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## Greater Mekong Sub-region (GMS) Eight Meeting of the Focal Group (FG-8)

# Progress of Cambodia Power Development Plans & Transmission Interconnection Projects

Ministry of Industry, Mines and Energy  
Electricité du Cambodge

*Luangprabang, Lao PDR, 26 November, 2009*

EDC Powering Cambodia

# CONTENT

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- ✓ Current Development of Power Sector
- ✓ Outlook of Power Development Plan

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# Current Development of Cambodia Power Sector

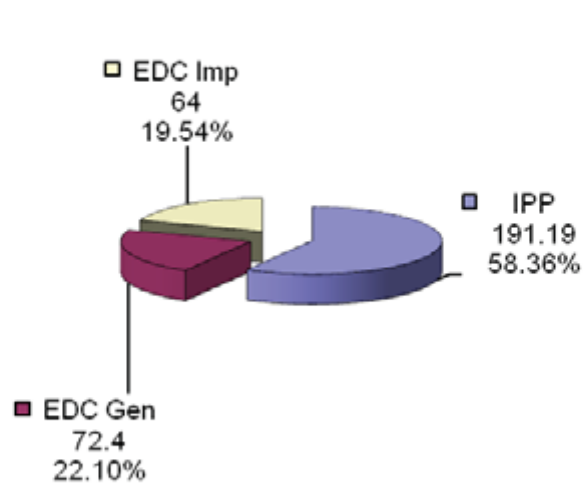
## Highlights on major achievements

Year	2002	2003	2004	2005	2006	2007	2008
<b>Generation</b>							
Installed Capacity, ? MW	157.4	158.4	182.2	223.25	276.36	390.01	390.01
Max generation, ? MW	123	124	158.3	173.22	241.26	358.06	358.06
Energy Generation, ? GWh	547.92	632.1	761.13	905.94	1,106.47	1,378.117	1,620.206
Peak Demand, ? MW	99.29	118.52	140.5	168.89	207.87	262.165	306.00
Sales, GWh	464.2	540.6	644.5	872.23	974.62	1222.52	1,448.101
Total System Loss, %	13.10%	12.70%	13.00%	11.35%	10.69%	10.37%	10.03%
# Customers			201,215	217,453	263,730	286,660	318,475
HV Cct-km	129	129	129	129	129	333	333
# HV Substation	4	4	4	4	4	7	7

