

- Cambodia Power Sector

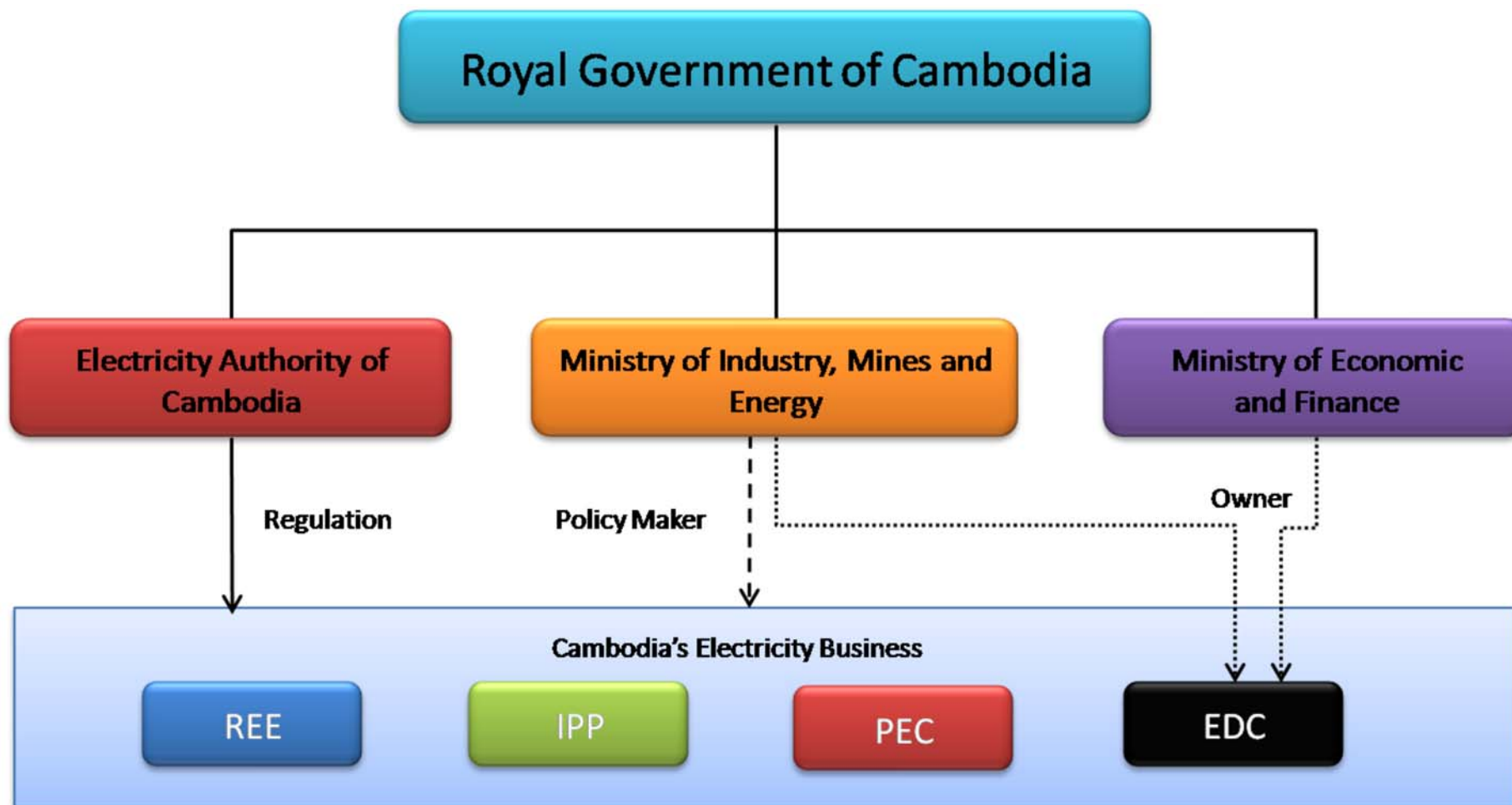


31 August 2015, Phnom Penh, Cambodia

Content

- 1. Structure of Electricity Organization**
- 2. Energy Policy**
- 3. Cambodia Power Strategy**
- 4. Overviews of Power Sector**
- 5. Development of Generation**
- 6. Development of Transmission Lines**
- 9. Conclusion**

Framework of Power Sector in Cambodia



-➔ -Ownership of EDC
- - ➔ -Policy, Planning, Technical Standard
- ➔ -Tariff, License, Financial Performance, Enforce the regulations, Rule and Standard.

ENERGY POLICY

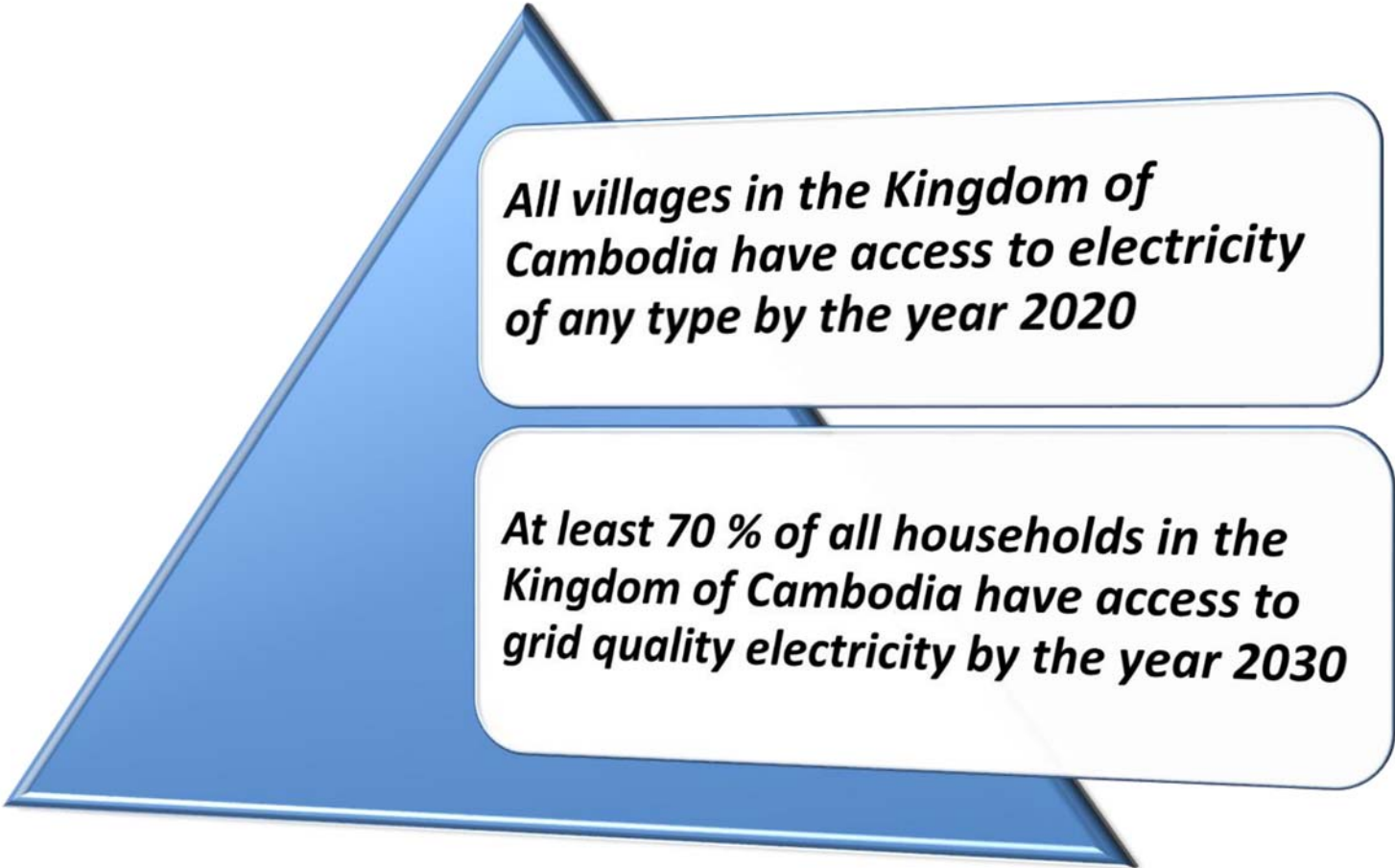
To provide an **adequate supply of energy** throughout Cambodia at reasonable and affordable price,

