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Table 3.1.1 Situation of Issued Licensees to Electric Power Supply Service Businesses by EAC (in Feb.2003)

Type of licensee	Name of Licensees	License No. issued date	Service Area	Outline of Facilities	Remarks
Consolidated Licensees [Total 13 Licenses]	Electricitè du Cambodge (EDC)	No.001L 2002.2.1	Phnom Penh	Generation Facility: 62.16 MW C2: 18 MW (3×6 MW) / heavy fuel oil: steam turbine C3: 15.56 MW (2×2.1 MW, 4×2.84 MW) / light fuel oil: diesel C5: 10 MW (2×5 MW) / light fuel oil: diesel C6: 18.6 MW (3×6.2 MW) / heavy fuel oil: diesel Transmission Facility :115 kV / 143 km Substation Facility :115 kV / 4 Distribution Facility	Generation, National Transmission, Distribution License
			Shihanoukville	Generation Facility: 10 MW / light fuel oil: diesel Distribution Facility	
			Provincial towns of Siem Reap	Generation Facility: 4.04 MW / light fuel oil: diesel Distribution Facility	
			Kampong Cham	Generation Facility: MW / light fuel oil: diesel Distribution Facility	
			Battambang	Generation Facility: 5MVA / light fuel oil: diesel Distribution Facility	
			Takeo	Generation Facility: 900 kW / light fuel oil: diesel Distribution Facility	
			District of Ponhea Krek (Kampong Cham)	Cross-border Supply from Vietnam Distribution Facility	
			District of Memut (Kampong Cham)	Cross-border Supply from Vietnam Distribution Facility	
			District of Baveth (Svay Rieng)	Cross-border Supply from Vietnam Distribution Facility	
	Mr. Huor Pheng	No.006L 2002.4.1	Phoum Tros, Khum Balang, Baray district (Kampong Thom)	Generation Facility: 0.42 MW / light fuel oil: diesel 525 kVA (250, 200, 75 kVA)	Generation License
			Kampong Thmar town in Khum Balang, Baray district and Khum Kampong Thmar in Sontuk district (Kampong Thom)	Distribution Facility	Distribution License

Type of licensee	Name of Licensees	License No. issued date	Service Area	Outline of Facilities	Remarks
	Chilbo Industrial (Cambodia) Co., Ltd.	No.012L 2002.8.9	Kampong Thom	Generation Facility: 1.52 MW / light fuel oil: diesel 1,900 kVA (1,000, 500, 400 kVA) Distribution Facility	Generation and Distribution License
	Mr. Mak Thorn	No.013L 2002.9.6	Phum Kampong, Khum Preah Bathchanchum, Kirivong district (Takeo)	Generation Facility: 0.508 MW / light fuel oil: diesel 635 kVA (250, 215, 125, 90, 45 kVA) Distribution Facility	Generation and Distribution License
	Mr. Srey Sokhom	No.015L 2002.11.22	Phsar Samrongyorng, Khum Trapaingsab, Baty district, (Takeo)	Generation Facility: 0.08 MW / light fuel oil: diesel 100 kVA Distribution Facility	Generation and Distribution License
	Mr. Ke Kuyhuoy	No.016L 2002.11.22	Phsar Kompongchret town, districts of Trang and Koh Andet, (Takeo)	Generation Facility: 0.048 MW / light fuel oil: diesel 60 kVA (40, 20 kVA) Distribution Facility	Generation and Distribution License
	Mr. Bun Liv	No.017L 2002.11.29	Neak Loeung Town (east of Mekong river), Peam Ro district (Prey Veng)	Generation Facility: 2,385 kVA / light fuel oil: diesel (4×450, 250, 250, 165, 125 kVA) Distribution Facility	Generation and Distribution License
	Mr. Ky Sophear	No.018L 2002.11.29	Phsar Snaypul town, Khum Roka, Pearang distict (Prey Veng)	Generation Facility : 345 kVA / light fuel oil: diesel (200, 75, 35, 35 kVA) Distribution Facility	Generation and Distribution License
	Mr. Te Kok Eng	No.019L 2002.12.12	Khum Treal town, Baray district (Kampong Thom)	Generation Facility: 175 kVA / light fuel oil: diesel (70, 50, 30, 25 kVA) Distribution Facility	Generation and Distribution License
	Mr. Chhou Lay	No. 020L 2002.12.30	Phsar Preylvear town, Khum Preylvear, Preykabas district (Takeo)	Generation Facility: 0.056 MW / light fuel oil: diesel 70 kVA Distribution Facility	Generation and Distribution License
	Mr. Nov Sokha	No.021L 2002.12.30	Neak Loeung town (west of Mekong river), Leukdek district (Kandal)	Generation Facility: 560kVA / light fuel oil: diesel (250,185, 125 kVA) Distribution Facility	Generation and Distribution License
	Mr. Kong Phat	No.022L 2003.2.11	Phum Thmarsar, Khum Korkpor, Boreychuolsar district (Takeo)	Generation Facility: 52.5 kW / light fuel oil: diesel (15, 37.5 kW) Distribution Facility	Generation and Distribution License

Type of licensee	Name of Licensees	License No. issued date	Service Area	Outline of Facilities	Remarks
	Mr. Khun Sambo	No.023L 2003.2.11	Phsar Preytoteung town, Preychhor district (Kampong Cham)	Generation Facility: 464 kVA / light fuel oil: diesel (250, 2×75, 64 kVA) Distribution Facility	Generation and Distribution License
Generation License [Total 7 Licensees]	Cambodia Utilities Pte Ltd. (CUPL)	No.002L 2002.2.1	Phnom Penh	37.1 MW / heavy fuel oil・light fuel oil: diesel 7units	IPP selling electricity to EDC , PPA between EDC on Sep.15, 1994
	Jupiter Power (Cambodia) Co., Ltd.	No.003L 2002.3.29	Phnom Penh	16 MW / light fuel oil: diesel	IPP selling electricity to EDC ,PPA between EDC on Mar.21, 2000
			Pursat	1 MW / light fuel oil: diesel 4×250 kVA	IPP selling electricity to Electricitè du Pursat's town, PPA between EDP on May 8, 1996
			Kampong Chhnang	0.75 MW / light fuel oil: diesel 2×250, 250 kVA	IPP selling electricity to Elrctricite du Kampong Chhnang,PPA between EDK on June 2, 1997
			Battambang	3.5 MW / light fuel oil: diesel 4units	IPP selling electricity to Electricitè du Battambang, PPA between EDB on Oct.30, 1998
	Global Technology Support (GTS)	No.004L 2002.3.29	Kampong Cham	2.92 MW / light fuel oil: diesel 4,100 kVA (1,000, 1,000, 1,300, 800 kVA)	IPP selling electricity to Electricitè du Kampong Cham, IPPA between EDC on May 6, 1998
	Mr. Chea Sopha	No.005L 2002.4.1	Siem Reap	6.072 MW / light fuel oil: diesel 5,920 kVA (4×1,000, 1,270, 650 kVA)	IPP selling electricity to Electricitè du Siem Reap, GLA between EDC on Dec.25, 2001
	CETIC International Hydropower Development Co., Ltd.	No.007L 2002.4.5	Kirirom Plateau (Koh Kong)	12 MW (2×6 MW) / Kirirom 1 Hydropower Plant	IPP selling electricity to EDC , PPA between EDC on July 28, 2000

Type of licensee	Name of Licensees	License No. issued date	Service Area	Outline of Facilities	Remarks
	Cambodia Wan Long International Industrial Co., Ltd.	No.010L 2002.5.27	Kampot	1.28 MW / light fuel oil: diesel 1,300 kVA (2×650 kVA)	IPP selling electricity to Electricité du Kampot
	Global Power System Pte. Ltd.	No.024L 2003.2.11	Prey Veng	1,230 kVA / light fuel oil: diesel (600, 380, 25 kVA)	IPP selling electricity to Prey Veng DIME PPA between MIME on Jan.17, 2001
Distribution License [Total 4 Licenses]	Franasie Import Export Co., Ltd.	No.008L 2002.4.10	Kamrieng (Battambang) Phnom Preuk (Battambang) Sampou Loun (Battambang)	Cross-border Supply from Thailand (22 kV) Distribution Facility	Agreement in Apr.2001
	MSP Development Co., Ltd.	No.009L 2002.5.27	Phum Phsar Prum(close to Cambodia-Thai border), Sangkat Stung Khsach, Khan Salakrao (Pailin)	Cross-border Supply from Thailand (22 kV) Distribution Facility	Agreement in Mar.2001
	Anco Brothers Co., Ltd.	No.011L 2002.8.9	Ochraov district (Banteay Meanchey)	Cross-border Supply from Thailand (22 kV) Distribution Facility	Agreement in Oct.2001
	Duty Free Shop Co., Ltd.	No.014L 2002.11.22	Koh Kong Osmarch town, khum Osmarch, Samrong district (Oedar Meanchey)	Cross-border Supply from Thailand (22 kV) Distribution Facility	Agreement in Apr.1997 Agreement in Feb.1997

Table 3.2.1 SITUATION OF ELECTRICITY GENERATION AND SUPPLY IN CAMBODIA (in 2002)

No	Provinces	Installation Capacity kVA, (kW)	Available Capacity kVA, (kW)	Peak load kW	Power Generation and Power Purchase from IPP MWh	Energy Selling (Invoice) MWh	Loss %	Tariff R/kWh ($/kWh)	Number of Customers	Remarks
1	Banteay Meanchey	2,290	1,570	1,400	2,575	1,309	49.2	1,600	4,815	IPP (BOT) +Private ***
2	Battambang	(6,850)	(6,000)	2,540	11,405	8,674	23.9	960	10,183	EDC
3	Kampong Cham	(3,590)	(2,900)	1,450	6,258	4,833	22.8	850	4,427	EDC with IPP (GTS)
4	Kampong Chhnang	1,000	800	650	1,759	1,356	22.9	(0.277)	1,750	IPP (BOT)
5	Kampong Speu	1,190 **	645 **	500 **	866*	588*	32.1*	1,500 **	1,400 **	Private ***
6	Kampong Thom	1,900	1,600	990	1,357	914	32.6	950	3,100	Private
7	Kampot	2,350	1,030	860	2,532	1,567	38.1	1,200	4,031	IPP (BOT) ***
8	Koh Kong	2,000	2,000	1,800	4,891	3,328	31.9	500, 600	2,211	Private (Power Purchase from Thailand)
9	Kratie	1,475	850	600	1,286	880	31.6	1,200	2,025	Provincial DIME
10	Krong Kaeb	-	-	-	-	-	-	-	-	No Information
11	Krong Pailin	1,030	1,030	970	340	268	21.0	1,500	752	Private
12	Mondul Kiri	150	100	80	691	501	27.5	1,600	185	Private
13	Otdar Meanchey	-	-	-	-	-	-	-	-	No Information
14	Phnom Penh	(133,800)	(121,300)	91,900	477,574	418,088	12.5	350 ~ 800	133,674	EDC with IPP (CUPL, Jupiter, CETIC)
15	Pursat	1,250	1,000	838	2,571	1,577	38.6	(0.28)	4,590	IPP (BOT)
16	Preah Vihear	100	60	50	560	393	29.8	2,000	300	Private
17	Prey Veng	880	450	360	1,091	704	35.5	1,100	1,935	Provincial DIME ***
18	Ratanak Kiri	1,000	864	850	2,300	765	66.8	200, 400, (0.16)	1,200	Provincial DIME ***
19	Siem Reap	(14,620)	(5,910)	3,100	19,241	15,372	20.1	635 ~ 850	8,660	EDC
20	Sihanoukville	(10,390)	(8,280)	3,500	19,231	16,090	16.3	500 ~ 784	7,290	EDC
21	Stung Treng	1,165	800	550	348	308	11.5	1,800	1,250	Private ***
22	Svay Rieng	1,580	1,186	684	2,383	1,125	52.8	1,600	2,605	Private ***
23	Takeo	(875)	(900)	541	1,994	1,499	24.9	900	2,405	EDC
	Total	**19,360 (170,125)**	**13,985 (145,290)**	**114,213**	**561,253**	**480,139**	**14.5**		**198,788**	

*: in 2000, **:in 2001, ***: to be transferred to EDC in the near future, Source: - EDC Annual Report 2002 (Draft), - MIME report 2002 (Draft)

Table 3.3.1 Power Plant of EDC (Phnom Penh and Ta Khman) (as of March 2003)

Type	Name of Plant	Establishment by	No. of Unit	Manufacturer Engine/Gene.	Country Engine/Gene.	Date of Commissioning	Installed Capacity (kW)	Available Capacity (kW)	Kind of Fuel
Steam Turbine	C2		1	SKODA/SCODA	Czech/Czech	1967	6,000	5,000	HFO
			2	SKODA/SKODA	Czech/Czech	1967	6,000	5,000	HFO
			3	SKODA/SKODA	Czech/Czech	1967	6,000	5,000	HFO
			Sub-Total				18,000	15,000	
Diesel Plant	C3	GM	1	GM/GM	USA/USA	1973	2,100	1,900	DO
			2	GM/GM	USA/USA	1973	2,100	1,900	DO
			Sub-Total				4,200	3,800	
		IRB	1	Cat/Cat	USA/USA	1996	2,840	2,500	DO
			2	Cat/Cat	USA/USA	1996	2,840	2,500	DO
			3	Cat/Cat	USA/USA	1996	2,840	2,500	DO
			4	Cat/Cat	USA/USA	1996	2,840	2,500	DO
			Sub-Total				11,360	10,000	
		Total					15,560	13,800	
	C5	Japan	1	MHI/Toshiba	Jpn/Jpn	1995	5,000	5,000	DO
			2	MHI/Toshiba	Jpn/Jpn	1996	5,000	5,000	DO
			Sub-Total				10,000	10,000	
	C6	ADB	1	Wartsilä/ABB	Finland/Finland	1996	6,200	6,200	HFO
			2	Wartsilä/ABB	Finland/Finland	1996	6,200	6,200	HFO
			3	Wartsilä/ABB	Finland/Finland	1996	6,200	6,200	HFO
			Sub-Total				18,600	18,600	
	Diesel Total						44,160	42,400	
Total							62,160	57,400	

