



Kingdom of Cambodia
Ministry of Industry, Mines and Energy

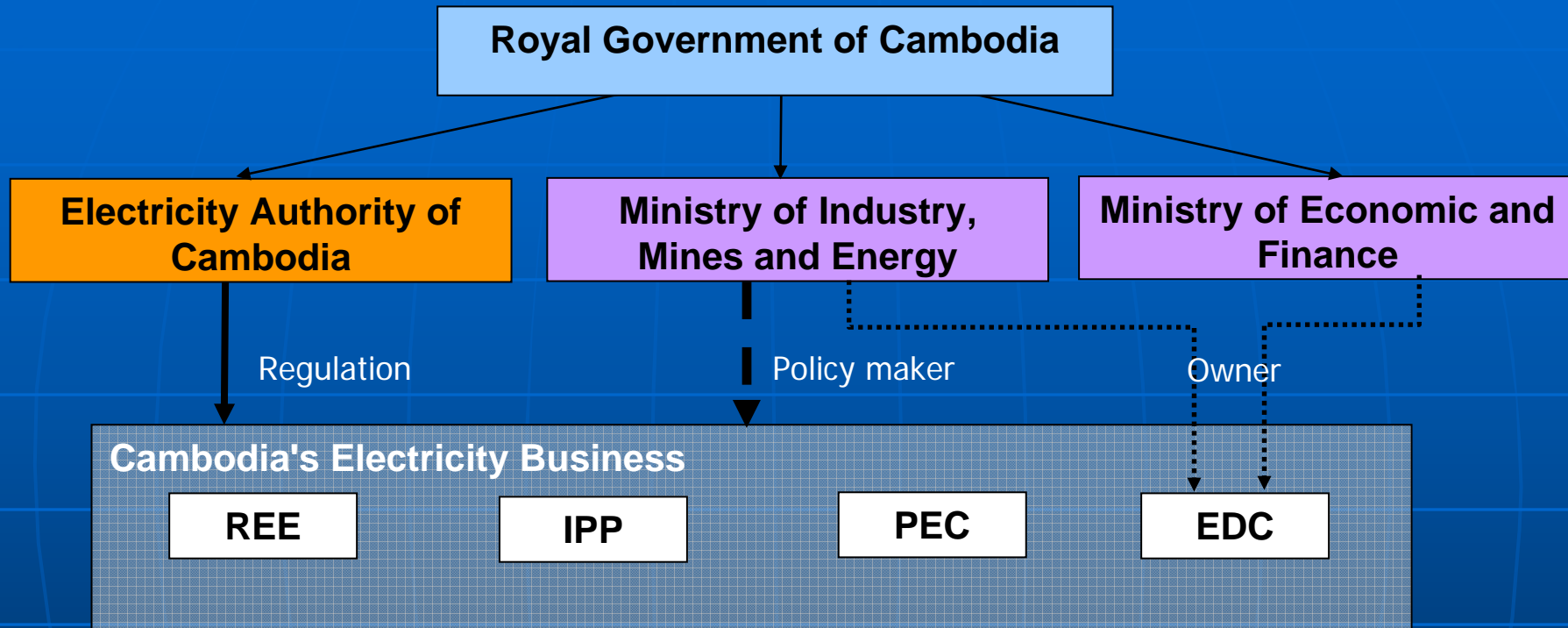
Hydropower Development in Cambodia

by Mr. Tung Sereyvuth, Deputy Director
of Energy Development

Regional Multi-Stakeholder on MRC's Hydropower Programme
on 25-26 September 2008 in Vientiane, Lao PDR



Current Structure of Electricity Sector



- Ownership of EDC
- Policy; Planning; Development; Technical standard
- Tariff, license, finances and performance; Enforce the regulations, rules and standards



Energy Policy

- To provide an adequate supply of energy throughout Cambodia at reasonable and affordable price,
- To ensure a reliable and secured electricity supply at reasonable prices, which facilitates the investments in Cambodia and developments of the national economy,
- To encourage exploration and environmentally and socially acceptable development of energy resources needed for supply to all sectors of Cambodia economy,
- To encourage the efficient use of energy and to minimize the detrimental environmental effects resulted from energy supply and consumption.