To ensure a **reliable and secured electricity supply at reasonable price**, which facilitates investment in Cambodia and development of national economy,

To encourage exploration **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 affects resulted from energy supply and consumption.

Goal of the Rural Electrification Development Program



All villages in the Kingdom of Cambodia have access to electricity of any type by the year 2020

At least 70 % of all households in the Kingdom of Cambodia have access to grid quality electricity by the year 2030

CAMBODIA POWER STRATEGY

A-Development of Generation

Increasing diversify of power supply such as Hydro, Coal power, Importing electricity, biomass and others renewable energies to meet the electricity demand and reduce fuel oil for power generation.

B-Development of Transmission lines

Development the national transmission line, GMS & ASEAN power grid, maximize mini-grid to rural areas, upgrading the HV, MV & LV.

C-Development of Rural Electrification

Supply from the National Grid, Mini-grid, Grid extension and stand-alone system (BCS, SHS, Micro Hydropower, biomass, etc.

5 Years Action Plan 2012-2016

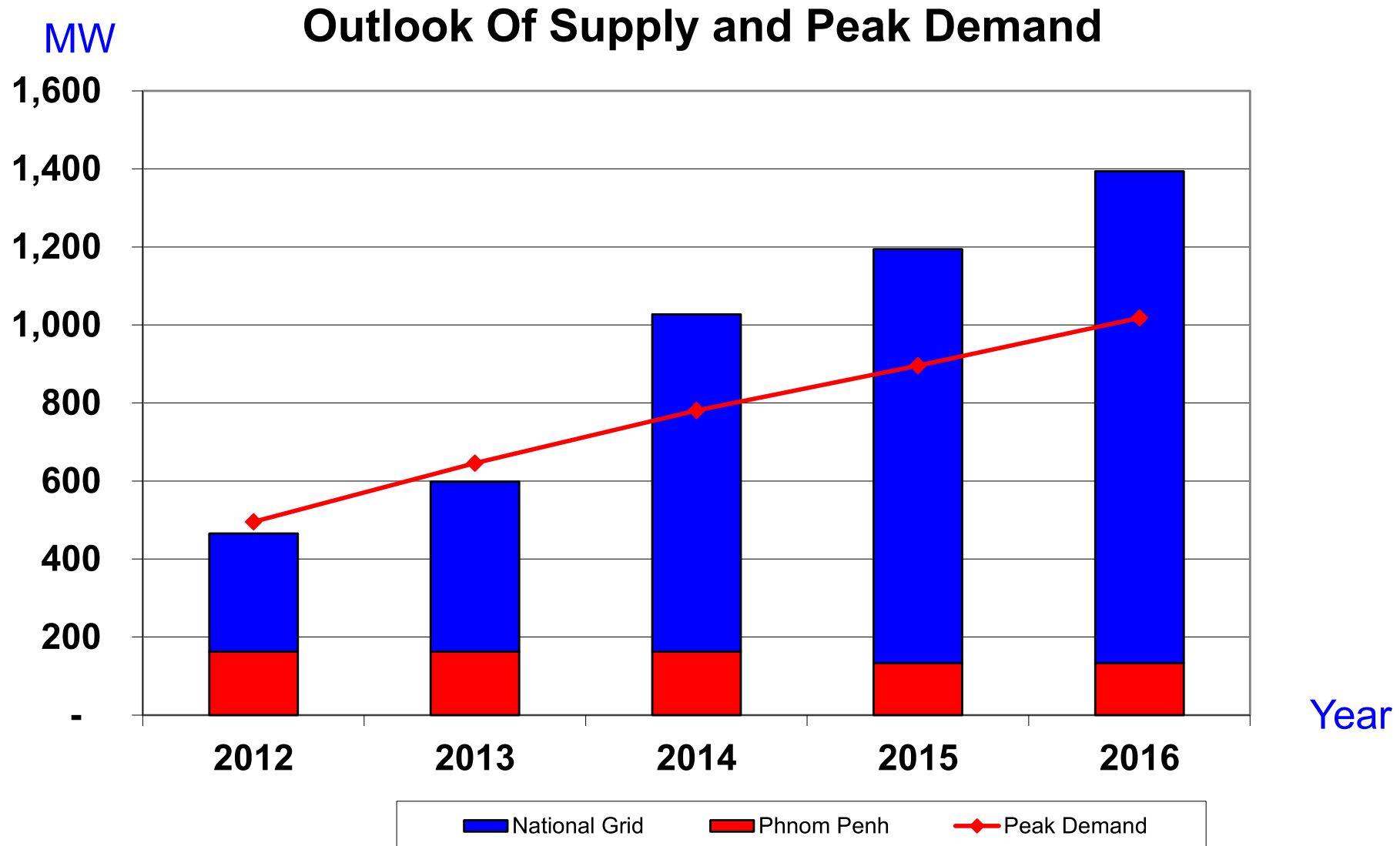
The main action plan in electricity power development plan 2012 – 2016 is to reduce the generation cost and increase the rate of electrification by :

- Import lower cost power source from neighboring countries**
- Construct and put in service the large scale generation such as hydro, coal, Biomass...**
- Power transmission from the generation source and interconnected between provincial towns**
- Extension distribution network through out the country**