Note: DO: Light Diesel Oil HFO: Heavy Fuel Oil

Table 3.3.2 IPP Power Plant supplied to EDC in Phnom Penh (as of March 2003)

Type	Name of Plant	No. of Unit	Manufacturer Engine/Gene.	Country Engine/Gene.	Date of Commissioning	Installed Capacity (kW)	Available Capacity (kW)	Kind of Fuel
Diesel Plant	CUPL (Cambodia Utility Pte Ltd.)	1	GMT/Ansaldo	Italy/Italy	1996	5,520	4,414.3	HFO
		2	GMT/Ansaldo	Italy/Italy	1996	5,520	4,414.3	HFO
		3	GMT/Ansaldo	Italy/Italy	1996	5,520	4,414.3	HFO
		4	GMT/Ansaldo	Italy/Italy	1997	5,520	4,414.3	HFO
		5	GMT/Ansaldo	Italy/Italy	1997	5,520	4,414.3	HFO
		6	GMT/Ansaldo	Italy/Italy	1997	5,520	4,414.3	HFO
		7	GMT/Ansaldo	Italy/Italy	1998	5,520	4,414.3	HFO
		Sub-Total				38,640	30,900.1	
	Jupiter Company (Cambodia Power Co., Ltd.)	1~10	Cat/Cat	USA/USA	2000	10×1,500	10×1,500	DO
		11~14	Cat/Cat	USA/USA	2002	4×1,500	4×1,500	DO
		Sub-Total				21,000	21,000	
	Thermal Total					59,640	51,900.1	
Hydro	Kirirom 1 (CETIC International Hydropower Development Co., Ltd.		Unknown	Unknown	2002	12,000	12,000	Dam and waterway type, Horizontal Platform turbine
Total						71,640	63,900.1	

Table 3.3.3 Power Plant (Sihanoukville)

Owner	No. of Gene. Set	Installed Capacity (kW)	Available Capacity (kW)	Notes
EDC	2	5,200	5,200	Wartsilä

Table 3.3.4 Power Plant (Siam Reap)

Owner	No. of Gene. Set	Installed Capacity (kW)	Available Capacity (kW)	Notes
EDC	4	2,100	1,920	USSR
Private	5	4,952	4,480	
Total	9	7,052	6,760	

Table 3.3.5 Power Plant (Kampong Cham)

Owner	No. of Gene. Set	Installed Capacity (kW)	Available Capacity (kW)	Notes
Private	2	2,720	2,400	Cat
EDC	1	800	500	USSR
Total	3	3,520	2,900	

Note: GTS: Global Technolgical Support (Malaysia)

Table 3.3.6 Power Plant EDC (Takeo)

Owner	No. of Gene. Set	Installed Capacity (kW)	Available Capacity (kW)	Notes
Private	8	692	692	

Table 3.3.7 Power Plant EDC (Battambang)

Owner	No. of Gene. Set	Installed Capacity (kW)	Available Capacity (kW)	Notes
Jupiter (IPP)	4	3,520	3,500	Cat

Table 3.3.8 Outline of Kirirom I Hydroelectric Power Plant

Owner of the Power Plant (Type of License)	CETIC International Hydropower Development Co., Ltd. (Generation License)
Type of Power Generation	Dam and Waterway Type Hydroelectric Power Plant
Maximum Output	12 MW = 2 × 6 MW
Maximum Plant Discharge	3.94 m^3/s
Net Head	373.5 m
Annual Average Generated Energy	60 GWh
Annual Generating Duration	5,349 hours
Type of Turbine	Horizontal Pelton
Type of Dam	Center Core Type Earth Rock Fill Dam
Dam Height	34.0 m
Crest Length	343 m
Crest Width	8 m
Design Flood Discharge	1,110 m^3/s
Gross Storage Capacity of Reservoir (Effective Storage Capacity)	9,800,000 m^3 (9,300,000) m^3
Available Drawdown of Reservoir	39.0 m

Table 3.3.9 Outline of O Chum Hydroelectric Power Plant

Type of Power Generation	Dam and Waterway Type Hydroelectric Power Plant	
Maximum Output	960 kW = 2 × 480 kW	
Maximum Plant Discharge	3.75 m^3/s	
Net Head	31 m	
Annual Generating Energy	1,292 MWh (record in1999)	
Type of Turbine	*Horizontal Francis*	
Name of Dam	O Chum 1	O Chum 2
Type of Dam	Earth Fill Type Dam	Earth Fill Type Dam
Reservoir/Regulating Pond	Reservoir	Regulating Pond
Dam Height	22 m	9 m
Crest Length	860 m	50 m
Design Flood Discharge	64.0 m^3/s	210.0 m^3/s
Gross Storage Capacity of Reservoir (Effective Storage Capacity)	13,100,000 m^3 (12,680,000) m^3	146,000 m^3 (88,000) m^3
Reservoir Drawdown Depth	12.5 m	1.5 m

Table 3.3.10 List of Existing Transmission Lines

Name of Line		GS1-GS3	GS3-GS2	GS1-Kirirom
Nominal Voltage [kV]		115	115	115
Line Length [km]		11.238	11.17	111.214
Commercial Operation Year		2000	2000	2002
No. of ccts		1	1	1
Current Carrying Capacity [MW/cct]		185MW	185MW	65MW
Conductor	Type	AAC	AAC	ACSR (2.78*24+1.85*7) (LGJ-150/20: GB1179-83)
	Nominal Cross Sectional Area [mm^2]	250	250	150
	No. of Conductors per a phase [No./phase]	2	2	1
Ground Wire	Type	OPGW	OPGW	GSW (2.6*7) (GJ-35)
	Nominal Cross Sectional Area [mm^2]	35	35	35
	No. of wires[No.]	1	1	2
Supporting Structure Type 1	Type	concrete pole		(concrete pole)
	No.	376		- (put on GS1 - GS3 line)
Supporting Structure Type 2	Type	steel pole		steel pole
	No.	10		-
Supporting Structure Type 3	Type	steel tower		steel tower
	No.	4		267
Insulator	Type	porcelain	porcelain	porcelain
	diameter[mm]	250	250	250
	No. of a string[No./string]	9	9	9
Owner		EDC	EDC	EDC
Consultant Name of the design and the Country		SMEC / Australia		
Contractor Name and the country		SEPC in China		

Table 3.3.11 List of Existing Substations

items			1	2	3	4
Owner			EDC	EDC	EDC	EDC
Name /Commercial Operation Year			GS1/2000	GS2/2000	GS3/2000	Kampong Spueu/2002
Designer and the Country			Korea			China
Contractor and the Country			LG Engineering, Korea			CETIC, China
Transformer	Nos. of Units		2	1	1	1
	Rated Capacity [P]	MVA/unit	30			6.3
	Rated Capacity [S]	MVA/unit	30			6.3
	Rated Capacity [T]	MVA/unit	12	12	-	-
	Rated Voltage [P]	kV	115			115
	Rated Voltage [S]	kV	22			22
	Rated Voltage [T]	kV	15	15	-	-
	Nos. of Taps		17			5
	Taps Control Method		Automatic			Automatic
	Voltage Control Range[Max]	kV	120.750 - 97.750			120.750 - 109.250
	Voltage Control Range[Mid]	kV	-			-
	Voltage Control Range[Min]	kV	15.600 - 13.200	15.600 - 13.200	-	-
	Winds Connection		YNd11,YN0	YNd11,YN0	YNd11	YNd11
	Applied Specification		IEC 76/93			
	Manufacturer, Country		Romania			China
	Year of Manufacture		1998			2001
	Neutral Type [P]		Direct			Direct
	Neutral Type [S]		Earthing Tr + Resistance			Earthing Tr + Resistance
	Neutral Type [T]		Eerthing Tr + Resistance	Eerthing Tr + Resistance	-	-

Table 3.3.12 Distribution Facilities (1999)
(Phnom Penh and Takmau of Kandal Province)

Item	Quantity	Remark
Distribution Lines Length	401.74 cct-km	
Medium Voltage Lines	270.35 cct-km	22 kV, 15 kV, 6.3 kV
Low Voltage Lines	131.40 cct-km	380/220 V
Substation, nos	495	
MVA Substation	119.84 MVA	
Customers	93,178	November 2000

Source: EDC ANNUAL REPORT 2000

Table 3.3.13 Distribution Facilities in Siem Reap, Shianoukville, Kampong Cham and Takeo (December 2000)

Items		Siem Reap	Shianoukville	Kampong Cham	Takeo	Remark
Medium Voltage Lines	Old	14.87 km	22 km	5.5 km	29.794 km	6.3 kV
	New	47.06 km	31.25 km	1.8 km	0 km	22 kV
	Total	61.93 km	53.25 km	7.3 km	29.794 km	
Low Voltage Lines	Old	61.14 km	18 km	19.44 km	31.367 km	
	New	79.67 km	72.55 km	7.5 km	0 km	
	Total	140.81 km	90.55 km	26.94 km	31.367 km	
Distribution Lines		202.74 km	143.8 km	34.24 km	61.161 km	
Substation, nos	Old	10	9	7	10	
	New	24	34	4	0	
	Total	34	43	11	10	
Customers		7,794	6,440	2,920	2,078	

Source: MIME Annual Conference in 2001

Table 3.4.1 Areas supplied by low voltage beyond Thailand's border line

Area's name	Province or special city	Company	Date of contract
Koh Kong	Koh Kong	Duty Free Shop Co., Ltd.	Apr.1997
Osmarch	Otdar Meanchey		Feb.2001
Ochraov District	Banteay Meanchey	Anco Brother Co., Ltd.	Oct.1999
Kamrieng	Battambang	Franasie Import Export Co., Ltd.	Apr.2001
Phnom Preuk			
Sampou Loun			
Phum Phsar Prum	Pailin special city	MSP Development Co., Ltd.	May.2001

Table 3.4.2 Areas supplied by low voltage beyond Vietnam's border line (Schedule is also included)

Area's name	Province or special city	Company	Date of contract
Ponhea Krek	Kampong Cham	EDC	Electricity are supplied from Jan.2002 (Minutes :Aug.28.2000)
Memot			
Bavit	Svay Rieng		
Snoul	Kratie	NA	In 2002 (Schedule)
Tbong Khmum	Kampong Cham	NA	
Kampong Ro	Svay Rieng	NA	
Svay Rieng		NA	
Chrey Thom	Kandal	NA	
Koam Samnor		NA	
Kampong Trach	Kampot	NA	

Table 3.5.1 Past Records of Generated Power in the Provincial Capitals and Municipalities in Cambodia

(MWh)

No.	Provincial Capital / Municipality	1994	1995	1996	1997	1998	1999	2000	2001	2002
1	Banteay Meanchey	360	507	510	1,428	1,528	1,169	10,357	3,104	2,575
2	Battambang	4,200	5,971	6,562	6,892	7,375	8,600	9,506	10,317	11,405
3	Kampong Cham	1,360	1,500	2,120	2,580	3,370	4,000	5,707	5,921	6,258
4	Kampong Chhnang	456	456	460	530	567	1,168	1,590	2,208	1,759
5	Kampong Speu	120	142	163	178	188	1,632	866	797	-
6	Kampong Thom	268	310	213	674	721	525	803	1,186	1,357
7	Kampot	1,430	2,225	2,120	2,204	2,500	2,498	2,412	2,655	2,532
8	Koh Kong	1,386	1,040	1,005	1,600	1,717	3,267	3,594	4,798	4,891
9	Kratie	120	209	441	480	550	1,021	1,251	1,661	1,286
10	Krong Kaep	-	-	-	-	-	-	-	-	-
11	Krong Pailin	-	-	-	-	-	-	129	284	340
12	Mondul Kiri	150	161	170	182	187	180	270	1,314	691
13	Otdar Meanchey	-	-	-	-	-	-	-	-	-
14	Phnom Penh	132,990	168,800	223,160	286,580	341,530	358,220	395,530	426,970	477,574
15	Preah Vihear	210	220	232	212	250	315	327	1,073	560
16	Prey Veng	800	869	907	987	801	1,104	841	1,308	1,091
17	Pursat	183	256	391	1,555	1,478	1,743	2,075	2,890	2,571
18	Ratanak Kiri	1,378	2,453	2,246	2,208	2,673	1,386	2,016	2,696	2,300
19	Siem Reap	2,110	2,780	3,600	4,320	5,130	6,000	12,204	17,146	19,241
20	Sihanoukville	5,890	6,960	7,520	8,040	8,060	9,000	15,962	17,146	19,231
21	Stung Treng	298	221	271	289	310	288	300	349	348
22	Svay Rieng	255	156	350	552	592	1,603	2,116	3,280	2,382
23	Takeo	340	344	571	610	654	1,182	1,410	1,835	1,994
	Total	154,304	195,580	253,012	322,101	380,181	404,908	469,274	508,938	560,386

Remarks: - No information for Krong Kaep and Otdar Meanchey
- Phnom Penh System includes Takhmau System in Kandal Province.