# Generation

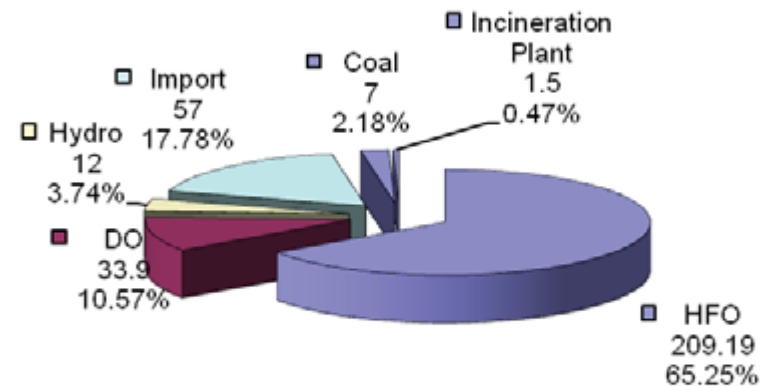
## Generation Sources

Generation Sources in 2008, MW



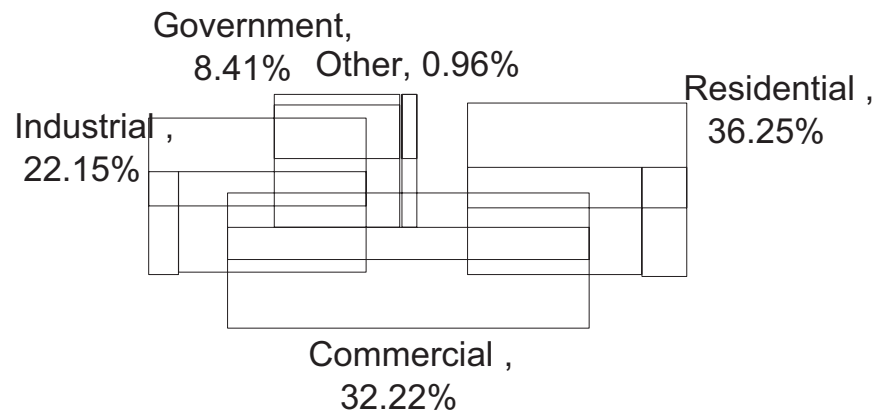
## Fuel Mixes

Fuel Mix of EDC Generation in 2008, MW

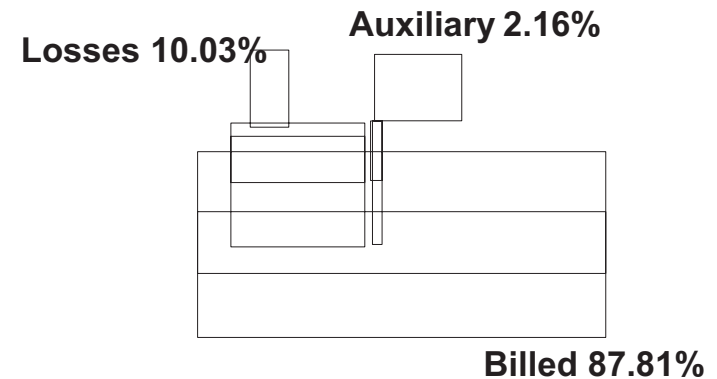


# Business 2008 (EDC's Phnom Penh only)

Customer by sector



Energy sale vs. losses



# Customers

EDC	# of Customers					Growth, %			
	2004	2005	2006	2007	2008	2005-2004	2006-2005	2007-2006	2008-2007
Phnom Penh	150,726	162,605	177,172	192,697	211,680	7.31	8.22	8.05	9.67
Provinces	50,489	54,835	86,561	93,963	103,825	7.92	33.65	7.88	10.63
<b><u>Total</u></b>	<b><u>201,215</u></b>	<b><u>217,440</u></b>	<b><u>263,733</u></b>	<b><u>286,660</u></b>	<b><u>315,505</u></b>	<b><u>7.46%</u></b>	<b><u>17.55%</u></b>	<b><u>8.00%</u></b>	<b><u>9.14%</u></b>

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# Outlook of Power Development Plan



# Policy Targets

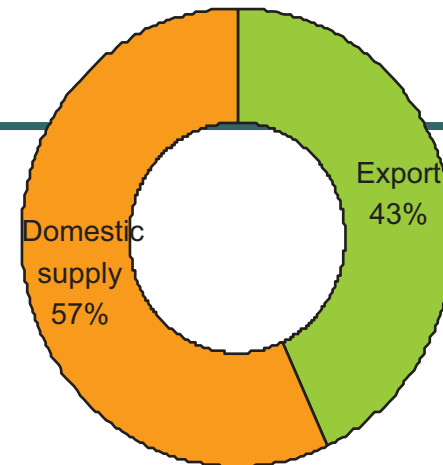
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- 100% of villages have access to electricity services by 2020
- 70% of rural households have access to quality electricity services by 2030

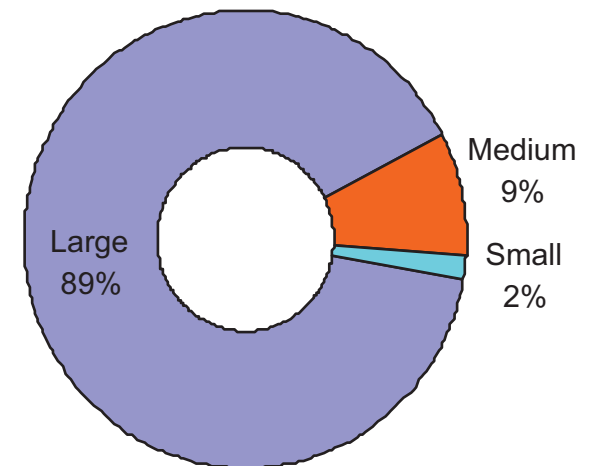
# Policy (Cont')