Overview of Power Sector

- Cambodia's power sector was severely damaged by years of war and neglect
- EDC's Capacity output in 2007 : 194.8 MW and 1071 GWh
- Projection in 2020 : 3,502 MW and 18,597 GWh
- At present, only 18% of households has access to electricity (54% of Urban HH and 13% of Rural HH)
- Annual energy consumption per capita: 55kWh
- 22 small isolated power system
- High potential of hydro source : more than 10,000 MW

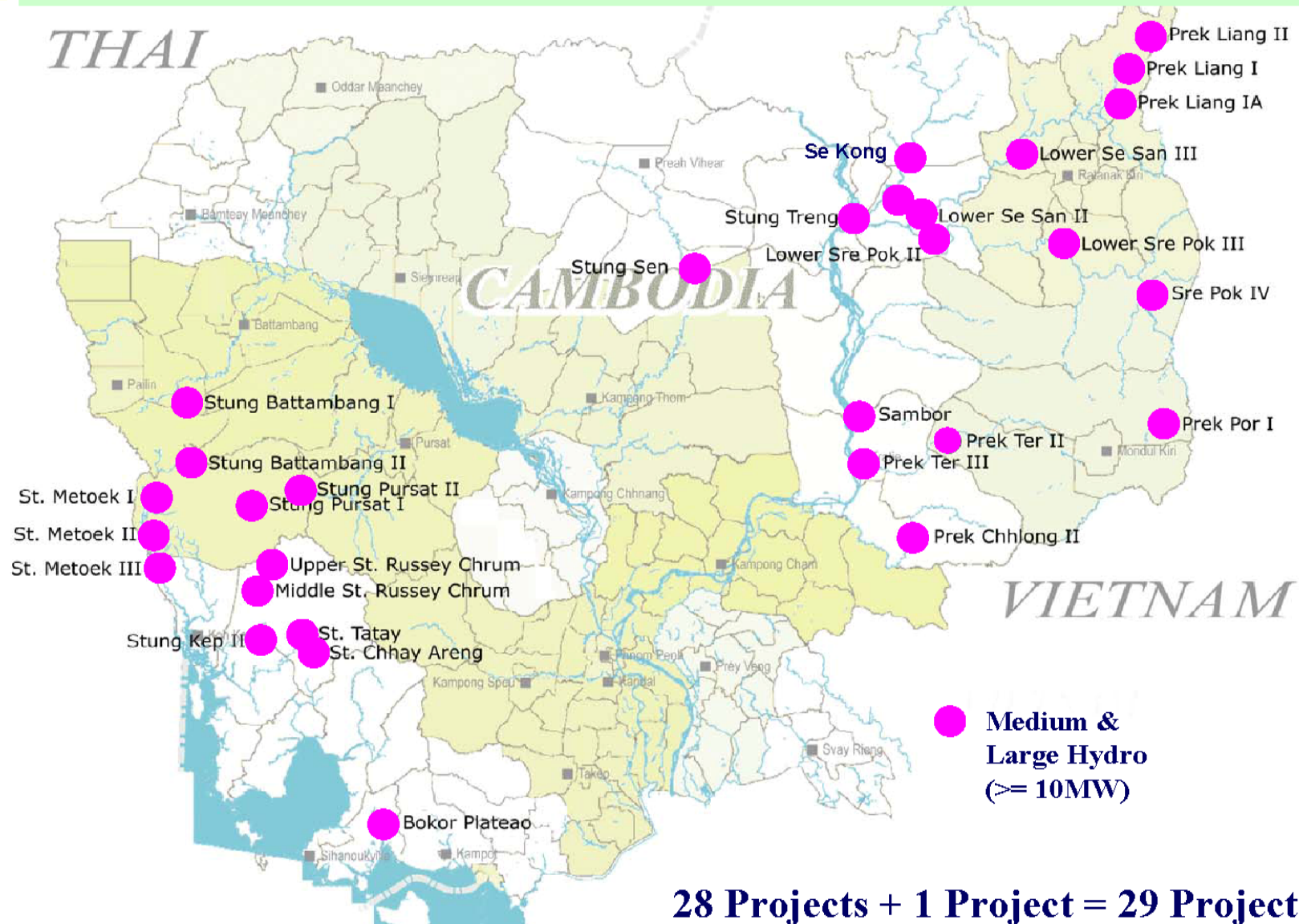


Inventory of Hydropower Potential

- Number of Possible Hydropower sites: 29
(Exclude Installed Capacity < 10 MW)
- Technical Hydropower Potential: 6,695 MW
where:
 - Mekong mainstream: 3,580 MW ...53.50 %
 - Mekong Tributaries: 1,771 MW...26.50 %
 - Outside Mekong Basin: 1,344 MW... 20 %