Table 3.5.2 The Latest Records of Electricity Demand in EDC Service Areas

Year	2001					2002				
Items	Peak Demand (sending end) (MW)	Annual Power Generation (MWh)	Annual Energy Selling (MWh)	Loss Rate (%)	Load Factor (%)	Peak Demand (sending end) (MW)	Annual Power Generation (MWh)	Annual Energy Selling (MWh)	Loss Rate (%)	Load Factor (%)
Phnom Penh*	86.60	426,970	364,150	14.7	56.3	91.9	477,574	418,088	12.5	60.3
Sihanoukville	3.50	17,146	14,717	14.2	55.9	3.50	19,231	16,090	16.3	62.7
Siem Reap	3.10	16,045	13,528	15.7	59.1	3.10	19,241	15,372	20.1	70.9
Kampong Cham	1.40	5,921	4,417	25.4	48.3	1.40	6,258	4,833	22.8	51.0
Takeo	0.54	1,835	1,379	24.9	38.8	0.54	1,994	1,499	24.8	42.2
Battambang	2.54	10,317	7,638	26.0	46.4	2.54	11,405	8,674	23.9	51.3
Total	-	478,234	405,829	15.1	-	-	535,703	464,556	13.3	-

*: Phnom Penh system includes Takhmau system in Kandal Province.
Source: EDC Annual Report 2001 (Draft) and EDC Annual Report 2002 (Draft)

Table 3.6.1 EDC Electricity Tariff

	Riels/kWh	US$/kWh
Phnom Penh		
Residential		
0-50 kWh/month	350	0.09
51-100 kWh/month	550	0.14
>100 kWh/month	650	0.17
Industrial and Handicraft		
<45,000 kWh/month	600	0.15
45,000-80,000 kWh/month	550	0.14
80,000-130,000 kWh/month	550	0.14
130,000 kWh/month	500	0.13
Medium Voltage	480	0.12
Commercial & Service Sectors		
<45,000 kWh/month	650	0.17
45,000-80,000 kWh/month	600	0.15
80,000-130,000 kWh/month	600	0.15
130,000 kWh/month	500	0.13
Medium Voltage	480	0.12
Embassy, Foreigners' House, NGO, OI	800	0.20
Government Institutions	700	0.18
Siem Reap		
Overall Sectors		
<20,000 kWh/month	850	0.217
20,000-50,000 kWh/month	757	0.193
50,000-110,000 kWh/month	690	0.176
>130,000 kWh/month	635	0.162
Sihanoukville		
Residential	500	0.13
Industrial & Handicraft		
<20,000 kWh/month	686	0.175
20,000-50,000 kWh/month	690	0.176
50,000-110,000 kWh/month	568	0.145
>130,000 kWh/month	529	0.135
Commercial		
<20,000 kWh/month	764	0.195
20,000-50,000 kWh/month	706	0.18
50,000-110,000 kWh/month	643	0.164
>130,000 kWh/month	588	0.15
Hotels, Houses for Foreigners		
<20,000 kWh/month	784	0.20
20,000-50,000 kWh/month	721	0.18
50,000-110,000 kWh/month	666	0.17
>130,000 kWh/month	627	0.16
Embassy, Government Institutions	760	0.19
Kampong Cham		
Overall Sectors	850	0.22
Takeo		
Overall Sectors	900	0.23
Battambang		
Overall Sectors	960	0.245
Baveth		
Overall Sectors	650	0.16
Ponhea Krek		
Overall Sectors	650	0.16
Memut		
Overall Sectors	650	0.16

Source: EDC Annual Report 2002 (Draft) Corporate Planning and Project Department, Planning, MIS and Tariff Office 2002
3,920Riel=US$1

Table 3.7.1 Expected Generation Output for Cambodia (Maximum Power Demand)

(MW)

year	1998	2000	2002	2004	2006	2008	2010	2012	2014	2016
Banteay Meanchey	4.0	5.9	8.0	10.0	12.0	14.5	17.3	20	24	26
Battambang	3.5	5.7	8.6	12.0	15.0	18.5	22.4	27	31	33
Kampong Cham	4.9	7.8	10.5	13.0	15.2	17.9	20.5	23	26	29
Kampong Chhnang	1.1	1.6	2.2	2.8	3.4	4.0	4.7	5	6	7
Kampong Speu	1.0	2.0	2.9	3.8	4.7	5.9	7.2	9	12	16
Kampong Thom	1.5	2.4	3.4	4.5	5.3	6.4	7.5	9	10	11
Kampot	2.7	4.8	8.1	10.1	13.9	16.3	18.9	25	28	33
Kandal	2.2	3.9	5.5	6.7	7.9	9.2	10.6	12	13	15
Koh Kong	0.7	0.9	1.2	1.4	1.7	2.0	2.3	3	3	4
Kratie	1.9	3.2	4.4	5.7	6.8	8.0	9.4	11	12	14
Mondul Kiri	0.1	0.2	0.3	0.4	0.5	0.6	0.7	1	1	1
Phnom Penh	60	93	131	170	207	256	304	356	418	484
Preah Vihear	0.3	0.5	0.7	1.0	1.1	1.4	1.6	2	2	2
Prey Veng	1.7	3.0	4.4	5.5	6.6	7.8	9.0	10	11	13
Pursat	1.3	2.3	3.2	4.2	5.0	5.9	6.9	8	9	11
Ratanak Kiri	0.9	1.1	1.3	1.5	1.7	1.9	2.2	2	3	3
Siem Reap	3.0	4.2	5.6	7.1	8.4	10.0	11.5	13	15	17
Sihanoukville	2.9	3.4	4.1	4.8	5.5	6.3	7.3	8	10	11
Stung Treng	0.2	0.5	0.7	0.9	1.1	1.3	1.5	2	2	2
Svay Rieng	1.0	1.6	2.2	2.8	3.2	3.9	4.4	5	6	6
Takeo	1.5	2.4	3.4	4.2	4.9	5.8	6.7	8	8	9
Total	97	150	212	273	331	404	477	558	651	746

Reference: Cambodia Power Sector Strategy 1999-2016 (January 1999, revised November 2001)

Table 3.7.2 Expected Generation Output for Cambodia (Generated Power)

(GWh)

year	1998	2000	2002	2004	2006	2008	2010	2012	2014	2016
Banteay Meanchey	24.8	24.8	28.1	32.7	37.6	43.8	51.2	59.9	70.1	77.8
Battambang	22.5	28.8	36.0	43.5	50.6	59.6	69.8	81.5	95.1	102.0
Kampong Cham	28.8	34.0	39.3	44.8	50.3	58.1	65.3	73.1	82.9	92.9
Kampong Chhnang	5.1	6.1	7.3	8.3	9.5	11.0	12.6	14.4	16.4	18.2
Kampong Speu	8.0	9.4	11.0	12.7	14.3	16.8	19.6	23.4	29.6	38.8
Kampong Thom	7.4	9.1	11.1	13.3	15.1	17.5	20.3	23.5	27.0	30.9
Kampot	13.7	16.9	22.7	26.3	34.3	39.2	45.2	52.1	59.5	68.4
Kandal	16.0	21.0	27.5	34.0	41.1	49.6	60.0	69.9	82.1	95.6
Koh Kong	4.6	5.5	6.5	7.5	8.8	10.1	11.5	13.1	14.9	17.3
Kratie	8.7	11.2	14.3	17.6	20.7	24.3	28.4	33.1	38.4	44.6
Mondul Kiri	0.6	0.7	1.0	1.3	1.4	1.7	1.9	2.1	2.8	3.1
Phnom Penh	321	438	566	695	820	994	1168	1355	1584	1829
Preah Vihear	1.5	1.9	2.4	2.8	3.2	3.9	4.4	5.0	6.0	6.6
Prey Veng	10.6	12.4	14.5	16.3	18.2	20.8	23.7	26.7	30.0	33.5
Pursat	7.2	8.9	11.0	13.2	15.4	17.9	20.7	23.9	27.6	31.8
Ratanak Kiri	3.5	3.6	4.2	4.4	4.8	5.6	6.0	7.0	7.7	8.9
Siem Reap	12.5	15.2	18.2	21.1	23.9	27.5	31.4	36.2	41.4	47.3
Sihanoukville	10.2	11.9	14.0	16.2	18.3	20.8	23.7	27.0	30.8	35.4
Stung Treng	1.2	1.4	1.7	2.0	2.6	3.0	3.4	3.9	4.5	5.6
Svay Rieng	5.6	6.3	7.3	8.1	8.8	10.1	11.1	12.3	14.0	15.4
Takeo	8.6	10.4	12.3	14.2	16.2	18.4	21.6	24.6	27.4	31.6
Total	522	678	856	1036	1215	1454	1700	1968	2292	2634

Reference: Cambodia Power Sector Strategy 1999-2016 (January 1999, revised November 2001)

Table 3.7.3 Outline of F/S for Sihanoukville Gas Turbine Combined Cycle (JICA)

Max Continuous Rating	180 MW	Thermal Combine Cycle
Date of Commissioning	2006 : 90 MW	Stage-1
	2008 : 90 MW	Stage-2
Location	OP-4 Site	9 km of N-North East Sihanoukville
Kind of Final	Natural Gas	Backup : Diesel Oil
Estimated Natural Gas Price	US$ 4.0 / MMBTU	LHV base, Tax Free
	US¢ 6.0 / kWh	Equalised for life span
Project Cost	US$ 280 M	Included transmission line between Takeo and Sihanouke ville. Included escalation, taxes and interest during construction.
Total Project Cost	US$ 196.4 M	
(Breakdown) Stage-1	US$ 100.2 M	90 MW
Stage-2	US$ 74.6 M	90 MW
Transmission Line	US$ 21.6 M	Between Takeo and Sihanoukville
Generation Cost	US¢ 7.6 / kWh	Equalised for life span

Table 3.7.4 Outline of Kamchay Hydroelectric Power Project

Maximum Output	180 MW(3 × 60 MW)
Annual Generating Energy	460 GWh
Maximum Plant Discharge	53.3 m^3/s
Net Head	125.9 m
Type of Turbine	Francis
Type of Dam	RCC
Dam Height	114 m
Crest Length	590 m
Upstream Slope	0.85 to EL.67 m, vertical above
Downstream Slope	0.85 to EL.67 m, 0.75 above
Drainage Area	710 km^2
Reservoir Area	20 km^2
Flood Discharge (PMF)	9,000 m^3/s
Total Storage Volume	681, 314,404 m^3
Live Storage	327, 122,004 m^3
Construction Cost	US$170M
Construction Period	56 months
Operation Rule of Reservoir	Maximize Peak Supply Capacity

Source: Final Report by Experco International, June 2002

Table 3.7.5 Optimum Development Plan (Stung Meteuk No.2 Hydropower project)
Independent Development Option

Catchment Area (km^2)	591.2
Reservoir	
High Water Level (EL. m)	161
Low Water Level (EL. m)	121
Gross Storage (10^6m^3)	683
Effective Storage (10^6m^3)	595
Dam	
Height (m)	72
Crest Length (m)	333
Volume (10^6m^3)	1.41
Power Plant	
Maximum Discharge (m^3/s)	80
Rated Head (m)	130
Rated Capacity (MW)	91.7
Maximum Capacity (MW)	103
Annual Energy (GWh)	479.22
Firm Energy (GWh)	363.39
Secondary Energy (GWh)	115.83
95% Reliable Firm Output (MW)	81.43

Table 3.7.6 List of Suitable Small Hydroelectric Power Project Sites

Project Site	Province	Installed Capacity (MW)	Development Cost (US$/kW)			Production Cost * (US¢/kWh)
			Hydro	Trans.	Total	
Viable Schemes (subject to Pre-Investment Study)						
O Turou Trao	Kampot	1.1	1,629	13	1,642	4
Phnum Batau-downstream	Koh Kong	4.2	1,188	100	1,288	3.1
Stung Sva Slab	Kampong Speu	3.8	1,634	54	1,688	6
O Sla- upstream	Koh Kong	2.0	1,662	14	1,676	6
Stung Siem Reap	Siem Reap	1.7	2,120	212	2,332	7
Upper Stung Siem Reap	Siem Reap	0.65	1,709	88	1,797	6
Other Potentially Viable Schemes						
Phnum Tunsang-upstream	Koh Kong	3.1	-	-	-	-
Phnum Tunsang-downstream	Koh Kong	3.0	-	-	-	-
O Phlai	Mondulkiri	3.5	-	-	-	-
Total		23.05	-	-	-	-

* Production cost calculated at the 10% discount rate, assuming a scheme lifetime of 30 years and annual O&M costs equivalent to 2% of capital cost.

Table 3.7.7 Outline of ADB project in 8 provincial capitals

No.	Provincial Town	Province	System Details
1	Kampong Speu	Kampong Speu	*Supply from Kirirom I & distribution system*
2	Takeo/Angtassom	Takeo	Diesel generator sets (2,500 kW) & distribution system
3	Kampot	Kampot	Diesel generator sets (1,800 kW) & distribution system
4	Prey Veng	Prey Veng	Diesel generator sets (2,000 kW) & distribution system
5	Svay Rieng	Svay Rieng	Cross-border supply & distribution system
6	Sisophon	Banteay Meanchey	Cross-border supply & distribution system
7	Banlung	Rattanak Kiri	Diesel generator sets (1,500 kW) & distribution system
8	Stung Treng	Stung Treng	Diesel generator sets (2,000 kW) & distribution system

List of Figures

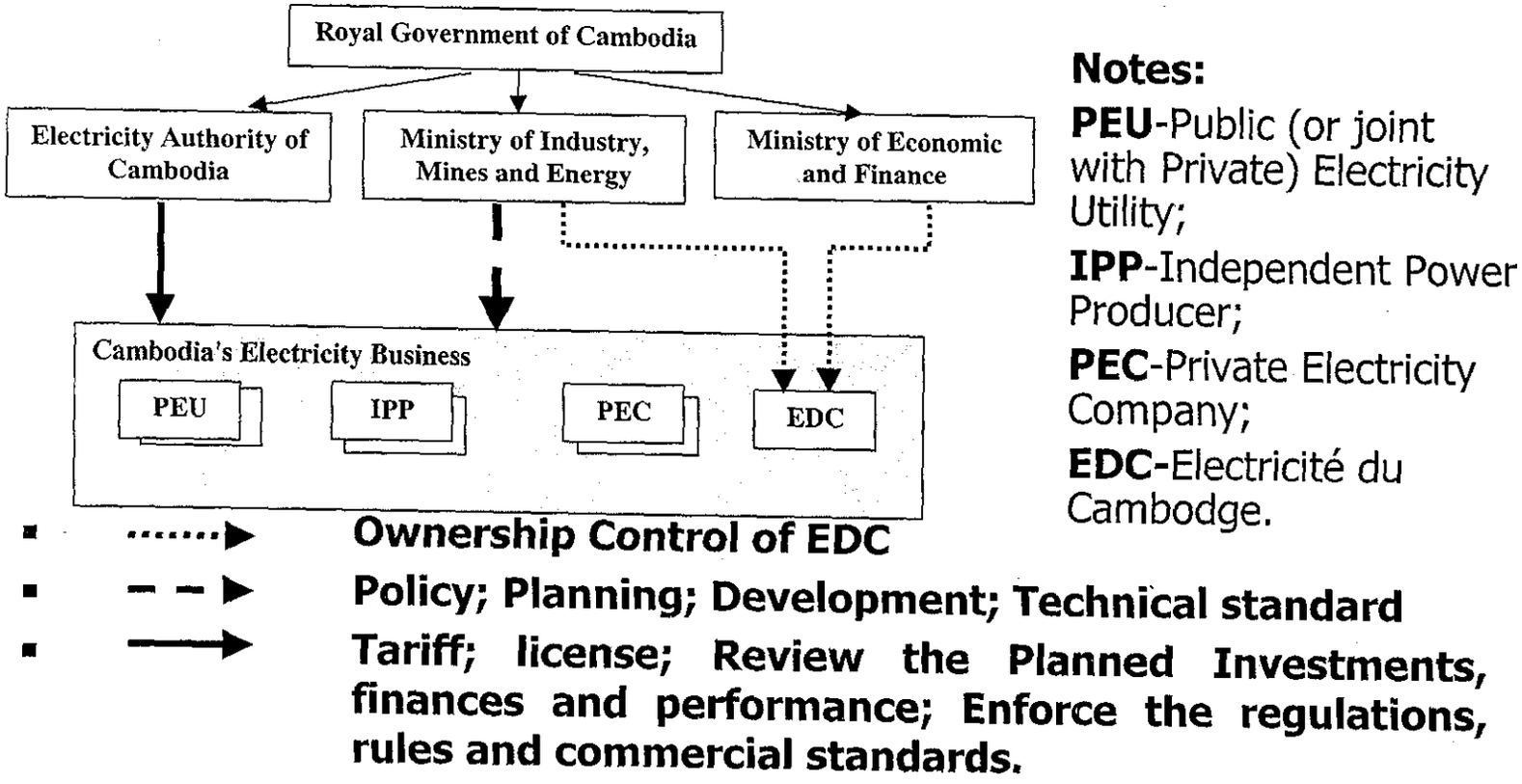


Fig.3.1.1 Constitutional Configuration of the Electricity Sector Administration and the Electricity Business in Cambodia