Projection of Electricity Supply in year 2020  
6,000 MW

- Projection in 2020, the Electricity supply about 6,000 MW.
- Domestic Supply about 3,500 MW and 18,597 GWh,
- Export more than 2,500 MW
- High potential of hydro source about 10,000 MW



Share of Hydro Power Potential 7,600 MW



# Generation Sources Plan

## A1- Project Existing

No.	Power-Project	Install Capa.MW	IA/PPA/LA	Company	Country	COD
1	Kirirom I	12	BOT	CETIC	China	2002
2	Ochum	1		EDC	Cambodia	1993
3	Oromis-Omleng	0.37		J-Power	Japan	2009

## A2- Project Under Implementation

No.	Power-Project	Install Capa.MW	IA/PPA/LA	Company	Country	COD
1	Kamchay Hydro	193	BOT	Synohydro	China	2011
2	Coal Power Plant I	100	BOO	Leader	Cambodia	2011
3	Kirirom III	18	BOT	CETIC	China	2012
4	Atay Hydro	110	BOT	CYC	China	2012
5	Coal Power Plant II	100	BOO	MKCSS	Cambodia	2012
6	Tatay Hydro	246	BOT	Chinese	China	2013
7	LSt. Russei Chrum	338	BOT	Chinese	China	2013

## Generation sources plan (Con't)

### A3- Project Under MOU Study

No.	Hydro-Project	Install Capa.MW	IA/PPA/LA	Company	Country	Plan
1	Sambor Hydro	2,600	F/S	--	China	2019
2	Lower Sesan II & Lower Srepok II	420	PFS	--	Vietnam	2016
3	Lower Sesan III	375	F/S	--	Korea	
4	Lower Srepok III	330	F/S	--	China	
5	Lower Srepok IV	235	F/S	--	China	
6	Battambang I	24	F/S	--	Korea	
7	Battambang II	36	F/S	--	Korea	
8	Stung Pursat I	75	F/S	--	China	
9	Stung Pursat II	17	F/S	--	China	
10	Prek Liang I	64	F/S	--	Korea	
11	Prek Liang II	64	F/S	--	Korea	
12	Stung Sen	40	F/S	--	Korea	
13	Stung Treng	980	F/S	--	Russia	

# Hydro Power Site

-The rest of hydro potential around 3000 MW.

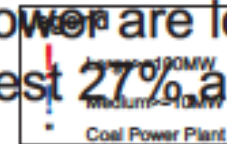
72%

MOU  
Over 6000 MW

27%

Under Construction  
about 1000 MW

- Cambodia has a huge of hydro potential about 10,000 MW
- The existing data for the Master Plan Study on Hydropower in Cambodia is around 7,500 MW. (75%). within the 29 sites of Hydropower sources.
- Currently the huge of hydro power are located in the North-East 72% and North-West 27% and Others 1% only.