OVERVIEWS OF THE POWER SECTOR

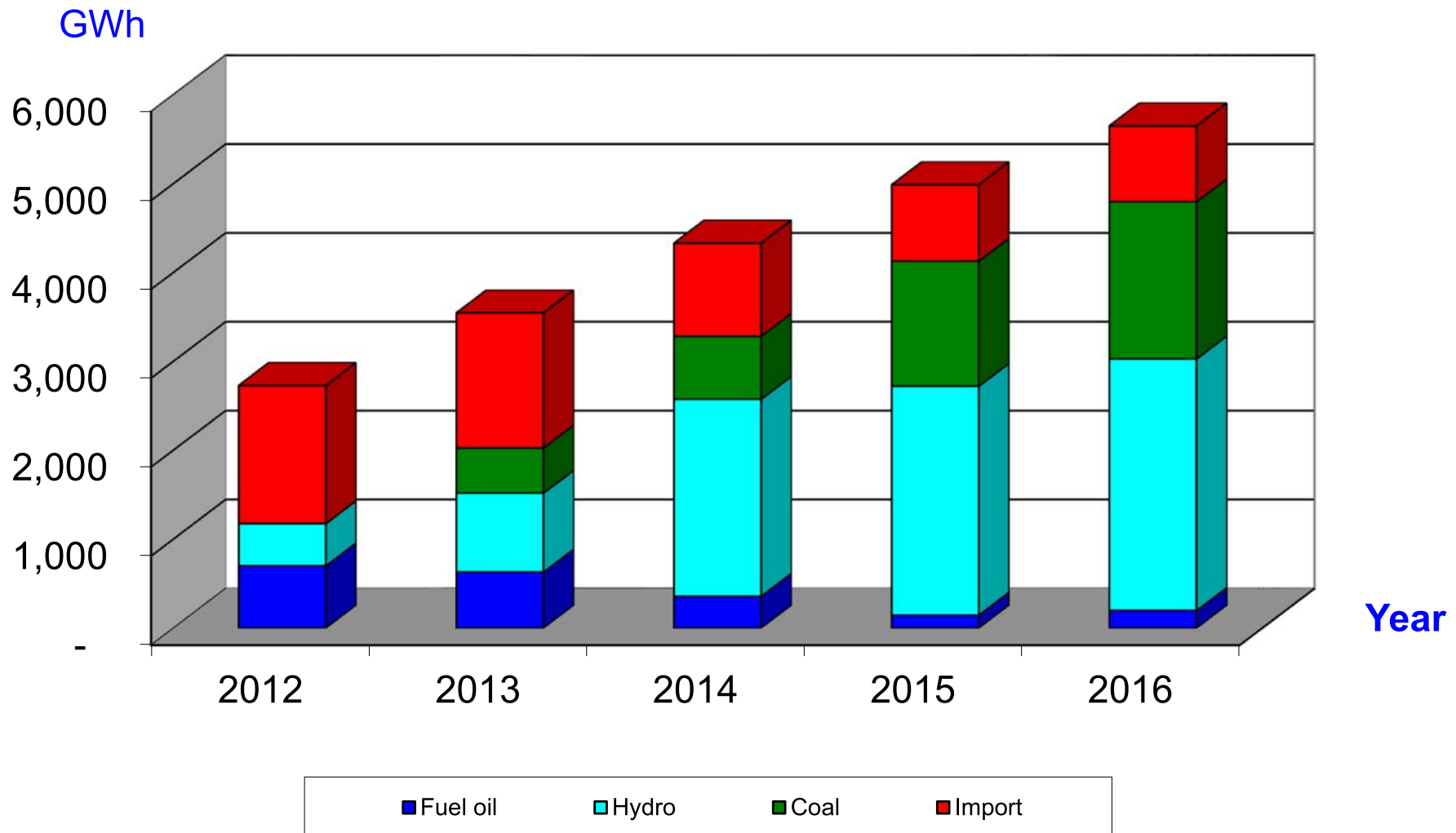
- ◉ Cambodia has a good potential of hydropower about 10,000 MW. At present, about 10% to the potential under construction. Generation Capacity is 1025MW (to increase to 1250MW) with 2920GWh in 2014.
- ◉ The annual electricity demand per capita increased from 191 kWh in 2011 to 300 kWh in 2015.
- ◉ In 2015, the national electrification rate increased to 52%, while the electrified household in urban areas were almost 100%. There are 9656km of MV line and 12130km of LV line feed by 4100 transformer posts. Estimated investment: 730 million USD.

Outlook of Peak Demand 2012-2016



Energy Generation by Fuel Type

Generation Planning by Type in National Grid



Estimated Investment on Generation Utilities

	Up to 2011		2012 - 2016		
	Capacity. MW		Capacity. MW		Investment MUS\$
	Installed	Available	Installed	Available	
EDC	77	72			
Private	269	236	1,060	810	1,874
Import	333	268	310	310	Trans. Inv
Total	679	576	1,370	1,220	1,874
Cumulative			2,049	1,796	

Generation (in Power Development Plan)

No.	Generation Expansion Plan	Fuel Type	Install Capa.MW	COD
1	Stung Atay Hydro Power Plant	Hydro	120	2013
2	200 MW Coal Power Plant (I) in Sihanouk Province - Phase 1	Coal	100	2013
3	Stung Tatay Hydro Power Plant	Hydro	246	2014
4	Lower Stung Russei Chrum Hydro Power Plant	Hydro	338	2015
5	700 MW Coal Power Plant (II) -Phase 1	Coal	270	2014-2015
6	700 MW Coal Power Plant (II) -Phase 2	Coal	100	2017
7	700 MW Coal Power Plant (II) -Phase 3	Coal	100	2018
8	200 MW Coal Power Plant (I) in Sihanouk Province - Phase 2	Coal	135	2016
9	Lower Se San II Hydro Power Plant	Hydro	400	2016
10	700 MW Coal Power Plant (II) -Phase 4	Coal	100	2018
11	Stung Chay Areng Hydro Power Plant	Hydro	108	2017
12	700 MW Coal Power Plant (II) -Phase 5	Coal	100	2019
13	Sambor Hydro Power Plant	Hydro	450/2600	2019
14	Coal Power Plant (III) or Gas Power Plant	Coal/Natural Gas	400	2020
15	Stung Treng Hydro Power Plant	Hydro	900	2020

Development of Generation

A1- Existing

No.	Power-Project	Install Capa.MW	IA/PPA/LA	Company	Country	COD	Achiev ement
1	Kirirom I	12	BOT	CETIC	China	2001	100%
2	Ochum	1	-	EDC	Cambodia	2002	100%
3	Coal plant	10	BOO	Sovanphume	Cambodia	2010	100%
4	Kamchay Hydro	194.1	BOT	Sinohydro	China	2011	100%
5	Kirirom III	18	BOT	CETIC	China	2013	100%