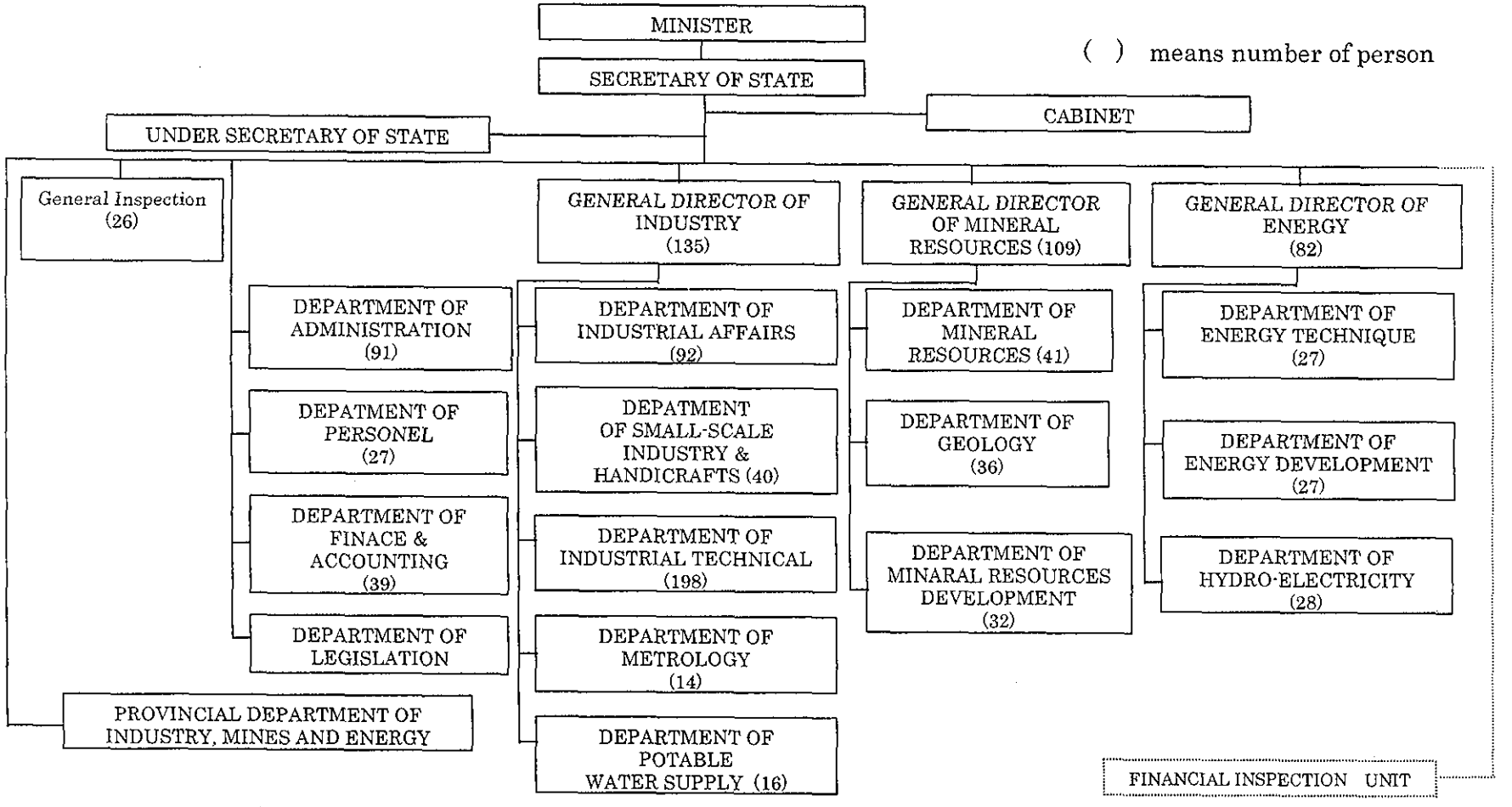


Fig.3.1.2 Organization Chart of MIME (1)

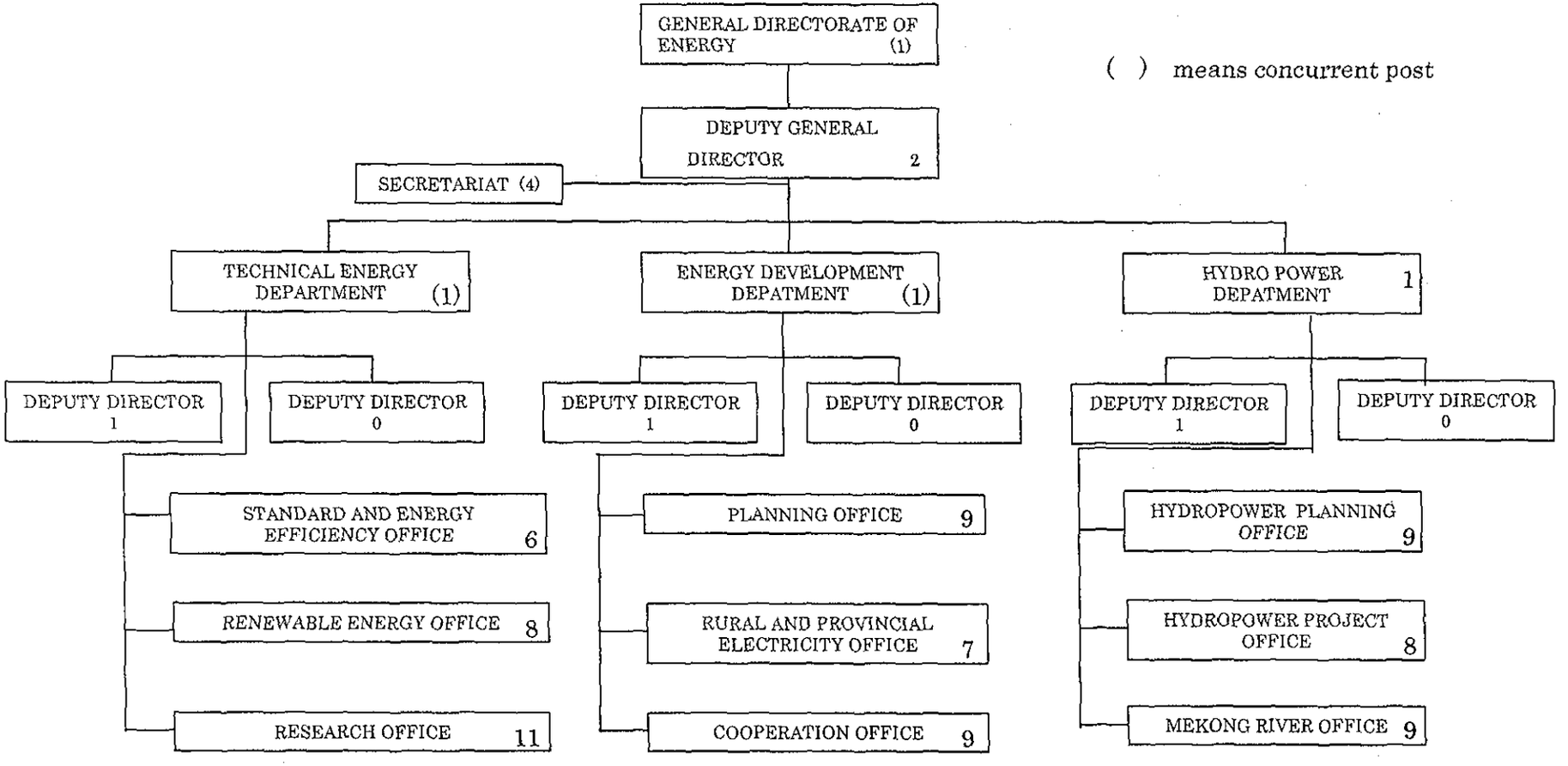
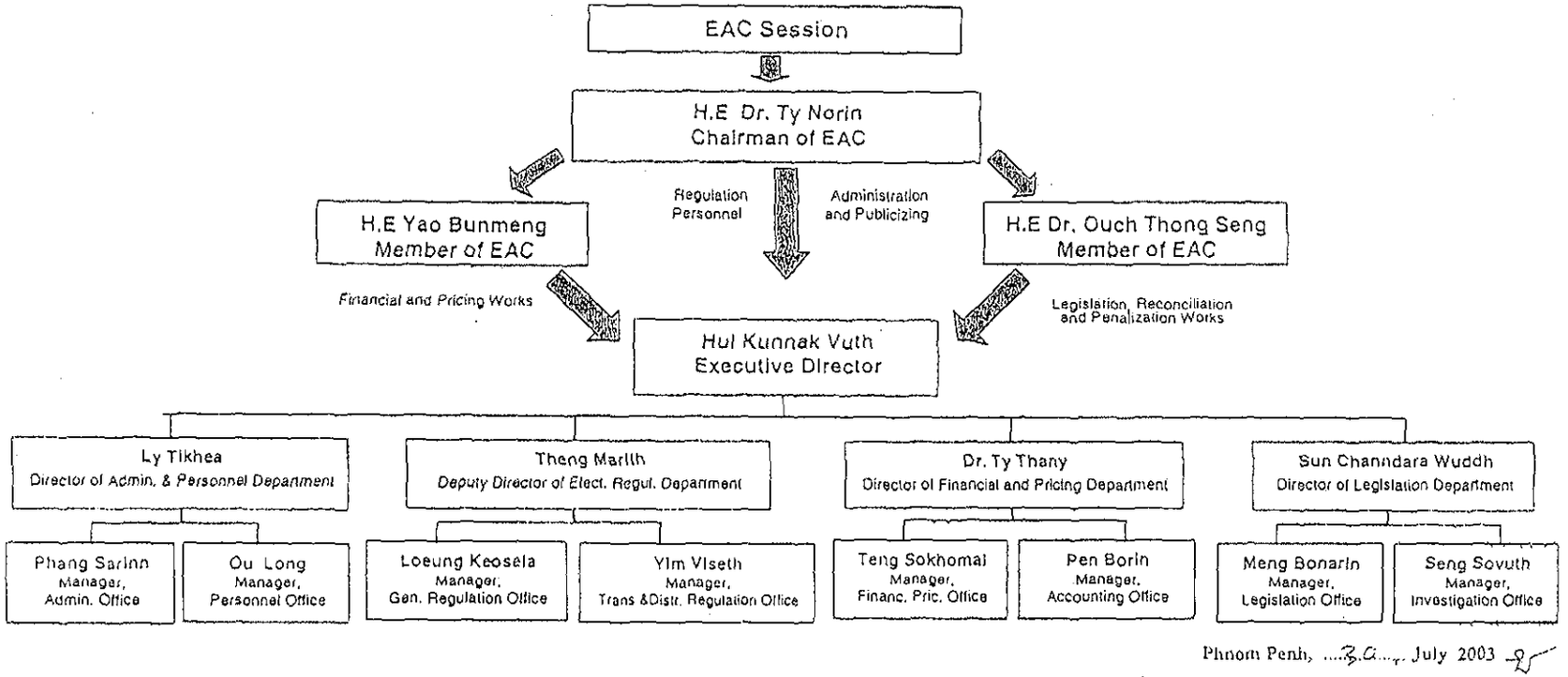


Fig.3.1.3 Organization Chart of MIME (2)

KINGDOM OF CAMBODIA
NATION RELIGION KING

Electricity Authority of Cambodia
No : .....608....03....EAC.....