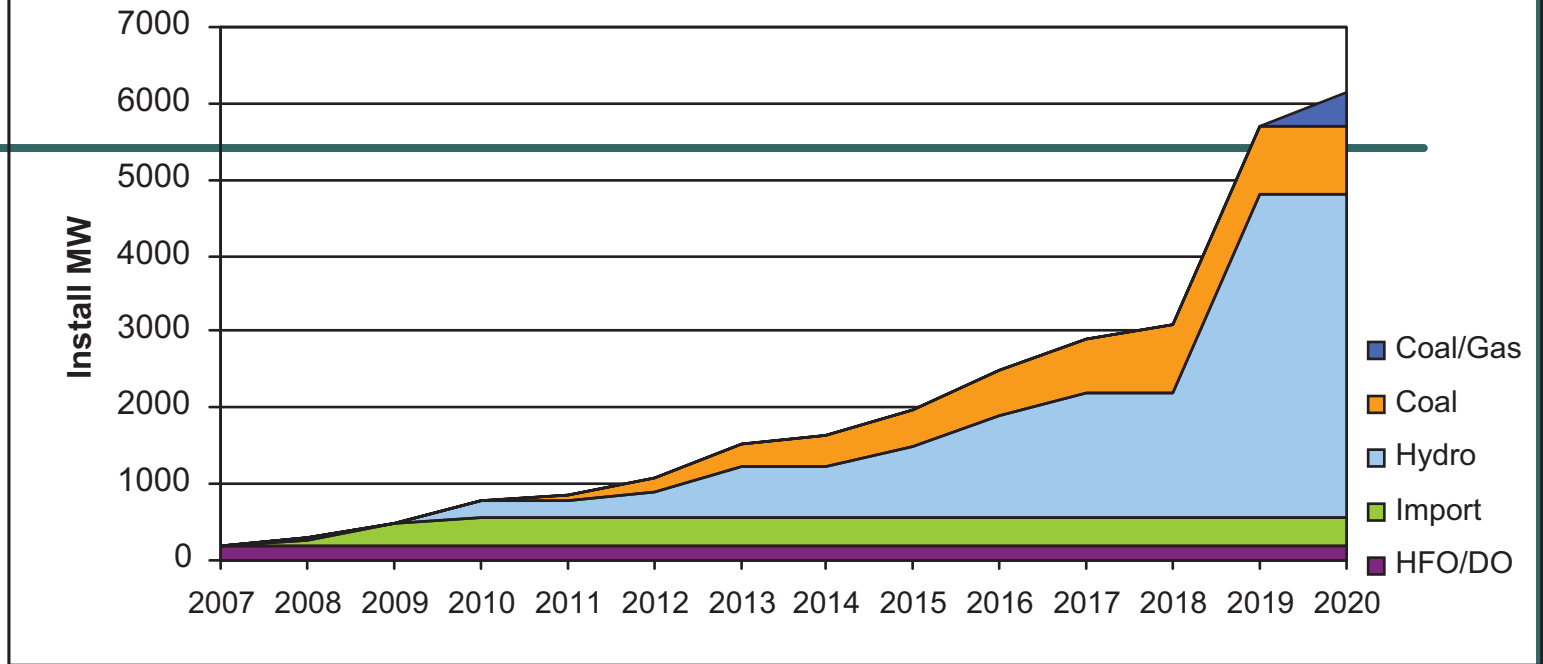


## Generation Expansion Plan (2007-2020)

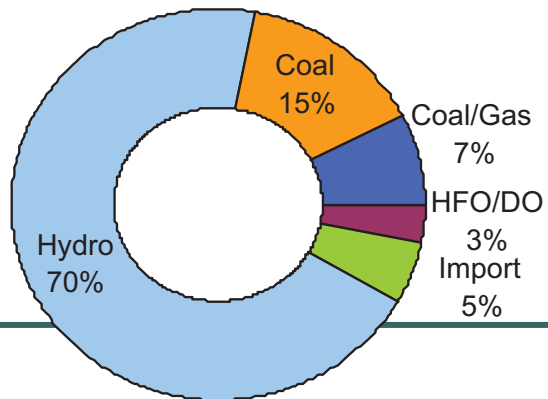
No.	Domestics Generation Expansion Plan	Fuel Type	Install Capa.MW	Year
1	Kamchay Hydro Power Plant	Hydro	193	2011
2	Kirirom III Hydro power Plant	Hydro	18	2012
3	200 MW Coal Power Plant (I) in Sihanouk Ville - Phase 1	Coal	100	2011
4	Atay Hydro Power Plant	Hydro	110	2012
5	200 MW Coal Power Plant (I) in Sihanouk Ville - Phase 2	Coal	100	2012
6	700 MW Coal Power Plant (II) -Phase 1	Coal	100	2013
7	Lower Stung Russei Chhrum Hydro Power Plant	Hydro	338	2013
8	Tatay Hydro Power Plant	Hydro	246	2013
9	700 MW Coal Power Plant (II) -Phase 2	Coal	100	2014
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	Stung Chay Areng Hydro Power Plant	Hydro	260	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	450	2019
17	Coal Power Plant (III) or Gas Power Plant	Coal/Natural Gas	400	2020
<b>Total</b>			<b>3,345</b>	

Cont'...