29 projects for MP Study





List of 29 Hydropower Projects (Installed Capacity > 10 MW)

No.	Projects Name	Installed Capacity (MW)	Annual Energy (GWh)
1	Battambang II	36	187
2	Battambang I	24	120
3	Middle St. Russey Chhrum	125	668
4	Upper St. Russey Chhrum	32	221
5	Stung Chey Areng	300	1,475
6	Stung Tatay	246	858
7	Sambor	2,600	14,870
8	Lower SeSan II	207	1,174
9	Lower Srepok II	222	1,060
10	Lower Srepok III	330	1,754 ⁸



List of 29 Hydropower Projects (Cont.)

No.	Projects Name	Installed Capacity (MW)	Annual Energy (GWh)
11	Lower Srepok IV	235	1,233
12	Prek Liang I	64	300
13	Prek Liang II	64	310
14	Lower SeSan III	375	1,977
15	Stung Pursat I	75	379
16	Stung Pursat II	17	86
17	Stung Sen	40	201
18	Se Kong	148	551
19	Stung Treng	980	4,870
20	Prek Por I	17	90
21	Prek Liang IA	12	77



List of 29 Hydropower Projects (Cont.)

No.	Projects Name	Installed Capacity (MW)	Annual Energy (GWh)
22	Prek Ter II	10	66
23	Prek Ter III	23	88
24	Prek Chhlong II	24	159
25	Stung Metoek I	175	350
26	Stung Metoek II	210	384
27	Stung Metoek III	50	105
28	Stung Kep	26	169
29	Bokor Plateau	28	147



Number of Projects under JICA Studies

- **29 projects** provided for MP study
- **10 priority projects** will be selected as the output of the study



Issues of selected projects

- To balance *hydropower development* with *environment conservation*
- Mitigation measures of social and environmental impacts to be **Key**



Existing Hydropower Projects

No.	Project Name		Installed Capacity	Annual Energy (GWh)
1	Kirirom	BOT	12	48
2	O Chum	EDC	1	3
Total			13	51



Projects under Implementation

- 193 MW **Kamchay** Hydro-project BOT by Synohydro from China (2010)
- 120 MW **Atay** Hydropower Plant, BOT by CYC from China (2012)
- 338 MW **Lower Russei Chhrum** Hydro Power Plant, BOT by Chinese Company (2014)
- 18 MW **Kirirum III**
- 246 MW **Tatay** Hydro power plant by CHMC (2015)



Committed Projects for Private Sector's Study

- 1- MOU for 2600 MW Sambor Hydro-project Feasibility Study by Chinese Company.**
- 2- MOU for 420 MW Lower Sesan 2 Hydro –project Pre-Feasibility and Feasibility Study, by Vietnamese Company.**
- 3- Letter of Permission for 375 MW Lower Sesan 3 Hydro Hydro–project Pre-Feasibility Study by Korean Company.**



Committed Projects for Private Sector's Study (cont.)

- 4- MOU for **330 MW Lower SrePok 3** Hydro-project Feasibility Study by Chinese Company.
- 5- MOU for **235 MW Lower SrePok 4** Hydro-project Feasibility Study by Chinese Company.
- 6- Letter of Permission for **24 MW Stung Battambang 1** Hydro-project Pre-feasibility study by Korean Company.
- 7- Letter of Permission for **36 MW Stung Battambang 2** Hydro-project Pre-feasibility study by Korean Company.
- 8- MOU for **100 MW Stung Pursat 1** Hydro-project Feasibility Study by Chinese Company.



Committed Projects for Private Sector's Study (cont.)

- 9-MOU for 17 MW Stung Pursat 2** Hydro-project Feasibility Study by Chinese Company.
- 10-Letter of Permission for 64 MW Prek Liang**
1 Hydro-project Pre-feasibility study by Korean Company.
- 11-Letter of Permission for 64 MW Prek Liang**
2 Hydro-project Pre-feasibility study by Korean Company.
- 12-Letter of Permission for 38 MW Stung Sen**
Hydro-project Feasibility study by Korean company.
- 13- MOU for 980 MW Stung Treng** Hydro-project Feasibility Study by Russian Company.