Organization Chart
Electricity Authority of Cambodia



Phnom Penh, ...3.0....July 2003

Dr. TY NORIN	YAO BUNMENG	Dr. OUCH THONG SENG	HUL KUNNAK VUTH	LY TIKHEA
Chairman of EAC	Member of EAC	Member of EAC	Executive Director	Director, Admin & Pers. Dept

Fig.3.1.4 Organization Chart of EAC

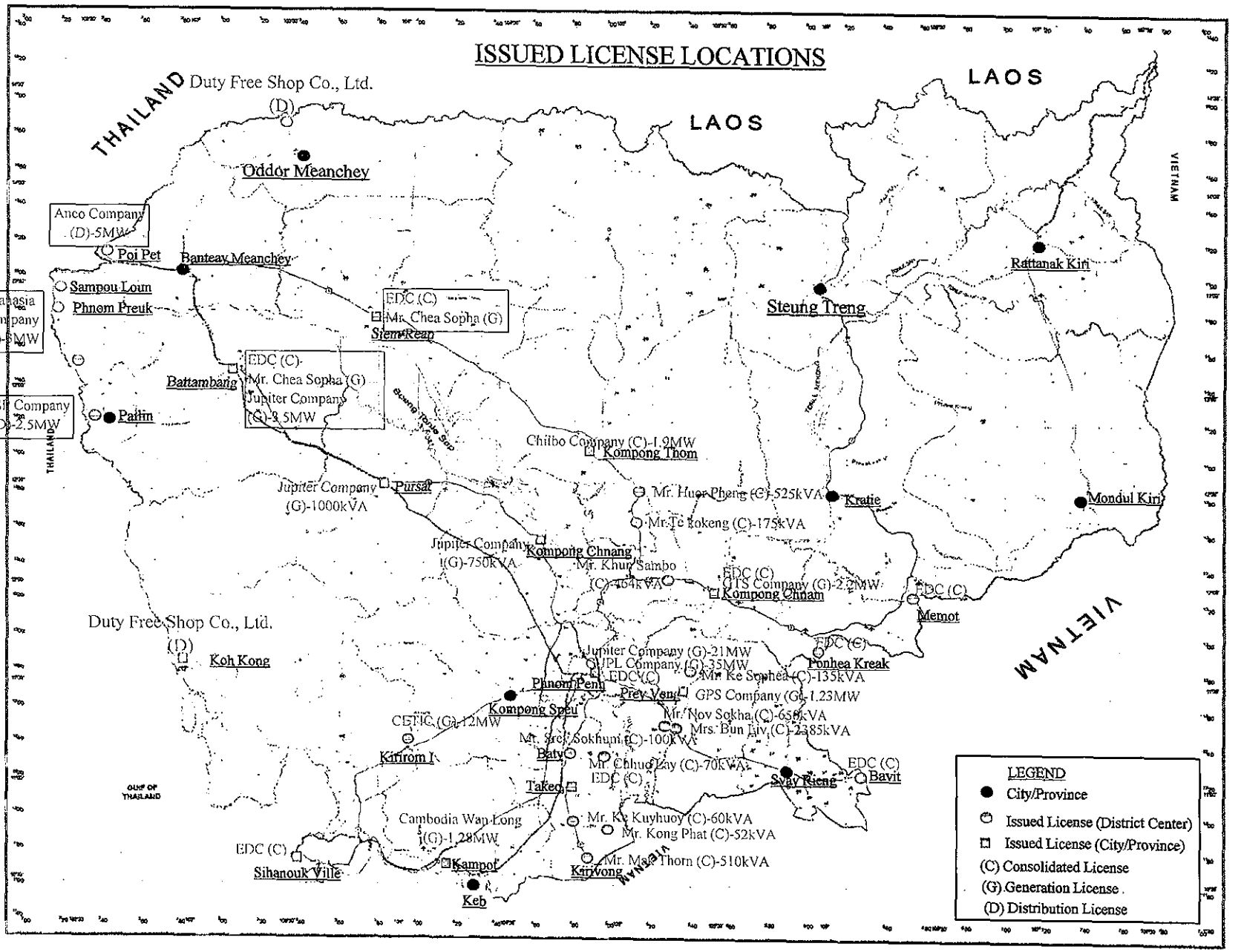


Fig.3.1.5 Issued License Locations

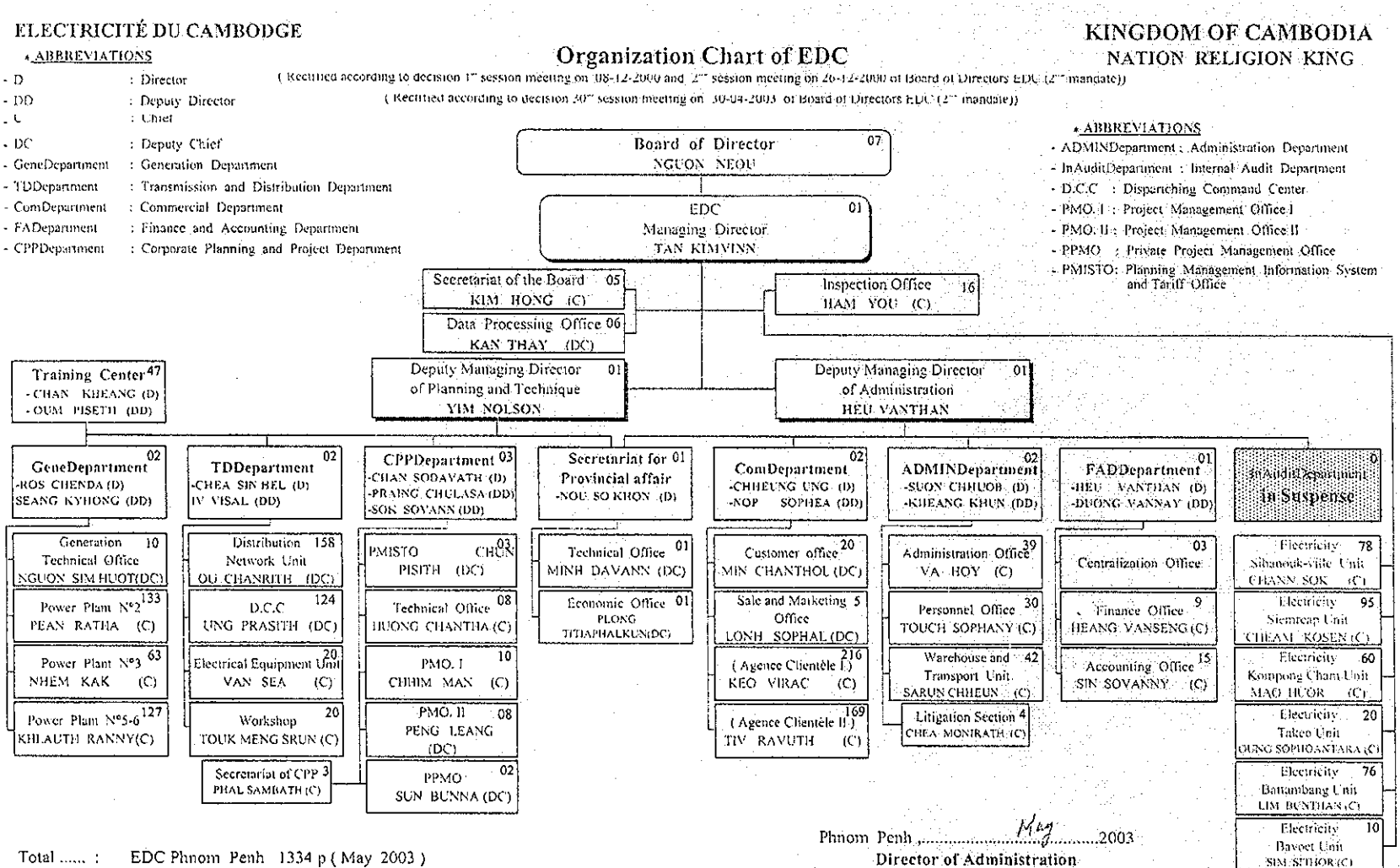


Fig.3.2.1 Organization Chart of EDC

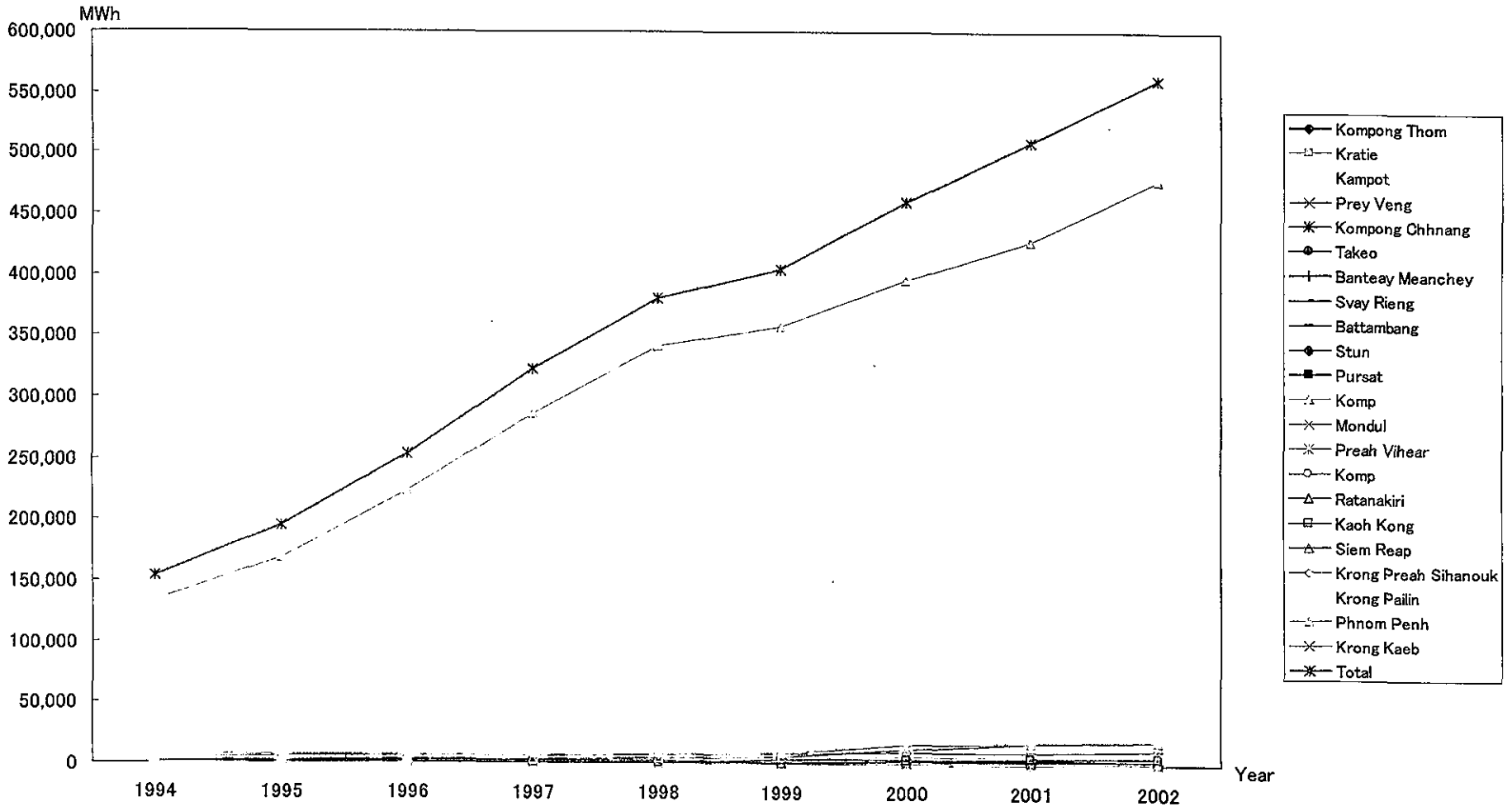


Fig.3.5.1 Past Records of Generated Power in the Provincial Capitals and Municipalities in Cambodia (1)

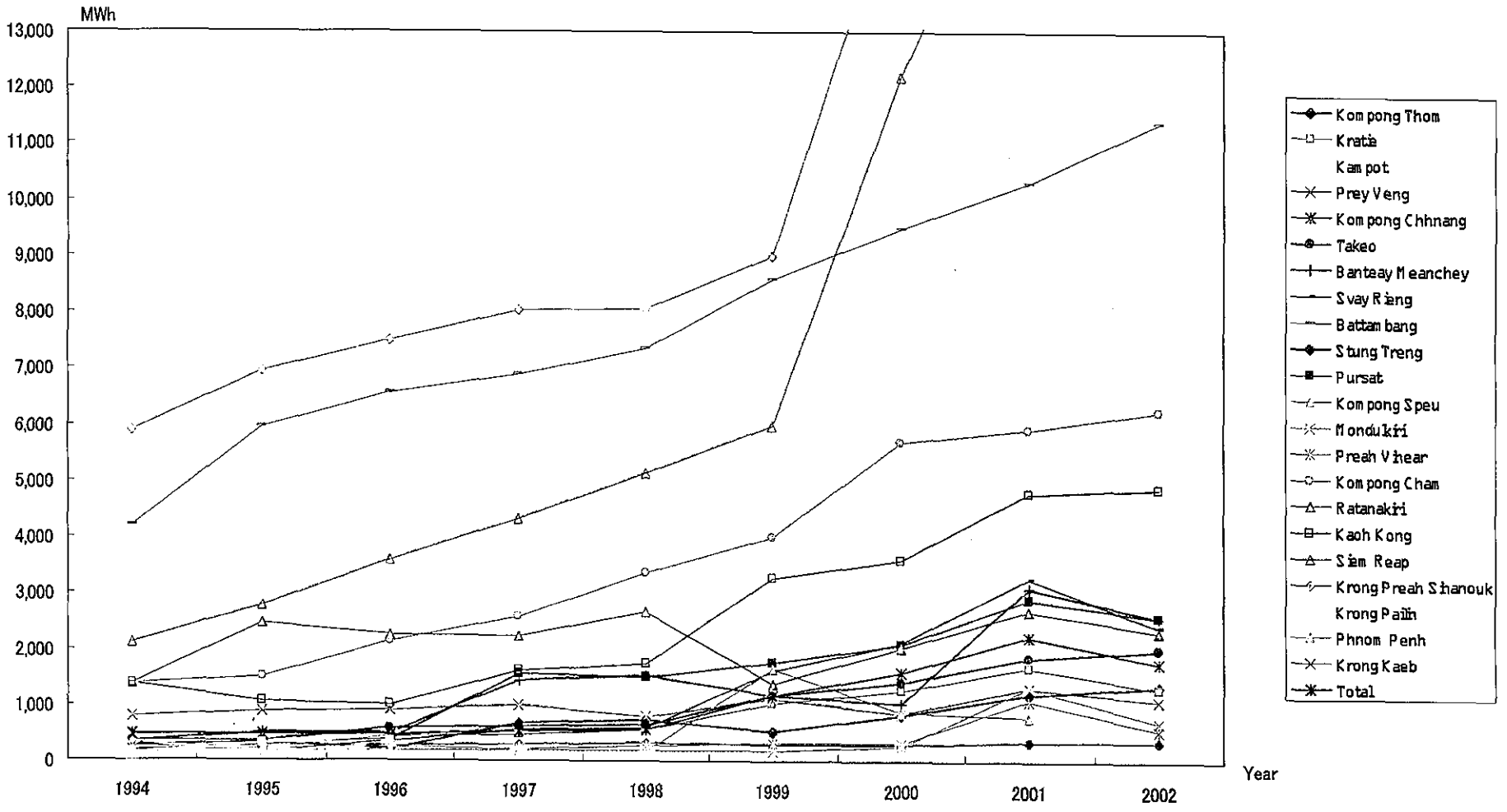


Fig.3.5.2 Past Records of Generated Power in the Provincial Capitals and Municipalities in Cambodia (2)