### Generation Expansion Plan 2007-2020



Projection of Electricity Generation by Fuel in 2020, 6000 MW



**The Projection 2020:**  
**-Domestics Supply 3,500 MW (57%)**  
**-Export more than 2,500 MW (43%)**

## Development of Transmission

No.	Transmission Expansion Plan	Distance (Km)	Grant/ Invest	Year
1	115 kV, Kirirom I - Phnom Penh	120	CETIC	2001
2	115 kV, Thailand - Bantey Meanchey - Siem Reap - Battambang	203	CPTL	2007
3	220 kV, Phnom Penh - Takeo - Viet Nam, (construct the substation in Takeo),	110	ADB & NFD	2009
4	115 kV, Reinforcement of transmission line and construct substation at WPP (West Phnom Penh),	30	WB	2009
5	230 kV, Takeo - Kompot, (construct substation in Kompot),	87	KFW	2010
6	115 kV, Steung Treng - Loa PDR, (construct substation in Steung Treng),	56	WB	2010
7	110 kV, Kampong Cham - Viet Nam, (construct 3 substations: - Kampong Cham, - Soung, - Pongnearkreak ),	68	WB	2010
8	230 kV, Kampot - Sihanouk Ville, (construct 2 substations: - Vealrinh - Sihanouk Ville),	82	ADB & JBIC	2011
9	230 kV, Phnom Penh - Kompong Chhnang - Pursat - Battambang, (construct 3 substations: - Kompong Chhnang, - Pursat, - Battambang),	310	CYC	2012
10	230 kV, Pursat - Osom, (construct 1 substation in Osom Commune),	175	CYC	2012
11	230 kV, Kampong Cham – Kratie,	110	CUPL	2012
12	230 kV, Kratie – Stung Treng,	126	INDIA	2012
13	230 kV, Phnom Penh – Kampong Cham,	100	CUPL	2012
14	220 kV, Phnom Penh – Sihanoukville, along national road 4,	220	CHMC	2013



## Development of Transmission (Cont'...)

No.	Transmission Expansion Plan	Distance Km	Grant/ Invest	Year
15	230 kV, East Phnom Penh – Neakleung – Svay Rieng, (construct 2 substations: Neakleung, - Svay Rieng)	120	CHMC	2014
16	230 kV, Stung Tatay Hydro – Osom substation,	15	CHMC	2015
17	115 kV, West Phnom Penh – East Phnom Penh ( construct substation GS4 at South Phnom Penh)	20	WB	2015
18	230 kV, Reinforcement of transmission line on the existing pole, Phnom Penh – Kampong Cham (transmit power from Lower Sesan II + Lower Srepok II)	100	CUPL	2017
19	230 kV, Stung Chay Areng - Osom substation	60	CSG	2017
20	230 kV, Kampong Cham - Kampong Thom - Siem Reap, (construct 1 substation in Kampong Thom)	250	KTC	2019
21	500 kV, Loa PDR (Ban Sok)- Steung Treng – Vietnam (Tay Ninh), (construct substation in Steung Treng)	220	ADB	2019
	<b>Total Transmission Line</b>	<b>2,582.0</b>		