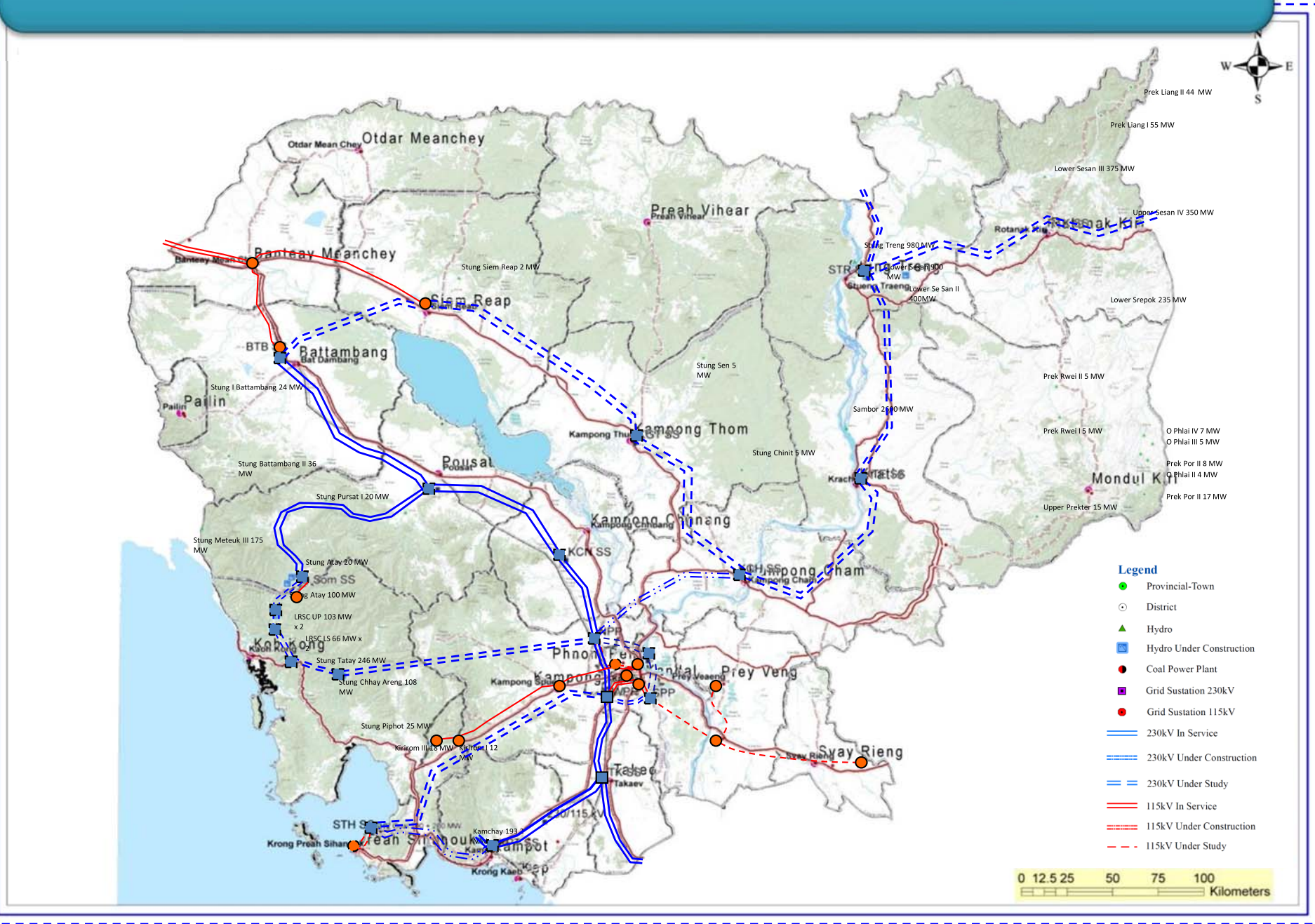
A2- Project newly completed

No.	Power-Project	Install Capa.MW	IA/PPA/LA	Company	Country	Com plete d	Achiev ement
1	Coal Power Plant	100	BOO	CEL	Malaysia	2013	
2	Coal Power Plant	100	BOO	CEL	Malaysia	2013	
3	Atay Hydro	120	BOT	CHD	China	2013	
4	Coal Power Plant	270	BOO	CIIDG	China	2014	
5	LSt. Russei Chhrum	338	BOT	China Huadian	China	2015	
6	Tatay Hydro	246	BOT	Sinohydro	China	2014	
7	Coal Power Plant	135	BOO	CIIDG	China	2016	

A3- Project Under MOU Study

No.	Hydro-Project	Install Capa.MW	IA/PPA/LA	Company	Country	Plan
1	Stung Cheay Areng	108	Negotiation	CGDC	China	2017
2	Lower Sesan I	90	F/S	EVNI	Vietnam	2018
3	Sambor Hydro	2600	F/S	CGDC	China	2019
4	Lower Sesan III	180	F/S	Sinohydro	China	-
5	Lower Srepok III	330	F/S	GGEP	China	-
6	Lower Srepok IV	235	F/S	GGEP	China	-
7	Stung Pursat I	40	F/S	KTC Cable	Korea	-
8	Prek Liang I	70	F/S	Kyung An Cable	Korea	-
9	Prek Liang II	50	F/S	Kyung An Cable	Korea	-
10	Stung Sen	38	F/S	Royal Group	Cambodia	-
11	Stung Treng	900	F/S	IDICO	Vietnam	2020
12	Se Kong	190	F/S	EVNI	Vietnam	-
13	M&U. Stung Russei Chhrum	125 &32	F/S	Sinohydro	China	