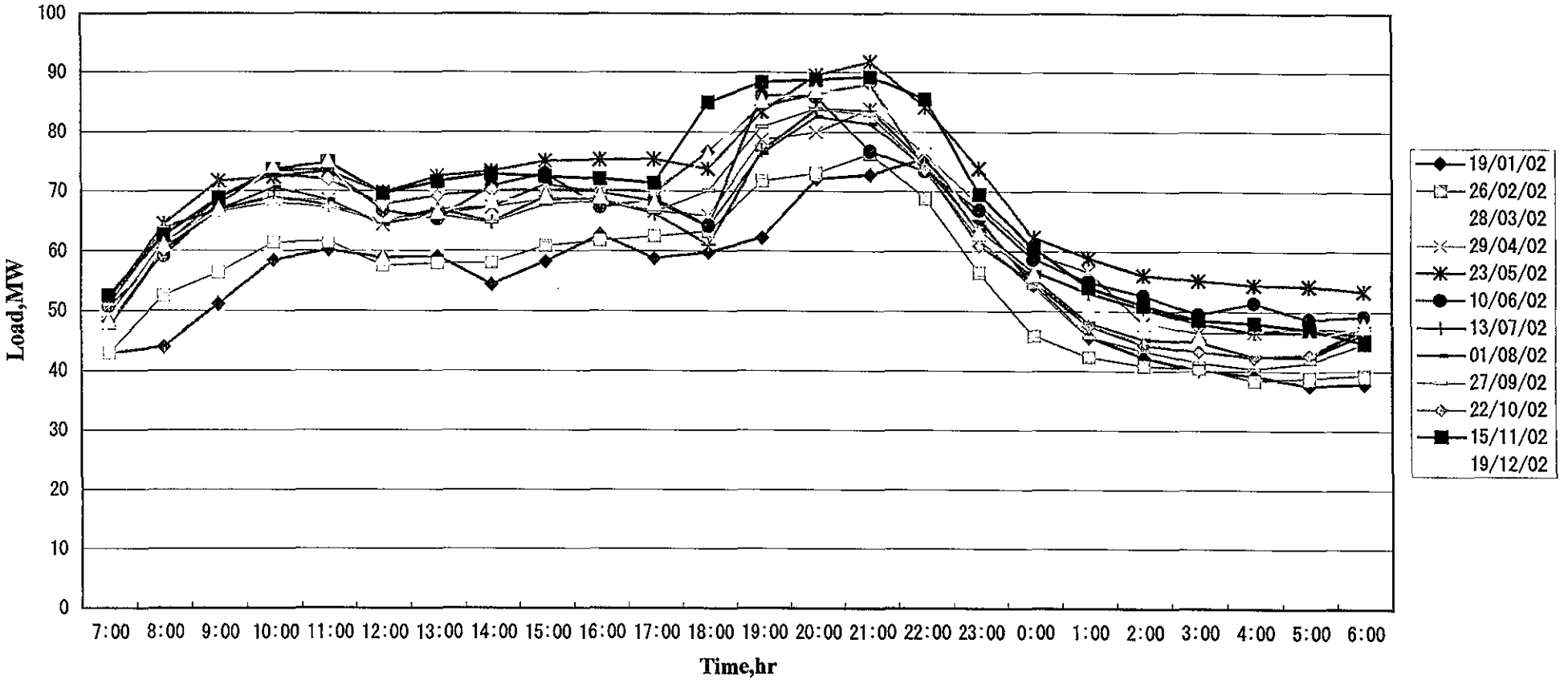


Fig.3.5.3 Daily Load Curve of Monthly Peak Day in Phnom Pen [2002]

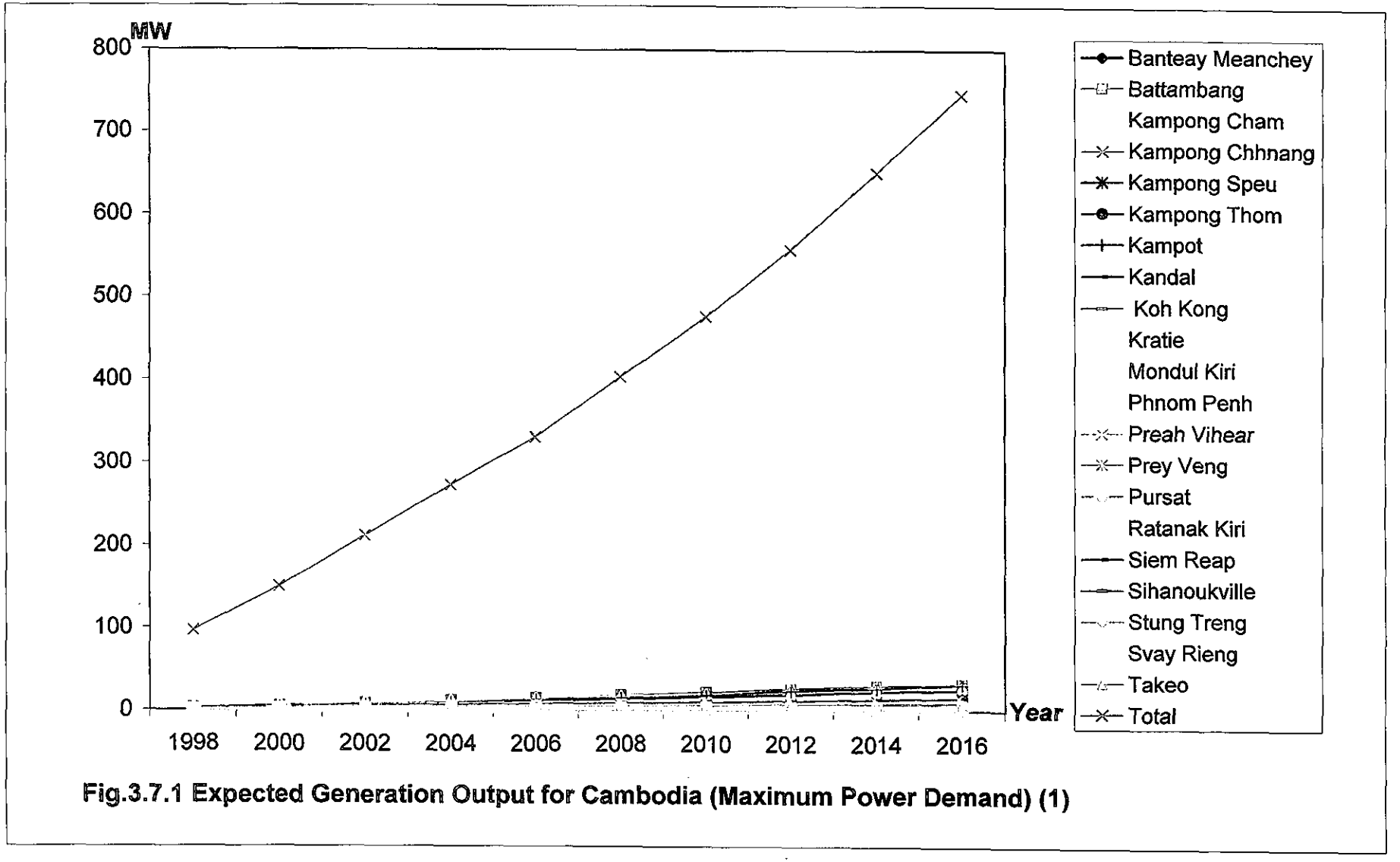


Fig.3.7.1 Expected Generation Output for Cambodia (Maximum Power Demand) (1)

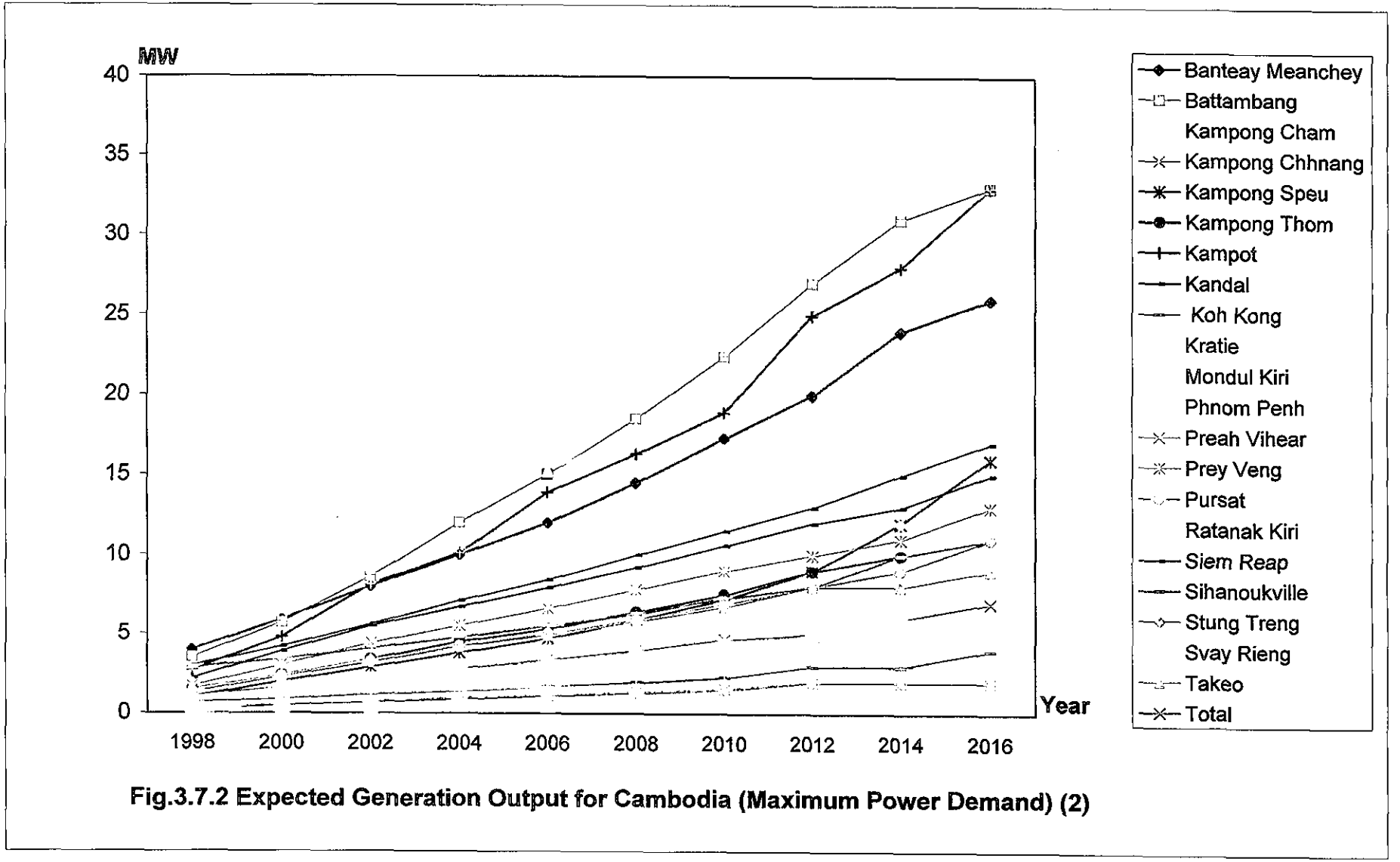


Fig.3.7.2 Expected Generation Output for Cambodia (Maximum Power Demand) (2)