Thailand

Loa PDR

Vietnam

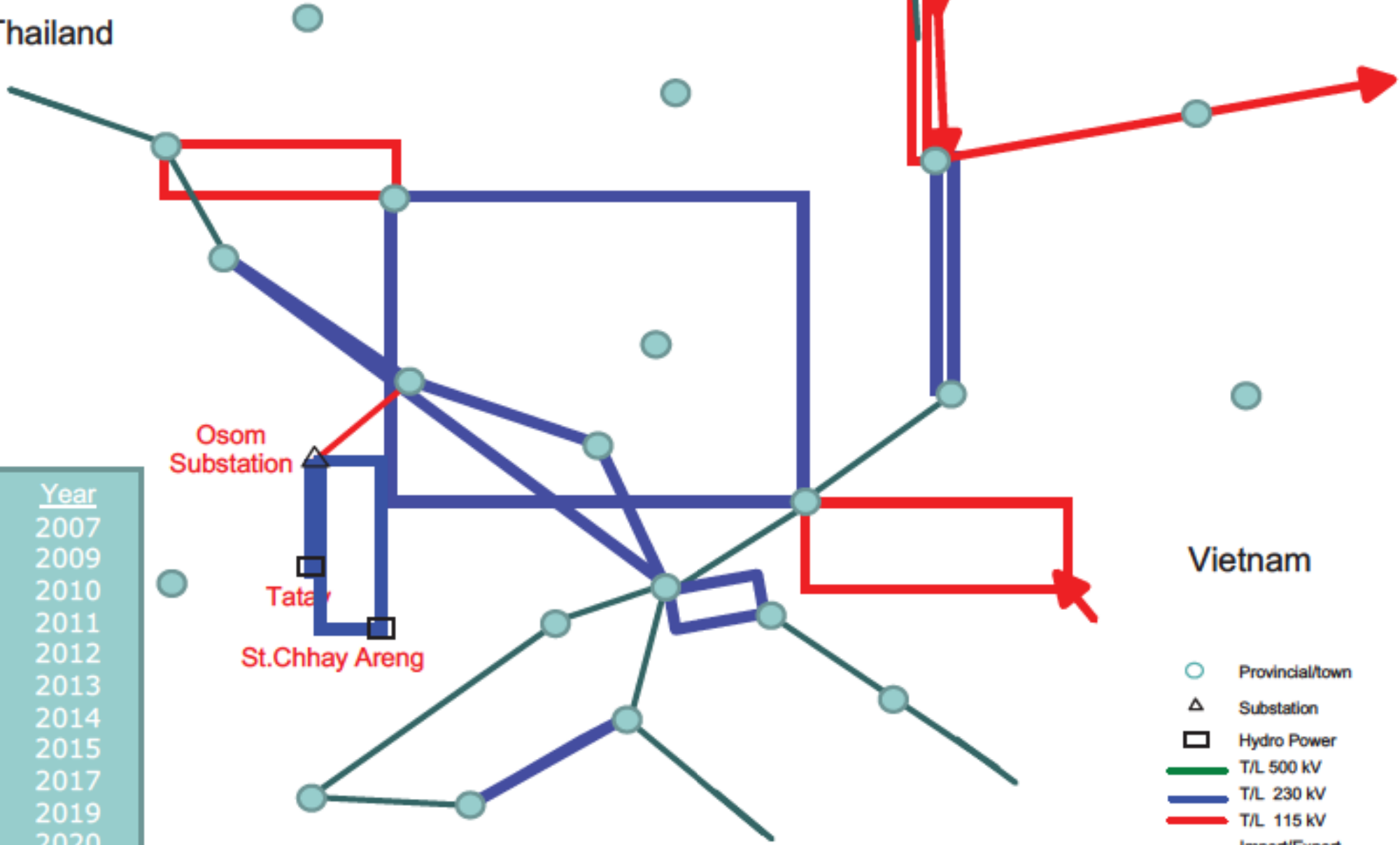
- Year
- 2007
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2017
- 2019
- 2020

