) San Fernando-Angeles Metropolitan Area Development,
(5) Bulacan Central Water Supply,
(6) Olongapo City Water Supply Improvement,
(7) LWUA Water Supply, and
(8) Bypasses Construction.

These projects and programs will serve collectively urban centers in the National Triad Growth Centers and other urban centers as outlined below. Profiles of these projects and programs are contained in Volume VIII: Project Report.

Bulacan

The Metro Manila conurbation area in Bulacan will be the initial target for the Urban Land Readjustment Program and the Urban Renewal and Industrial Modernization. The former will prepare a land readjustment manual, compiling available land readjustment methods and applying them to urban municipalities in Bulacan. The latter will be implemented first in Meycauayan, located closest to Metro Manila and having some polluting industries. Those industries within the urbanized areas will be relocated and re-established with more advanced technology in areas where common facilities will be provided for waste and wastewater treatment. Areas to be made available by the relocation will be developed for various urban facilities to enhance amenity.

The Bulacan Central Water Supply will expand the water supply by LWUA to eight municipalities/districts. It will be implemented in Phase I, following the on-going review of feasibility study and detailed design. Specific projects for other urban centers in the conurbation will be formulated by the Integrated Urban Development Program, which would be applied first to Malolos.

San Fernando-Angeles

The San Fernando-Angeles Metropolitan Area Development will create a new metropolis in the center of Central Luzon. A comprehensive planning study will be conducted first to clarify functional division among the member city/municipalities and allocate key facilities, and prepare land use plans. Specific urban projects to be implemented subsequently will be formulated. Urban projects to be implemented earlier within this future metropolitan area include bypass roads and water supply expansion for San Fernando and Angeles City.

SBMA-Olongapo

Olongapo City Water Supply Improvement is at an advanced stage and will be implemented during Phase I. Other projects will be formulated by the Integrated Urban Development Program. A proposed Olongapo City bypass will also be examined within a consistent framework.

Other urban centers

A bypass road and a bus terminal for Cabanatuan City will be implemented during Phase I. Of the LWUA Water Supply, those at an advanced stage include Masantol in Pampanga, Sta. Cruz in Zambales, and Cabanatuan City, San Leonard, San Isidro, Talavera, and Lupao in Nueva Ecija. Other urban projects will be formulated by the Integrated Urban Development Program, which will cover more urban centers in steps. Planning capacity of cities/municipalities would be augmented through land use planning and project formulation works under this program. Financial position of each city/municipality will also be analyzed and specific measures to strengthen the revenue base will be formulated.

5.4.2 Housing programs

The following three programs will enhance the supply capacities for housing by both the public and the private entities.

(1) Integrated Housing Development Program Associated with Railway Transportation,
(2) Education and Training Program for Housing Industry, and
(3) Establishment of Provincial Housing Supply Corporation.

The Integrated Housing Development Program Associated with Railway Transportation aims at supplying low cost housing and establishing socialized residential zones along existing and

future railway lines. Commuting areas within 30 to 50 km radius from Metro Manila will be the first target, and a feasibility study shall be conducted to formulate viable urban, housing and railway development projects.

The Education and Training Program for Housing Industry is to provide vocational training for housing construction skills. The program has dual purposes: (1) to expand employment opportunities especially for those displaced by the Pinatubo disaster, and (2) to enhance supply capacities for low cost housing.

The Establishment of Provincial Housing Supply Corporation (PHSC) will provide a vehicle to expand the housing supply capacities on a sustainable basis. The establishment of PHSCs in Central Luzon is particularly relevant in view of the massive needs for low cost housing created by calamities and the expected economic growth with large increases in population and income.