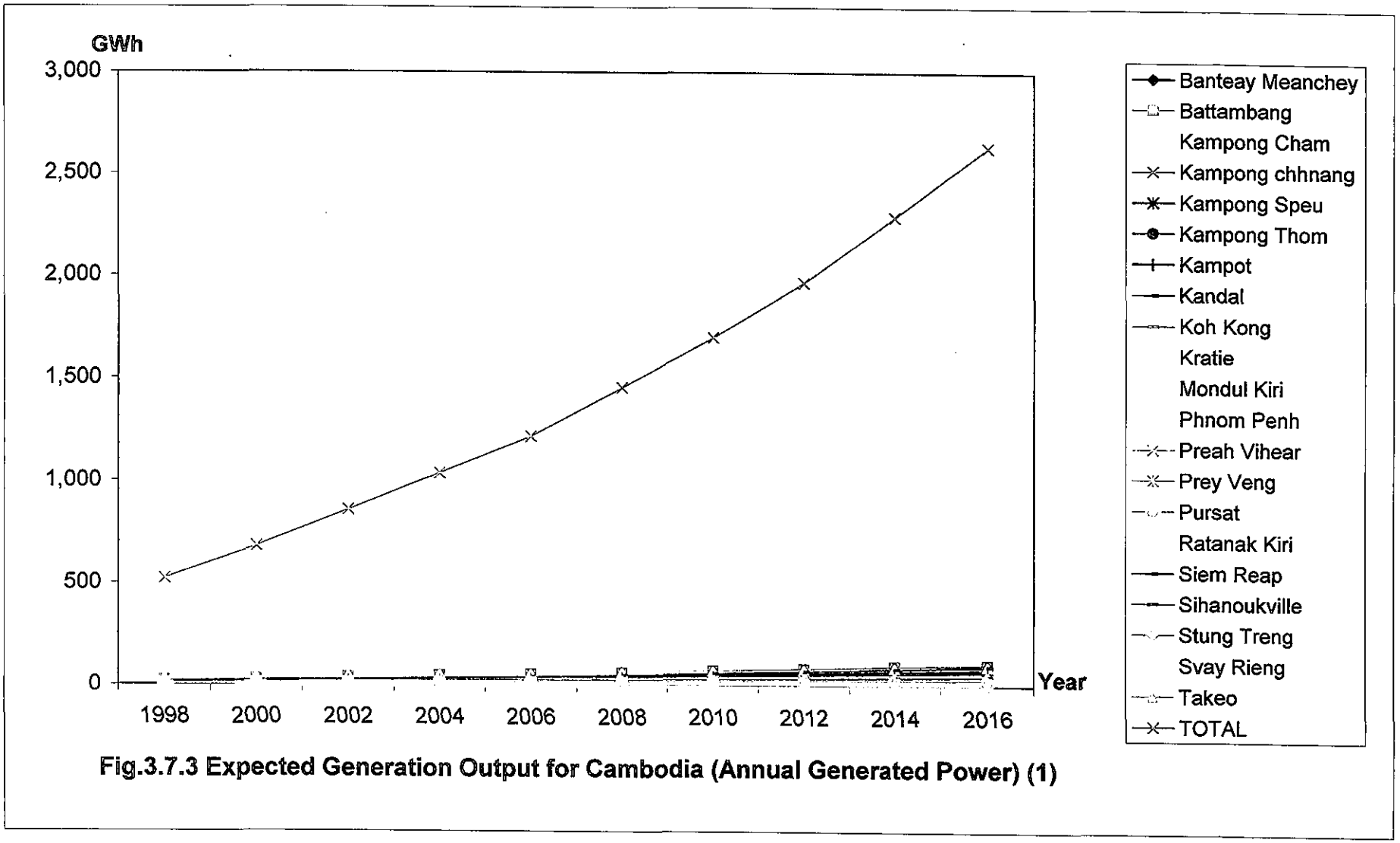


Fig.3.7.3 Expected Generation Output for Cambodia (Annual Generated Power) (1)

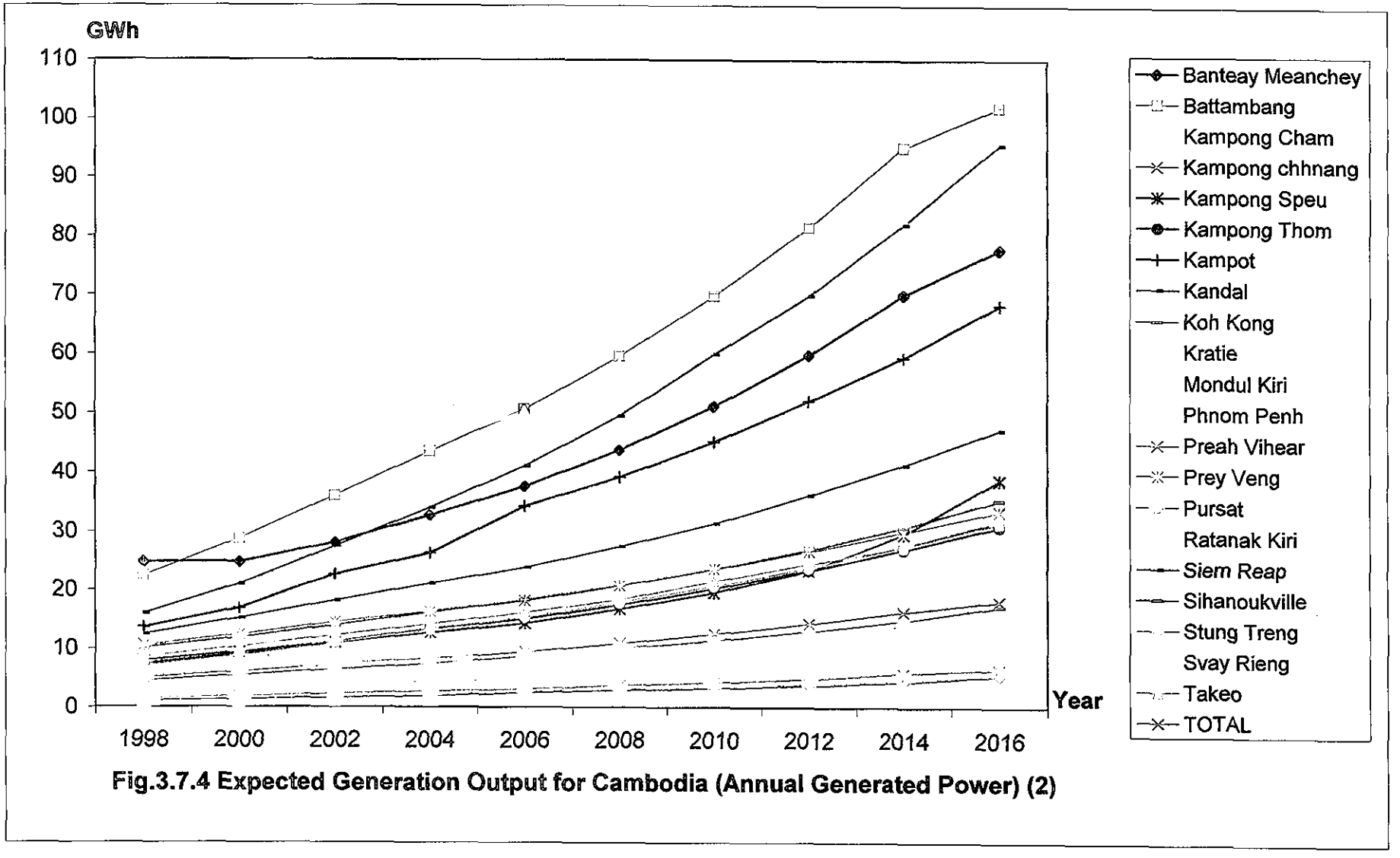


Fig.3.7.4 Expected Generation Output for Cambodia (Annual Generated Power) (2)

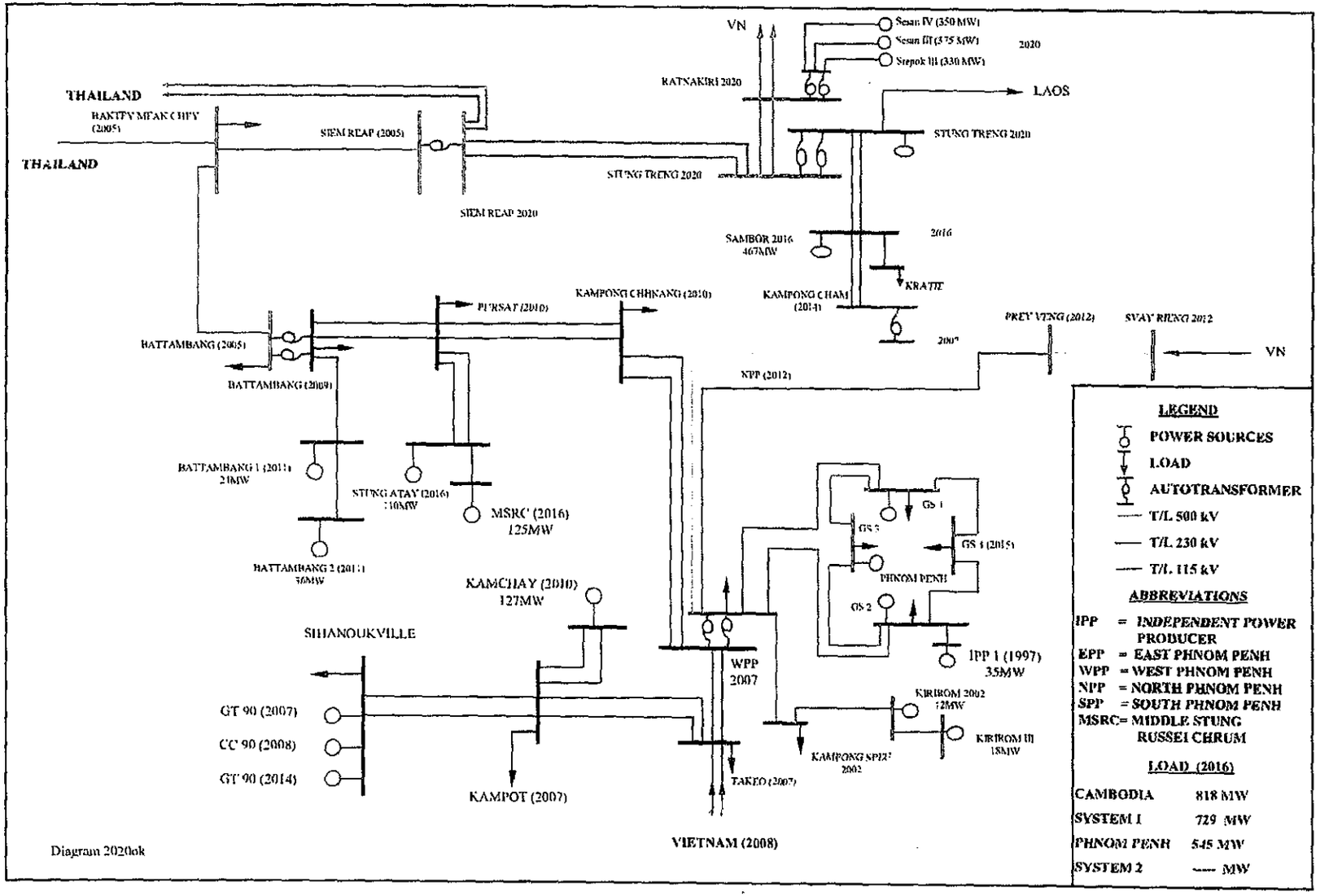
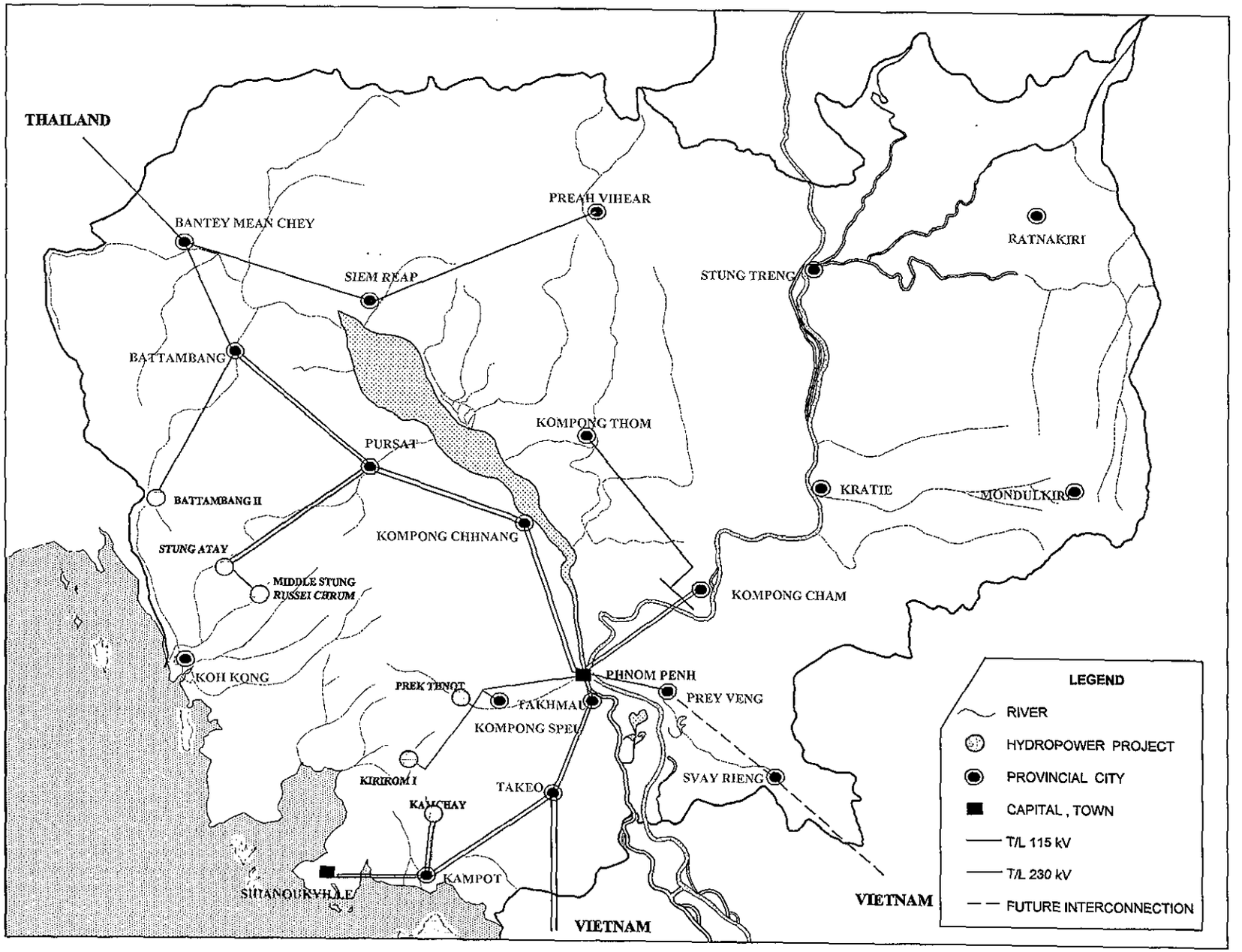


Fig.3.7.5 Cambodia Generation & Transmission Diagram (up to 2016)



Power System in Cambodia Stage 3 (2011-2016), Proposed Updating

FIG. 3.7.6 Cambodia Generation & Transmission Map (up to 2016)