Osom Substation

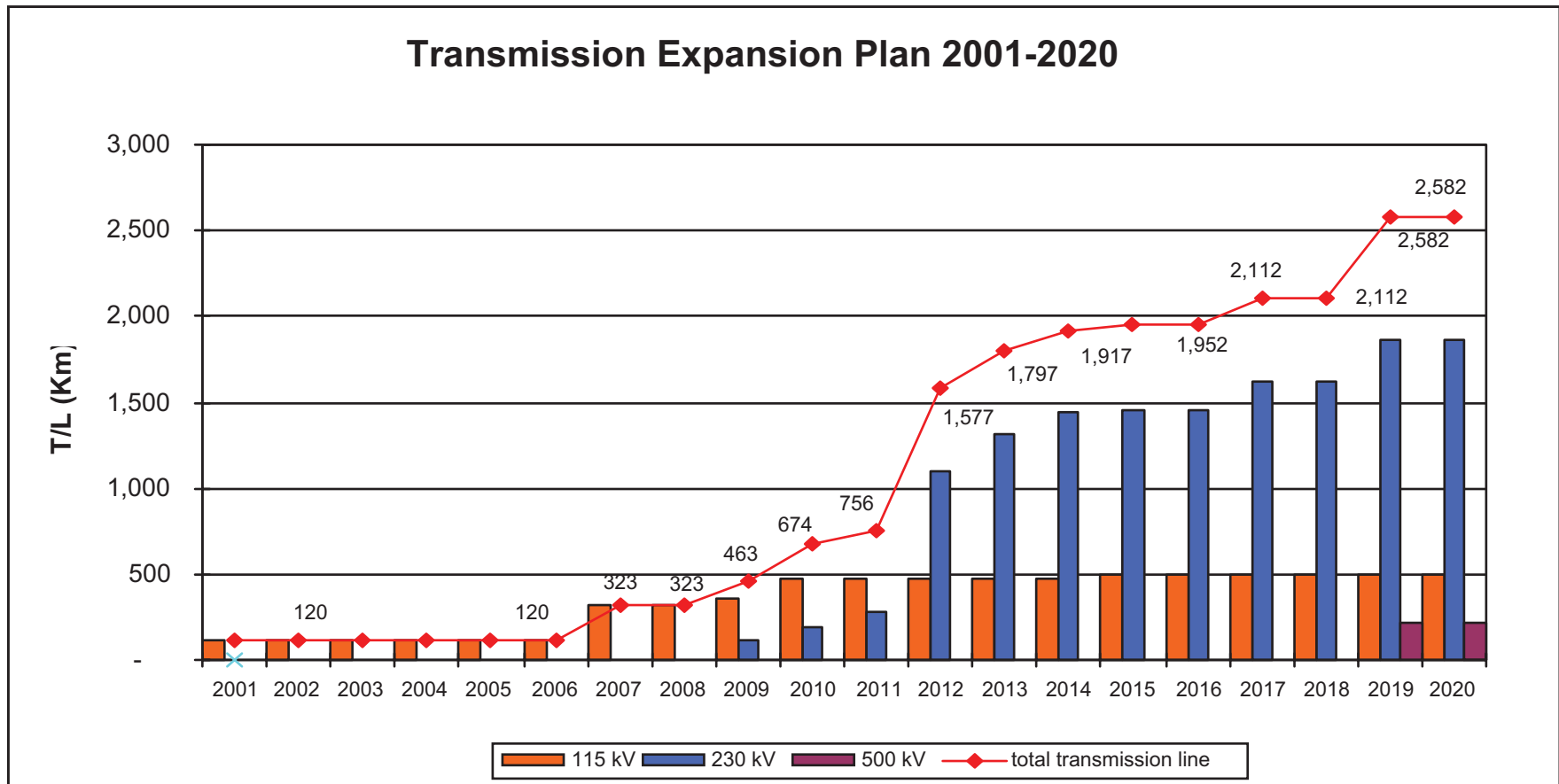
Tata

St.Chhay Areng

- Provincial/town
- △ Substation
- Hydro Power
- T/L 500 kV
- T/L 230 kV
- T/L 115 kV
- Import/Export



# Transmission Expansion Plan (2001 – 2020)



## Distribution and Rural Electrification Plan up to 2020

### Electrification plan:

- Grid electrification with government initiative and off-grid electrification with private sector initiatives.
- Electrification and financial demand:

Type of electrification	# of villages	Newly electrified h/h	Total cost, M\$
Grid electrification	6,411	600,000	308
Off-grid electrification	5,320	272,000	147
Total	11,731	872,000	455

## Distribution and Rural Electrification Plan up to 2020 (con't)

### Financial Demand by type of materials:

Type of materials	EDC's Zone	Other Zone	Total
New MV system, US\$	33,984,844	201,205,684	235,190,528
Transformers, US\$	1,669,500	0	1,669,500
New LV system, US\$	2,024,769	57,974,957	59,999,726
LV Metering systems, US\$	4,233,253	48,962,993	53,196,247
<b>Total</b>	<b>41,912,366</b>	<b>308,143,630</b>	<b>350,056,001</b>

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Thank you for your attention