Situation of Transmission Lines



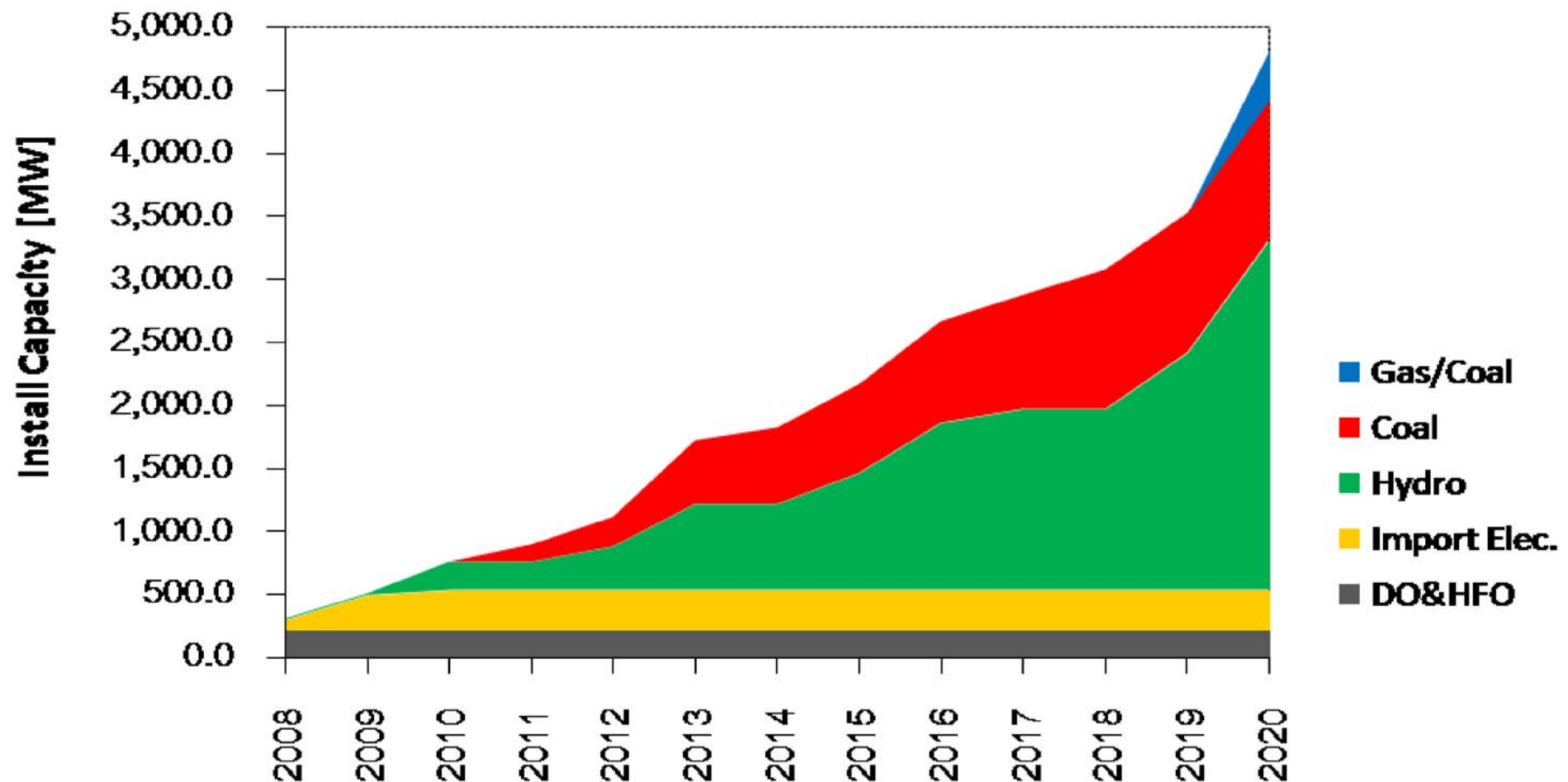
TRANSMISSION

- ◉ There are 1304km-line of 115 and 230 kV line.
- ◉ 18 Grid Substations ensure supply from Grid in 13 Provinces(total 25 provinces in Cambodia).
- ◉ Cambodia is building about 1075km-line of 230kV line that will give coverage to more 7 provinces and ensure tariff reduction planning at the end of 2020.

Development of Generation

- Base on PDP, by 2020, Cambodia intent to develop more domestic hydropower to contribute in the electricity supply which share more than 50%.

Power Development Plan 2008-2020

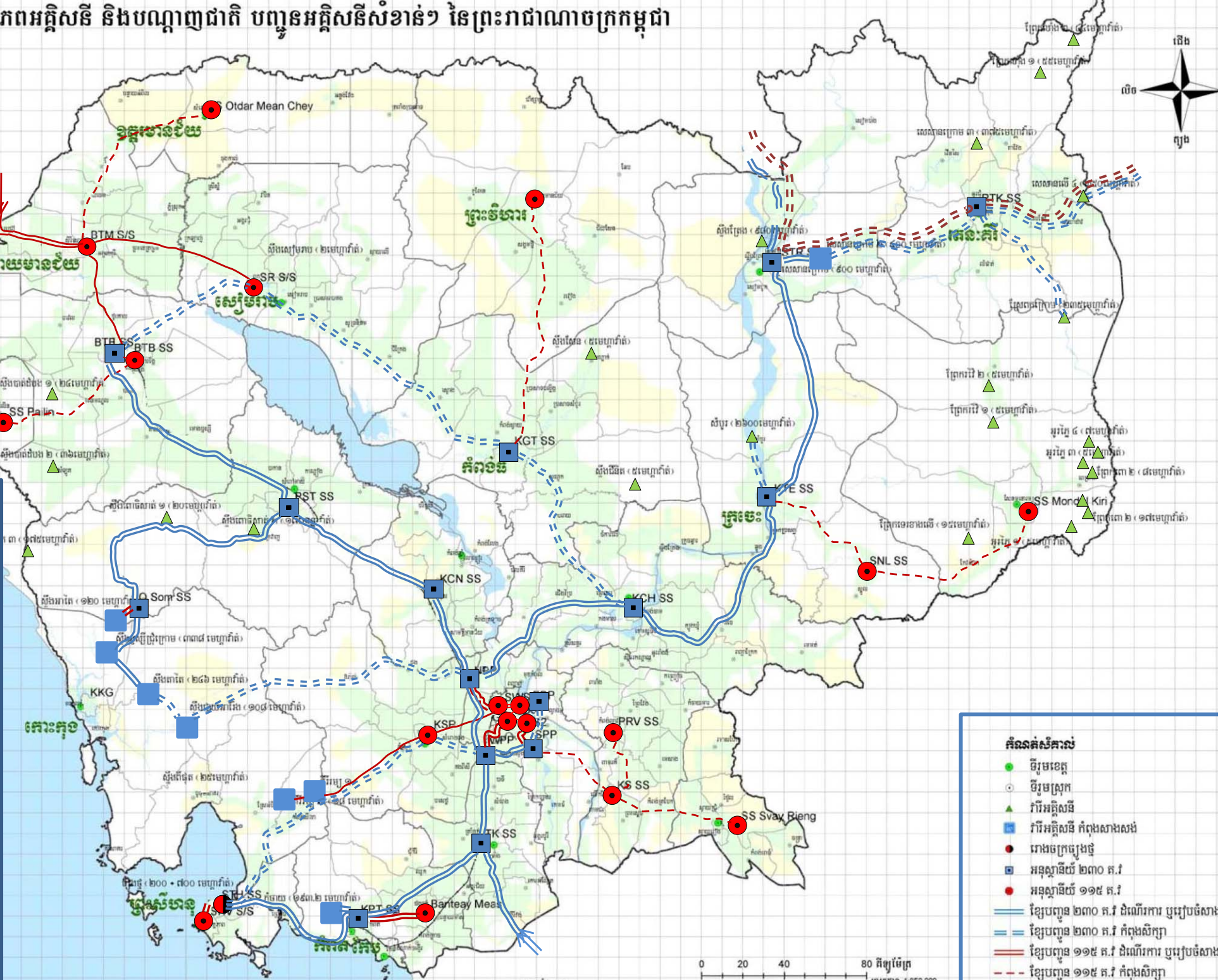


Estimated Investment on Transmission Facilities

	Up to 2011			2012 - 2016		
	Single. km	Double. km	Investment MUS\$	Single. km	Double. km	Investment MUS\$
115 kV	260	83	62	190	170	120
230 kV		170	60		1,000	500
Total			102			620
Cumulative 115 kV	260	83	62	450	253	182
Cumulative 230 kV		170	60		1,170	560