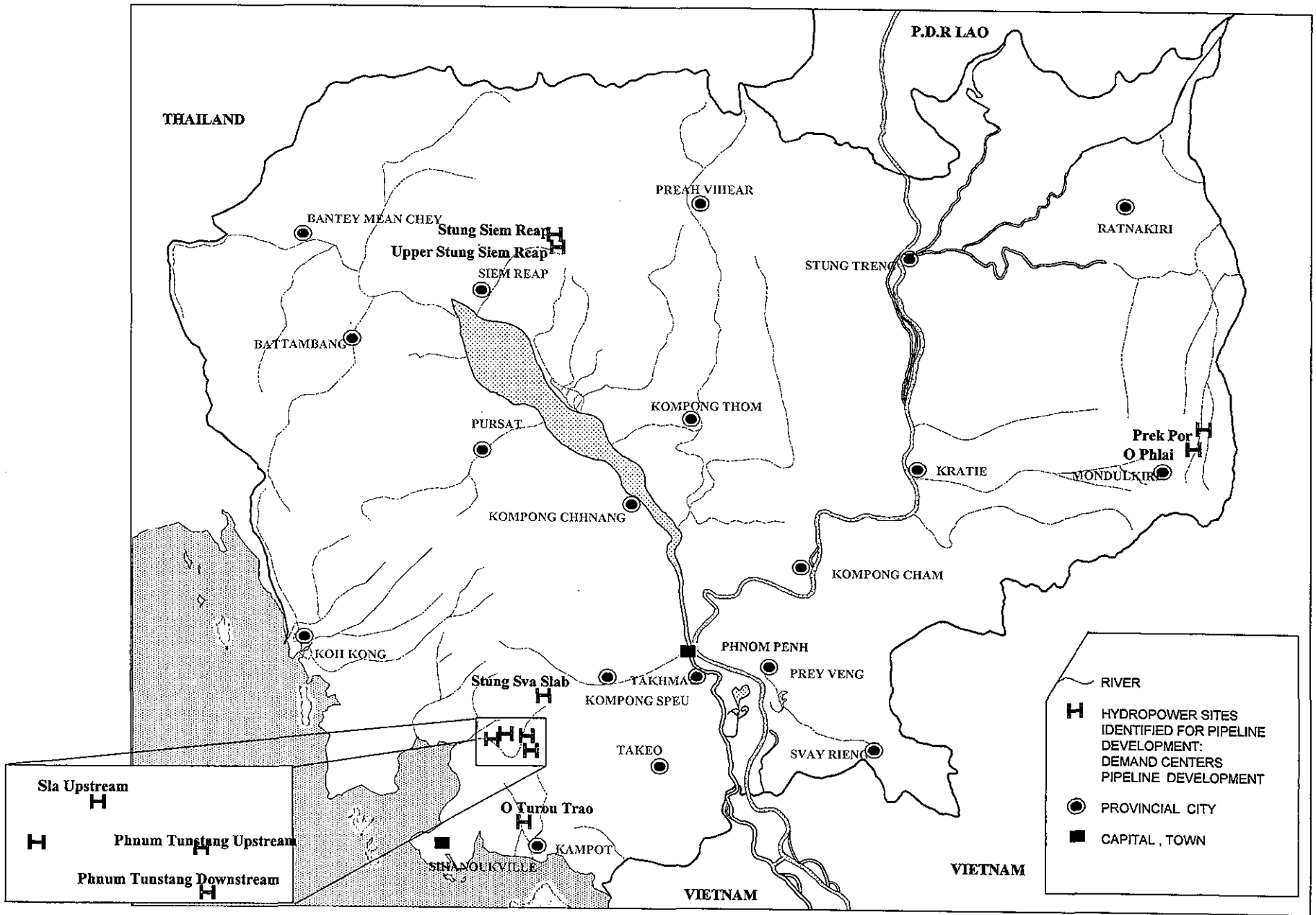


Fig.3.7.7 Site Map for Suitable Small Hydroelectric Power Project

4. PROSPECT AND ISSUES IN THE POWER SECTOR

CONTENTS

4. PROSPECT AND ISSUES IN THE POWER SECTOR

4.1 Power Sector Administration

Electricity Authority of Cambodia (EAC) was established under the Electricity Law enacted in February 2001 to be dedicated to administrate the electric power services. Whole power sector administration which had been in charge of MIME before was transferred to this new EAC in this occasion except those relating to the energy policy and power development planning.

4.2 New Power Service Administration

It became imperative that any entity who wants to operate an electric power business should apply to and obtain from EAC a license for the electric power business. For a while after the start of EAC, the existing power service entities have been licensed. It is anticipated new comers would soon apply for such licenses whereby EAC will face many applications and have to judge whether a license should be issued or not for each of them.

EAC is destined to be duly careful in examining a license application because all newcomers will not necessarily be familiar with Cambodian power sector business. To cope with this situation, it is indispensable to examine an application in reference to an authorized standard for electric power, which was supposed to have published by MIME earlier. Actually such electric power technical standards has not been published yet.

Under such circumstances Government of Cambodia urged to publish the Electric Power Technical Standards, and asked Government of Japan for technology transfer assistance in this field.

MIME prepared the Electric Power Technical Standards based upon JICA's recommendation "Cambodian Electric Power installation Standards (draft) and already finished public hearing on these Standards from people in concern by means of the two workshops held October and December 2003. These Standards will be published as legislative rules followed by necessary procedures to be facilitated by MIME.

After the Electric Power Technical Standards was put into effect, EAC will administrate licensing

of power service business in accordance with the Electric Power Technical Standards. EAC will also administrate many issues relating to power service business such as auditions to see whether a licensed power installation satisfies the Electric Power Technical Standards or not, a legislative action for a violence of the Electric Power Technical Standards, an arbitration to a litigation in power supply and demand, etc. Since EAC is a young organization and all EAC personnel are not necessary well experienced in this field, an effective OJT will be indispensable.

4.3 Variations in Power Demands

Power supply situation has been such that most large electric power consumer had difficulties in getting power quota from public utility entities, and even a quota was given, the electricity supply has not been expected because of a shortage of the power supply installations. Under this circumstances, such consumers has been relying upon non-utility or autonomous power generators. Therefore, the total capacity of non-utility and autonomous power generation facilities in Phnom Penh has become almost equal to that of the public utilities.

However, recently the situation is changing in such way that latent power consumers are becoming more willing to rely on the public utility power than private owned high tariff generators because the public power blackout chance was decreased and the fluctuations in voltage and frequency are decreased as a result of improved supply conditions in the public power utility services.

On the other hand, more great number of people are becoming well prepared to enjoy the electricity because the expansion and dissemination projects of power transmission and distribution have been progressed under a policy of developed countries and international organizations to assist developing countries in this field.

Currently the electric power demands are not fulfilled because of a shortage in power installation capacities of the utility companies. An increase in the power demand in Cambodia is substantially limited by the power supply capacity. A supply shortage at a consumer end is avoided by time sharing power shutdown or the like during a peaking time. Therefore, it is promising without a doubt that the latent power consumers will become real consumers when the power supply capacity is increased.

4.4 Issues in Power Supply Plan

The power supply plan has been revised time to time as a part of the electric power development planning. The power development finance of developing countries generally often relies on development assistance sources, which would in turn cause a plan to be managed by a third party and be difficult to realize as they wanted.

Cambodia is not an exceptional case with such situation. Although transmission and distribution development projects are implemented and power consumers have been increased, these consumers are currently not satisfied with electric power because the power supply installation capacity expansion has not been completed yet. Power supply shortage usually occurs in peaking time and utility companies solve such emerging problem by scheduled shutdown programs.

It is strongly desired to built power supply installations as quickly as possible because Cambodia would face an electric power crisis as would be caused by an increase in area of substantial blackout if the current situation is left as it is.

4.5 Post Publish Issues of the Electric Power Technical Standards

As a result of the publishing of the Electric Power Technical Standards, many power related equipment became unsatisfactory in view of the Standards (such as bare wiring power supply system) above all in rural areas. A new financing is necessary for improving such equipment. Article 5 of the Electric Power Technical Standards stipulates a tentative transitional rule "Harmful equipment shall be improved within two years" and "Other unsatisfactory equipment shall be improved to satisfy the Electric Power Technical Standards at the time of the most recent renewal of the equipment" in view of avoiding urgent finance rush. Nevertheless, such new finance demands should not be avoided in a long run and the financing issues will be unavoidable.

5. STRUCTURE OF THE ELECTRIC POWER TECHNICAL STANDARDS

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5. STRUCTURE OF THE ELECTRIC POWER TECHNICAL STANDARDS

5.1 Preparation of the Electric Power Technical Standards (draft) for Cambodia

The following items were taken into special considerations in preparing the Electric Power Technical Standards in order to publish the Standards expeditiously.

(1) Number of articles shall be limited as small as possible to save publishing procedure time.

(2) Descriptions shall be simple and clear as practically as possible in order to avoid misunderstandings.

(3) Care should be taken to express rules in a generalized manner to avoid a negligence of an important scope.

(4) Khmer version shall be examined by experts in this field.

Jurisdictional position of the Electric Power Technical Standards is shown on Table- . Structure of the Electric Power Technical Standards are shown below.

"Structure of the Electric Power Technical Standards for Cambodia"

Chapter 1 General Provisions

- Section 1 Definitions
- Section 2 Purpose, scope of application, and duty to comply with the rules
- Section 3 Quality of the electric power
- Section 4 Prevention of a power accidents
- Section 5 Prevention of a power shutdown
- Section 6 Environment Protection

Chapter 2 Technical Standards for Electric Power installations

- Section 1 General Provisions
- Section 2 Generating installations (Thermal electric generation)
- Section 3 Generating installations (Hydro electric generation)
- Section 4 Generating installations (Others)
- Section 5 Transmission and Distribution installations (Common)
- Section 6 Transmission and Distribution installations (High voltage)
- Section 7 Transmission and Distribution installations (Medium and Low voltage)
- Section 8 Indoor wiring

6. GUIDEBOOK FOR POWER ENGINEERS (GUIDEBOOK)

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6. GUIDEBOOK FOR POWER ENGINEERS (GUIDEBOOK)

6.1 The structure of the Guidebook for Power Engineers (Guidebook)

(1) Preparation of the Guidebook for power engineers (Guidebook)

The survey team and the counter part originally assumed that they would prepare guide lines for the Electric Power Technical Standards and MIME would put the guide lines into effect also as legislative rules. With the progress in the survey work, it became difficult to match the idea of the guide lines among them because the interpretations of the guide lines were quite different person to person. Therefore, they concluded that it would be satisfactory in a practical sense if a set of technical reference were prepared to help people understand and practice the Standards. Thus the preparation of "Guidebook for power engineers (Guidebook)" was concluded. This idea was also judged from a practical legislative sense that such a big volume technical references would impose them quite an inefficient unrealistic job in translating it into Khmer language to put into legislative procedure.

Jurisdictional terms in Khmer language are so difficult to understand that they may be different from a general dictionary published by MEXT of Japan, which means such professional usage of Khmer terms could be quite hardly accepted by Cambodian engineers. The Guidebook shall not necessary be put into legislative rules because it will include many technical examples and some explanatory diagram for rules, which would simply help people understand the rules.

The Guidebook for Power Engineers was so designed that it may include references (laws, organizations, electric power demand and supply, procurement procedures for power project equipment and materials, etc.) for the Cambodian electric power sector for the convenience of newly coming private power companies and electric power engineers.

The structure of the Guidebook for Power Engineers is shown below.

"The structure of the Guidebook for Power Engineers for Cambodia"

Vol.1 General

- Cambodia
- Power Sector in Cambodia
- Power Development Plan (PDP)
- Electric Power Project
- Project Management for Power Project

Vol.2 Thermal Power

Vol.3 Hydroelectric Power

- General Matters
- Dam
- Waterway
- Powerhouse and The Other Hydroelectric Power Civil Engineering Facilities
- Electrical and Mechanical Equipment
- Others

Vol.4 Renewable Energy

- Renewable Energy
- Condition of Connection with Power System for Dispersed Generator
- Biomes
- Photovoltaic (Solar Energy)
- Wind Power Generation

Vol.5 High Voltage Transmission System

Vol.6 Medium & Low Voltage Distribution System

Vol.7 Low Voltage House Wiring

7. THE ELECTRIC POWER TECHNICAL STANDARD INVESTIGATION REPORT OF NEIGHBORING COUNTRIES

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7. THE ELECTRIC POWER TECHNICAL STANDARD INVESTIGATION REPORT OF NEIGHBORING COUNTRIES

Information gathering concerning an electric power technical standard was performed about the neighboring countries of Cambodia, and three countries of Thailand Vietnam Laos.

The contents of investigation are shown below.

7.1 Thailand Investigation

(1) Visiting Date; From 12, February to 14 February 2003 (3 days)

(2) Visiting place

EGAT

EGCO

ATT Consultants

GMS Power

(3) Survey team

Team Leader; T. TAKAOKA

Team Member; K. TAKAOKA, K. MEGURO

(4) Research item

1) About a technical standard of Thailand
2) Interconnection system plan with neighboring countries (Cambodia)
3) Interconnection system plan with neighboring countries (Laos)
4) Interconnection system plan with neighboring countries (Malaysia)
5) Interconnection system plan with neighboring countries (Yunnan for China)
6) Interconnection system plan with neighboring countries (Myanmar)
7) Interconnection system plan between GMS (Great Mekong Sub-region) countries
8) ASEAN countries interconnection system plan countries
9) Electric power liberalization / electric power privatizations

7.2 Vietnam Investigation

(1) Visiting Date; From 13, February to 14 February 2003 (2 days)

(2) Visiting place

Institute of Energy

KINDEN

Project on Instructor Training for the Electric Power Sector

(3) Survey team

Team Member; K. SHIRAKI, Y. TAKECHI

(4) Research item

1) Interconnection system plan of Vietnam and neighboring countries
2) The conformity standard of middle voltage power facilities
3) The contents of completion inspection of electric power equipment
4) The technical standard and detailed rules in Vietnam
5) Existence of the qualification of the completion investigation duty of a power distribution company, and an electrician

7.3 Laos Investigation

(1) Visiting Date; From 13, February to 14 February 2003 (2 days)

(2) Visiting place

Electric Power Technical Standard Establishment Project Office

MIH, DOE

(3) Survey team

Team Member; T. NISHIKAWA, T. OMORI, T. SAHARA

(4) Research item

1) An established power equipment outline and an electric power equipment development project outline
2) Project purpose and activity plan
3) The present situation of a draft of Lao Electric Power Technical Standard d
4) Legislation of Lao Electric Power Technical Standard