Summary of Hydropower

Stage	Installed Capacity (MW)	Annual Energy (GWh)
2 existing projects	13.0	51
5 committed projects	915.2	3,022
10 projects under MP studies	1,031	4,601
13 MOU Projects	5,283	28,516
Total	7,242.2	36,190

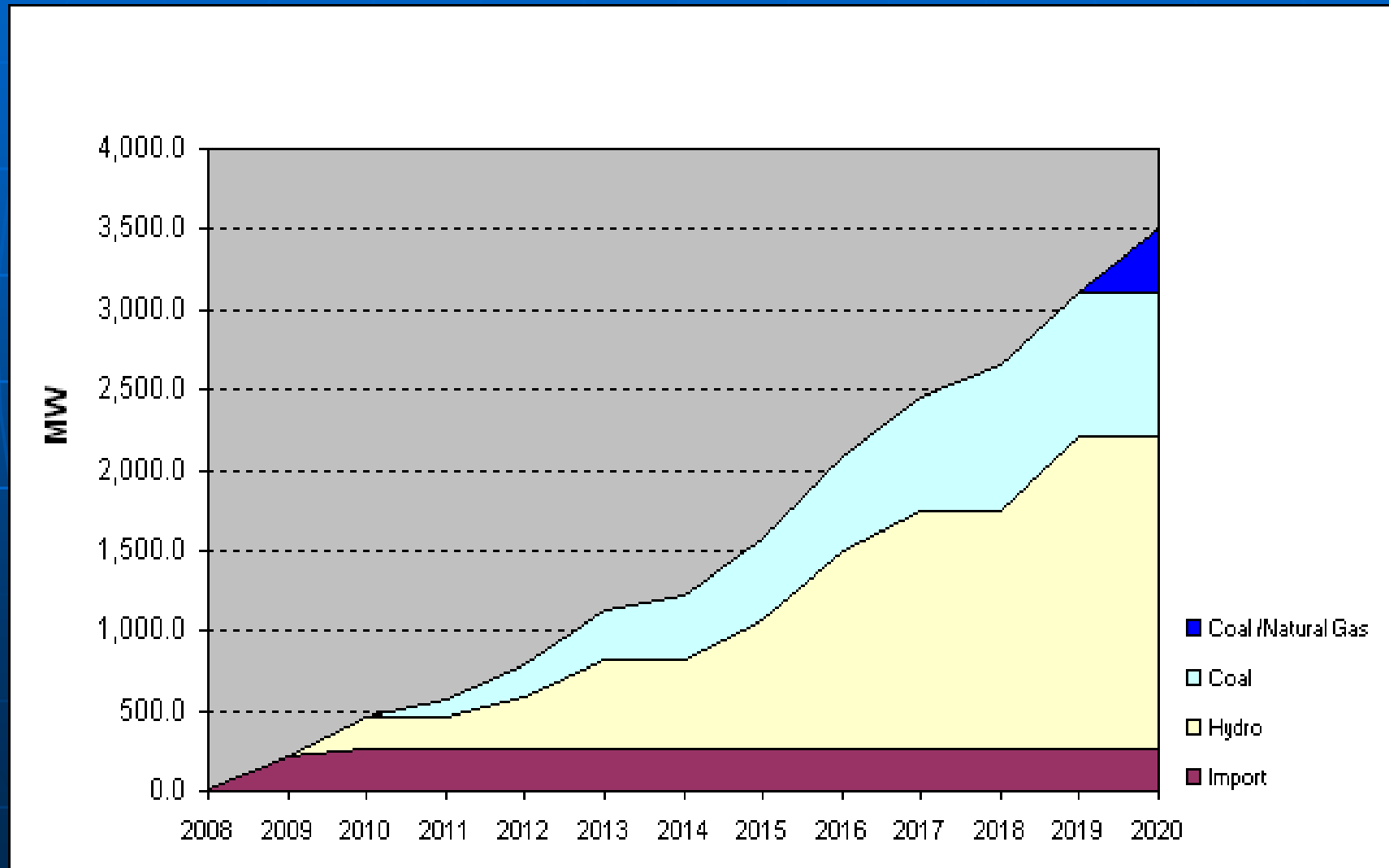


Summary of Generation Expansion MP

No.	Projects Name	Fuel	Power (MW)	Year Operation
1	Kirirom III Hydro power Plant	Hydro	18	2010
2	Kamchay Hydro Power Plant	Hydro	193	2010
3	200 MW Coal Power Plant (I) in Sihanouk Ville - Phase 1	Coal	100	2011
4	Atay Hydro Power Plant	Hydro	120	2012
5	200 MW Coal Power Plant (I) in Sihanouk Ville - Phase 2	Coal	100	2012
6	700 MW Coal Power Plant (II) -Phase 1	Coal	100	2013
7	Lower Stung Rusey Chhrum Hydro Power Plant	Hydro	338	2013
8	700 MW Coal Power Plant (II) -Phase 2	Coal	100	2014
9	Tatay Hydro Power Plant	Hydro	246	2015