នាសម្ព័ន្ធនៃប្រភពអគ្គិសនី និងបណ្តាញជាតិ បញ្ជូនអគ្គិសនីសំខាន់ៗ នៃព្រះរាជាណាចក្រកម្ពុជា

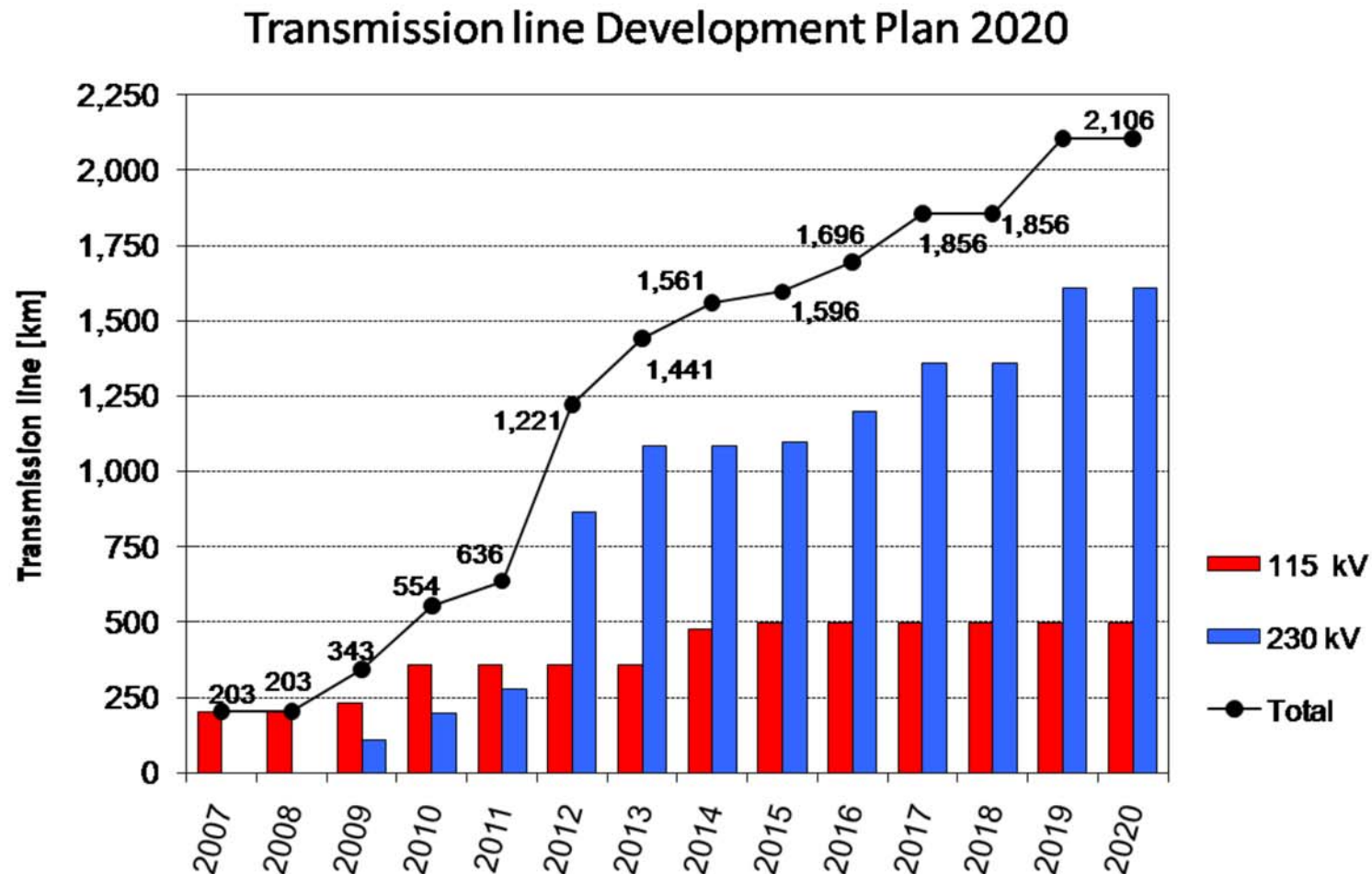
- 1999
- 2002
- 2007
- 2009
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- After 2020



- កំណត់សម្គាល់**
- ទីរួមខេត្ត
 - ទីរួមស្រុក
 - ▲ វារីអគ្គិសនី
 - វារីអគ្គិសនី កំពុងសាងសង់
 - រោងចក្រធុនធំ
 - អនុស្ថានីយ៍ ២៣០ គ.វ
 - អនុស្ថានីយ៍ ១១៥ គ.វ
 - ខ្សែបញ្ជូន ២៣០ គ.វ ដំណើរការ ឬរៀបចំសាង
 - ខ្សែបញ្ជូន ២៣០ គ.វ កំពុងសិក្សា
 - ខ្សែបញ្ជូន ១១៥ គ.វ ដំណើរការ ឬរៀបចំសាង
 - - ខ្សែបញ្ជូន ១១៥ គ.វ កំពុងសិក្សា

B- Development of Transmission Line

- By 2020, the development of transmission line would increase to more than 2,100 km.