10	700 MW Coal Power Plant (II) -Phase 3	Coal	100	2015
11	700 MW Coal Power Plant (II) -Phase 4	Coal	100	2016
12	Lower Sesan II + Lower Srepok II	Hydro	420	2016
13	Lower Sesan I	Hydro	90	2015
13	Stung Chay Areng Hydro Power Plant	Hydro	108	2017
14	700 MW Coal Power Plant (II) -Phase 5	Coal	100	2017
15	Add 700 MW Coal Power Plant at Offshore	Coal	200	2018
16	Sambor Hydro Power Plant	Hydro	2600/450	2019
17	Coal Power Plant (III) or Gas Power Plant	Coal/Natural Gas	450	2020
Total			5,483 / 3,333	¹⁹



Generation Expansion Plan (2008 – 2020)





Existing Transmission and Expansion Plan

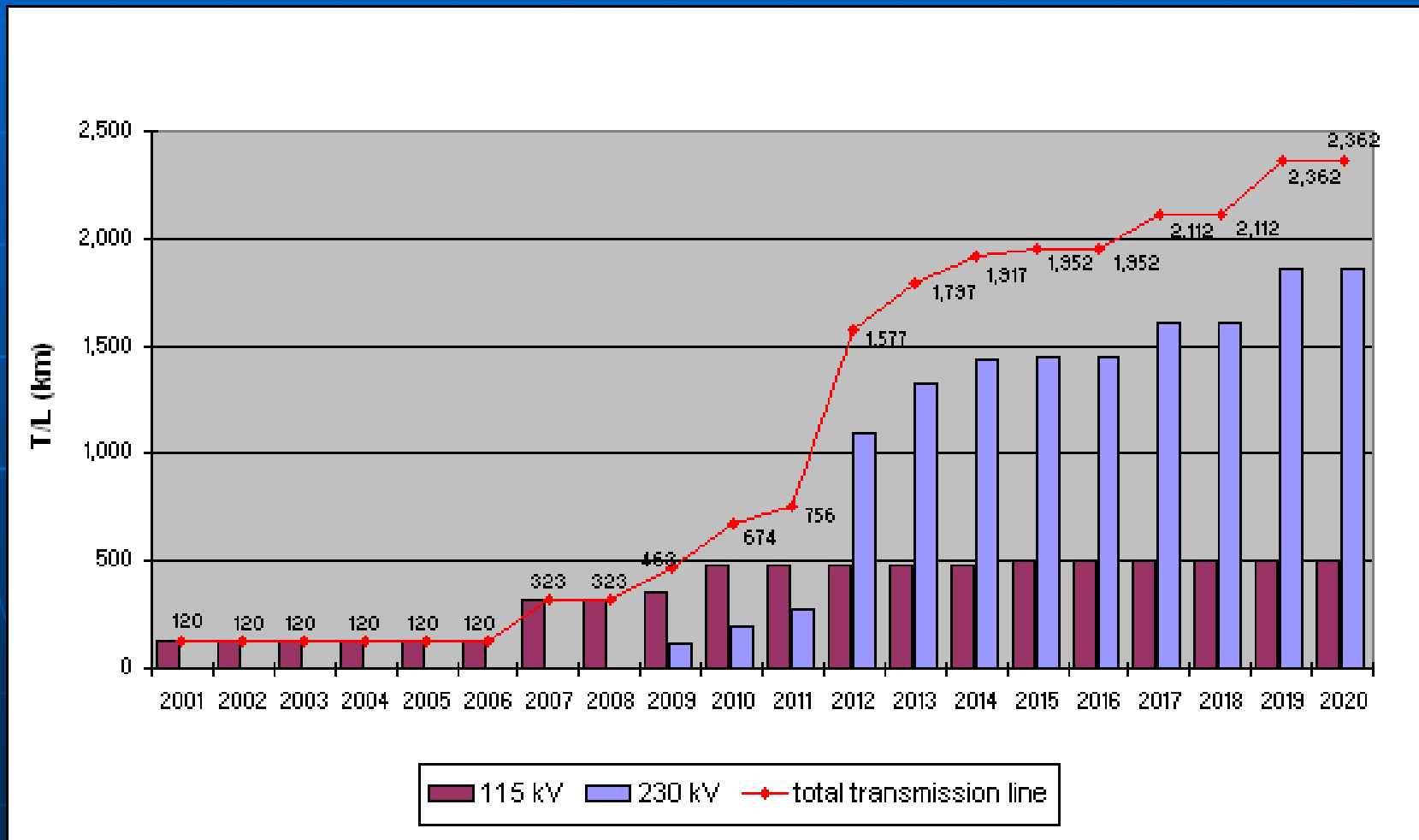
No	Existing Transmission and Expansion Plan	Year Operation	T/L (km)
1	115 kV, Kirirom I - Phom Penh (CETIC)	2001	120
2	115 kV, Thailand - Bantey Meanchey - Siem Reap - Battambang	2007	203
3	220 kV, Phnom Penh - Takeo - Viet Nam, with substation Takeo and WPP	2009	110
4	115 kV, Reinforcement of transmission line and construct substations at WPP (West Phnom Penh), (WB)	2009	30
5	230 kV, Takeo - Kompot, with substation in Kompot (KFW)	2010	87
6	115 kV, Stung Treng - Loa PDR, (substation in Stung Treng), (WB)	2010	56
7	110 kV, Kampong Cham - Viet Nam, (3 substations: - Kampong Cham - Soung, - Pongnearkreak), (WB)	2010	68
8	230 kV, Kampot - Sihanouk Ville, (2 substations: - Vealrinh - Sihanouk Ville), (ADB + JBIC)	2011	82
9	230 kV, Phnom Penh - Kompong Chhnang - Pursat - Battambang, (3 substations: - Kompong Chhnang, - Pursat, - Battambang), (IPP)	2012	310
10	230 kV, Pursat - Osom, (1 substation in Osom Commune), (IPP)	2012	175
11	230 kV, Kampong Cham – Kratie, (IPP)	2012	21 110