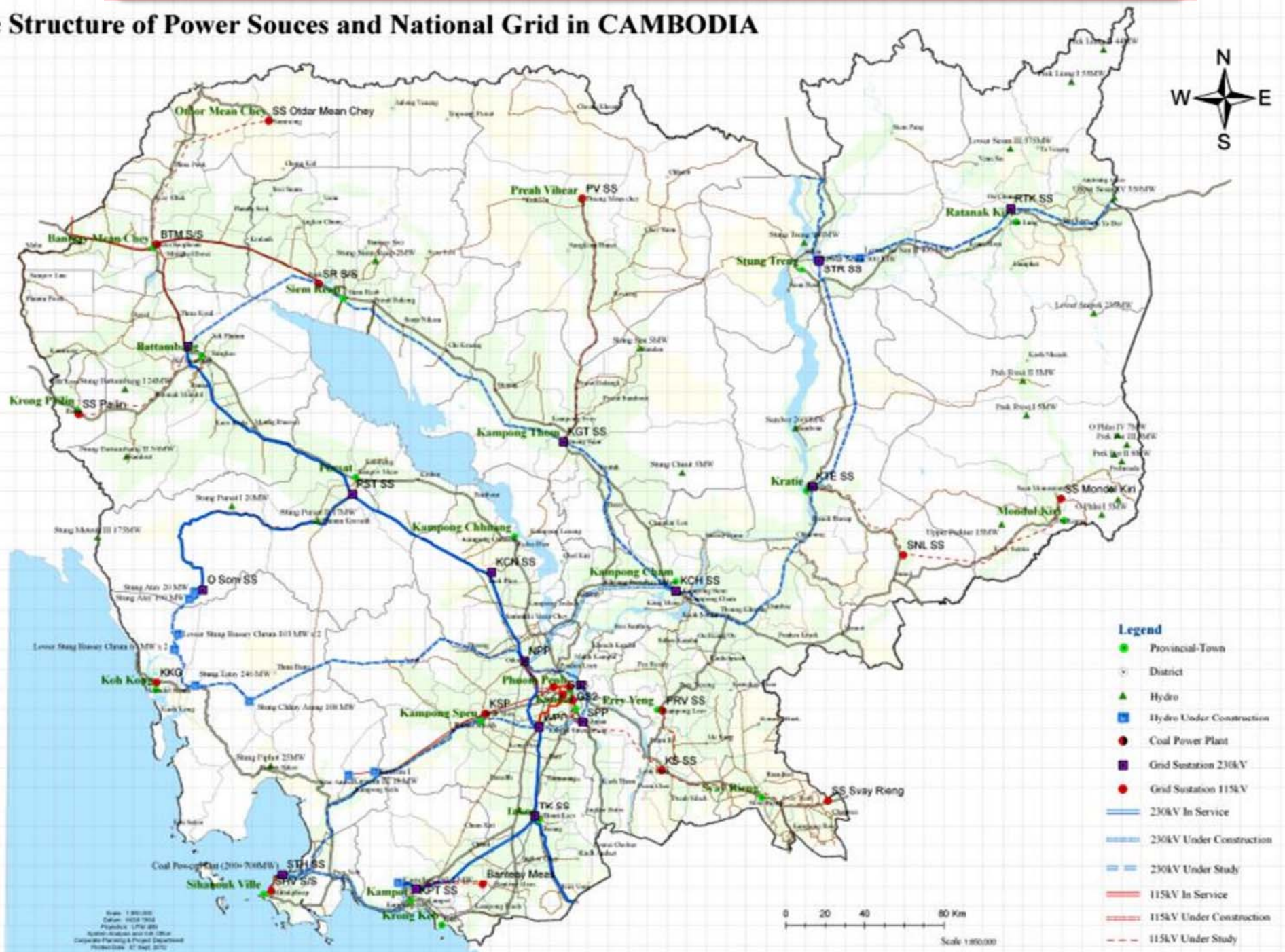
B- Development of Transmission Line

No.	Transmission Expansion Plan	Distance (Km)	Grant/ Invest	Year
1	230 kV, Takeo - Kompot, (construct substation in Kompot),	87	KFW	2011
2	230 kV, Steung Treng - Loa PDR, (construct substation in Steung Treng),	56	CIIDG	2017
3	230 kV, Kampot - Sihanouk Ville	82	ADB & JBIC	2013
4	230 kV, Phnom Penh - Kompong Chhnang - Pursat - Battambang, (construct 3 substations: - Kompong Chhnang, - Pursat, - Battambang),	310	CYC	2012
5	230 kV, Pursat - Osom, (construct 1 substation in Osom Commune),	175	CYC	2012
6	230 kV, Kampong Cham – Kratie,	110	Ly Group	2013
7	230 kV, Kratie – Stung Treng,	126	INDIA	2015
8	230 kV, Phnom Penh – Kampong Cham,	110	CUPL	2013
9	220 kV, Phnom Penh – Sihanoukville, along national road 4, (construct 1 substation in Sre Ambil)	220	Alex Corporation	2015
10	115 kV, East Phnom Penh – Neakleung – Svay Rieng, (construct 2 substations: - Neakleung, - Svay Rieng)	120	CHMC	2016

No.	Transmission Expansion Plan	Distance (Km)	Grant/ Invest	Year
11	230 kV, Stung Tatay Hydro – Osom substation,	15	CHMC	2013
12	230 kV, Stung Chay Areng Hydro – North Phnom Penh (NPP) substation	145	Grid Solution	2016
13	230 kV, Stung Chay Areng - Osom substation	60	CSG	2017
14	230 kV, Kampong Cham - Kampong Thom - Siem Reap, (construct 1 substation in Kampong Thom)	250	KTC	2019
Total Transmission Line		2,100		