No.	Existing Transmission and Expansion Plan (Con.)	Year Operation	T/L (km)
12	230 kV, Kratie – Stung Treng, (IPP)	2012	126
13	230 kV, Phnom Penh – Kampong Cham, (IPP)	2012	100
14	220 kV, Phnom Penh – Sihanoukville, along national road 4, (IPP)	2013	220
15	230 kV, Phnom Penh – Neakleung – Svay Rieng, (2 substations: - Neakleung, - Svay Rieng), (IPP)	2014	120
16	230 kV, Stung Tatay Hydro – Osom substation, (IPP)	2015	15
17	115 kV, West Phnom Penh – East Phnom Penh (substation GS4 at South Phnom Penh)	2015	20
18	230 kV, Reinforcement of transmission line on the existing pole, Phnom Penh – Kampong Cham (transmit power from Lower Sesan II + Lower Srepok II)	2017	100
19	230 kV, Stung Chay Areng - Osom substation (IPP)	2017	60
20	230 kV, Kampong Cham - Kampong Thom - Siem Reap, (1 substation in Kampong Thom), (IPP)	2019	250
Total Transmission Line			2,362



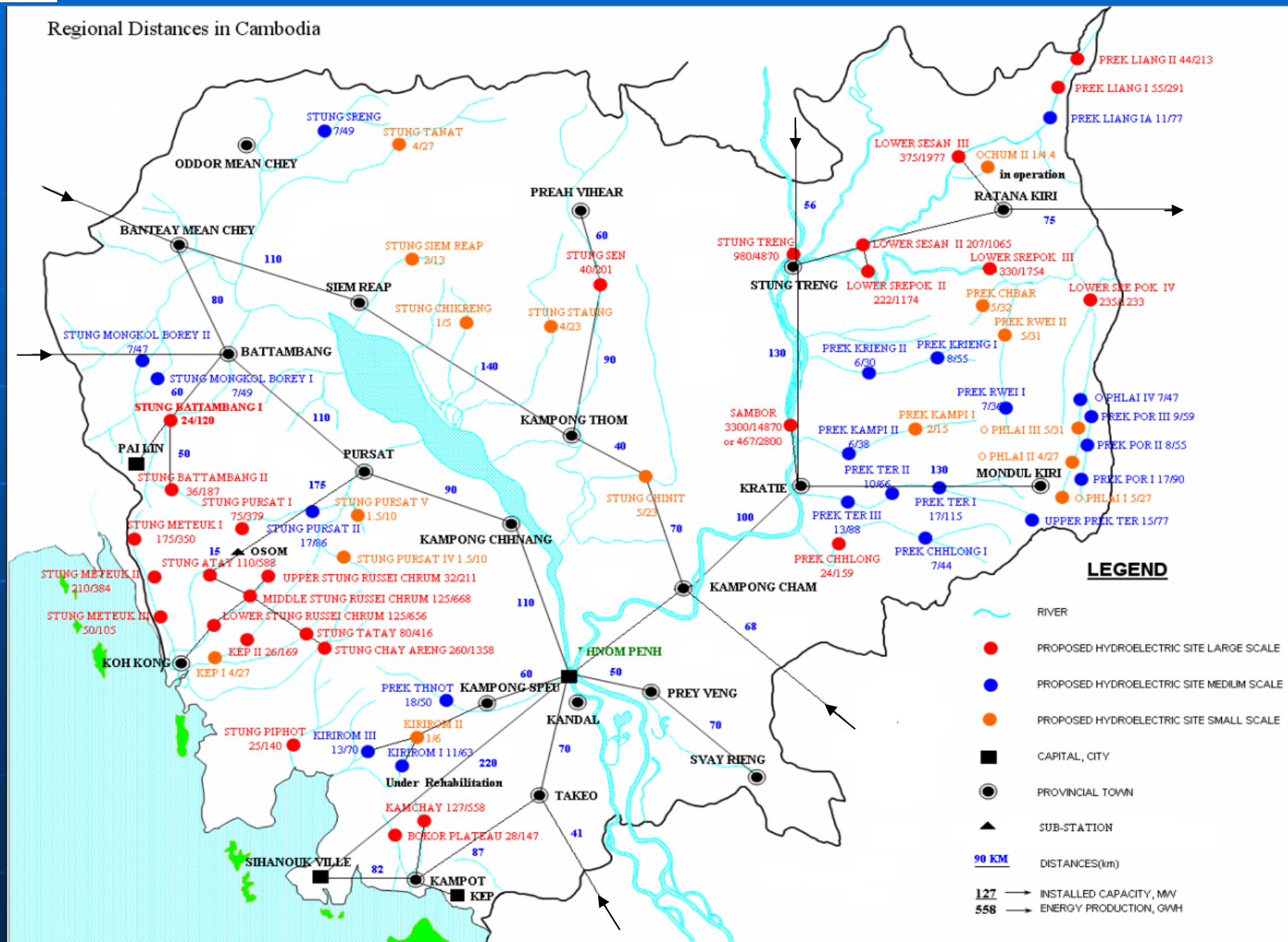
Transmission Expansion Plan (2001 – 2020)





Transmission Site

Regional Distances in Cambodia





Development of Power Trade

- Import from Vietnam at High voltage 220 kV 220 MW by year 2009 to serve southern grid and Phnom Penh
- Import from Thailand at 115 kV starting 2007 to serve northern grid up to 80 MW
- Import from Vietnam to Kompong Cham Province at high voltage 110 kV with capacity 20 MW by 2010
- Import from Lao to Stung Treng Province at 115 kV with capacity until 20 MW by 2010
- 5 Cross border MV links from Vietnam and 8 from Thailand at 22 kV to serve Cambodian communities close to the borders.

An aerial photograph of the Angkor Wat temple complex in Cambodia. The temple is a large, intricate stone structure with multiple towers and a long central axis. It is surrounded by a dense forest of green trees. In the foreground, a wide river flows, and a long stone bridge or causeway connects the temple to the riverbank. The sky is blue with some light clouds.

Thank you for your attention

Angkor Templ in Seam Reap Province