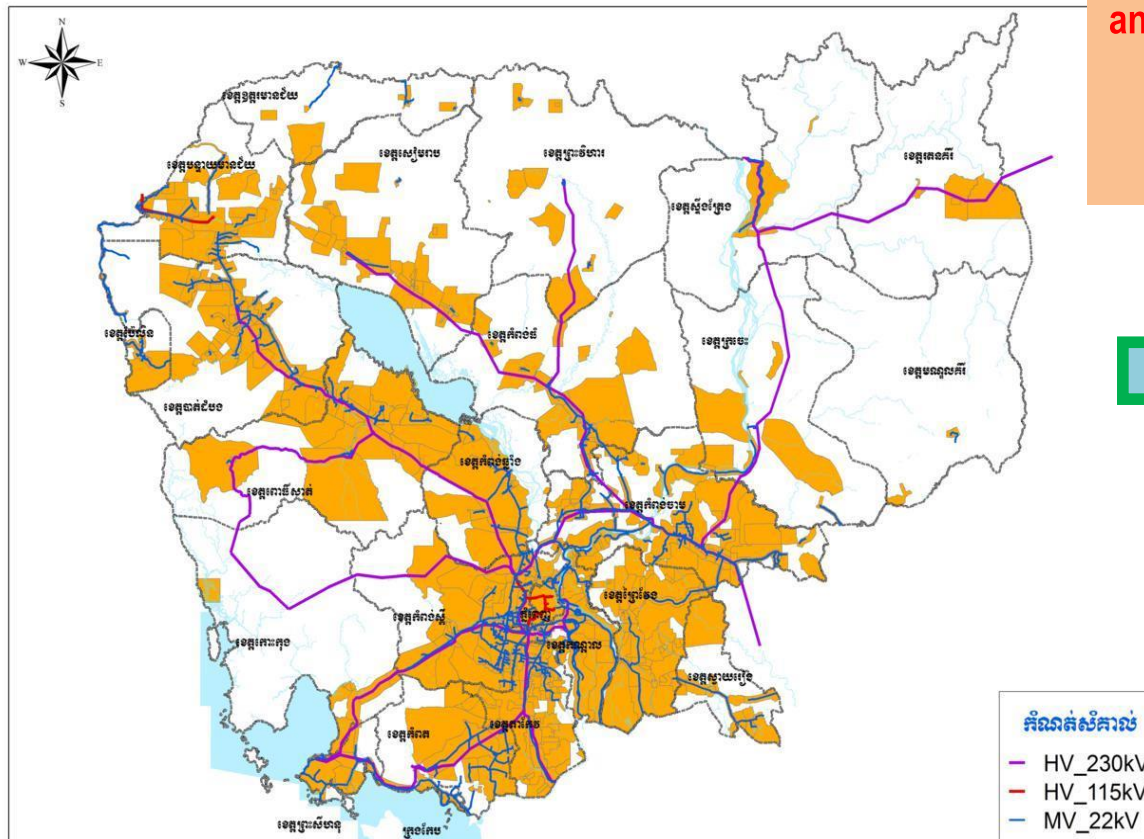
Power Development Plan in 2020

The Structure of Power Sources and National Grid in CAMBODIA

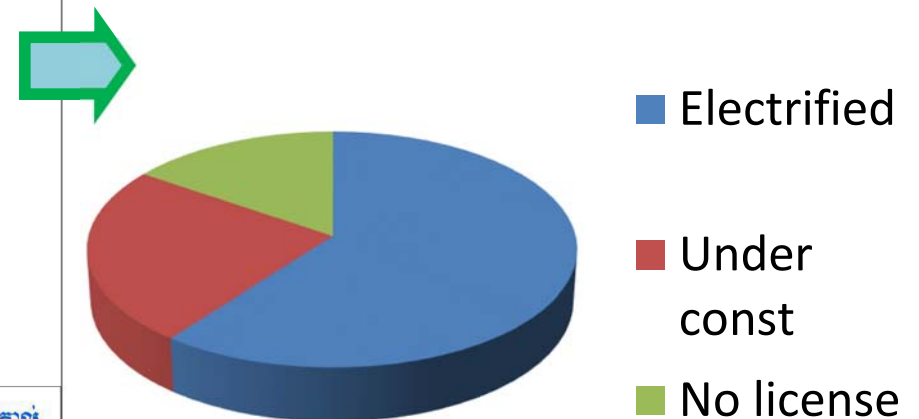


Distribution Areas in 2012 (EDC and REE)

Total number of villages in the country: 13 935
 At the end of 2014:
 Total number of villages in license zone (distribution and consolidated) : 11,905 (84.59%)
 Of which 8,682 (60.32%) electrified
 Priority is to connect REEs to the national grid and connect villages and HH in the zones



Villages



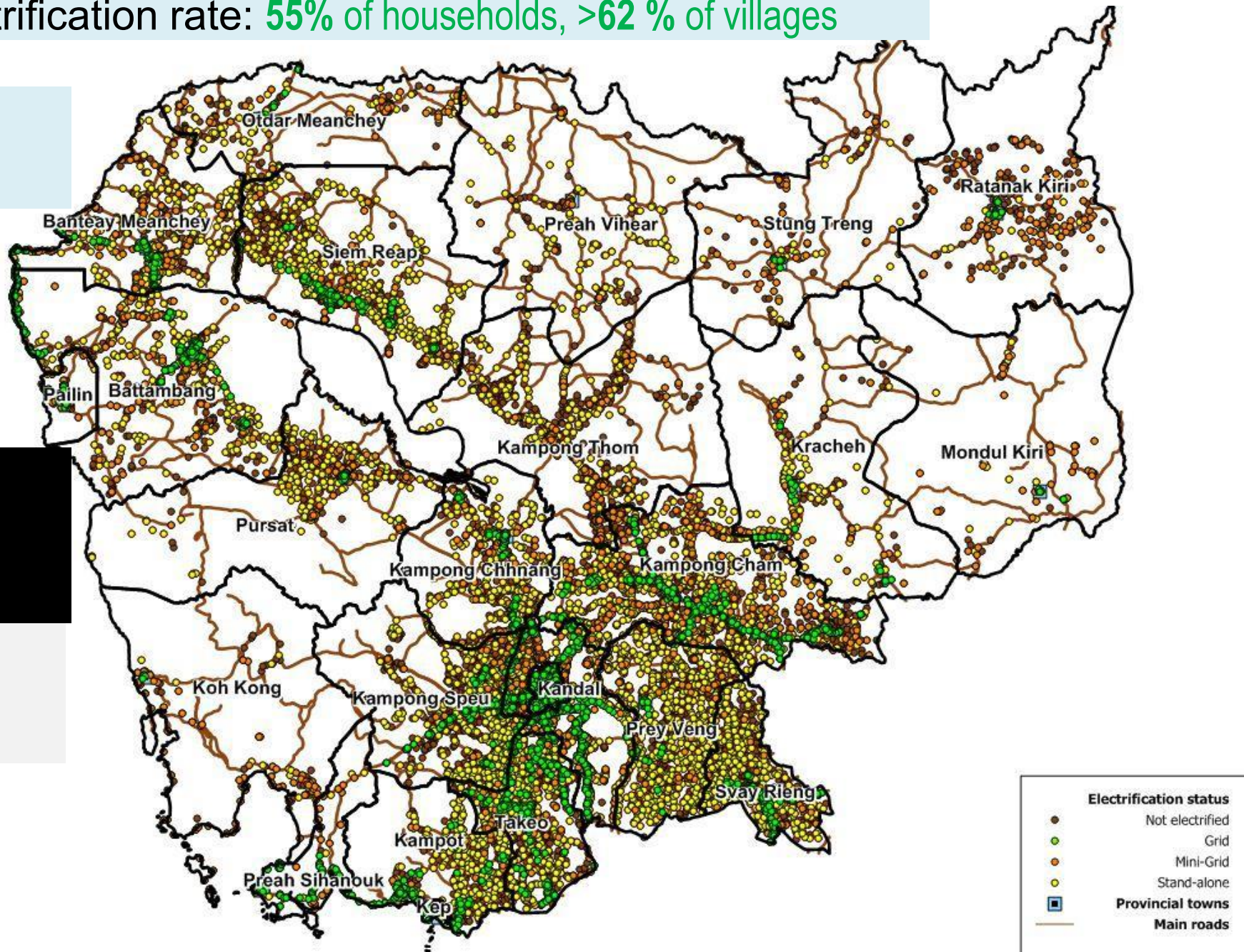
Status of Access to Electricity until 2015

National electrification rate: **55% of households, >62 % of villages**

EdC and REEs
before 2010

electrified after
2010:

Under
construction



Conclusion

Cambodia need to revise Power Sector Development Plan to ensure secured supply of Electricity and to strengthen her energy security while this development should be focused on eco-friendly technology and suitability.

THANK YOU