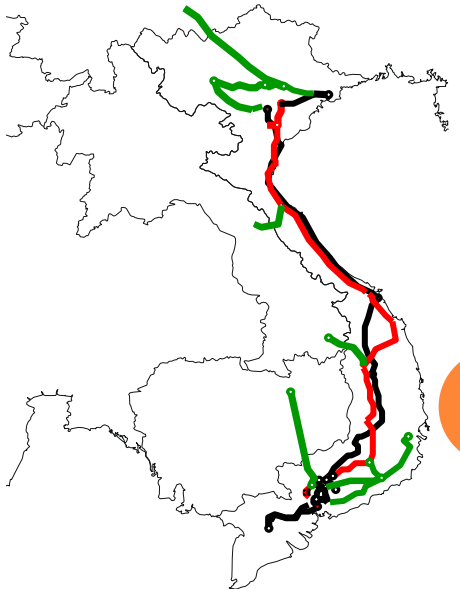
PROGRESS OF POWER SYSTEM IN VIETNAM AND TRANSMISSION INTERCONNECTION PROJECTS

VIỆN NĂNG LƯỢNG

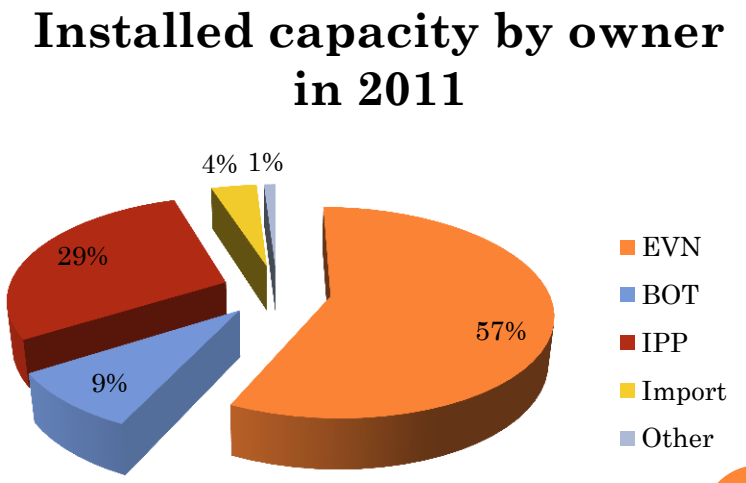


CURRENT SITUATION OF VIETNAM POWER SYSTEM

1. POWER GENERATION

Installed capacity by owner in 2011

Owner	Installed Capacity (MW)	Percentage
EVN	13410.39	57 %
BOT	2117.43	9 %
IPP	6822.83	29 %
Import	941.08	4 %
Other	235.27	1 %
Total	23527	100 %

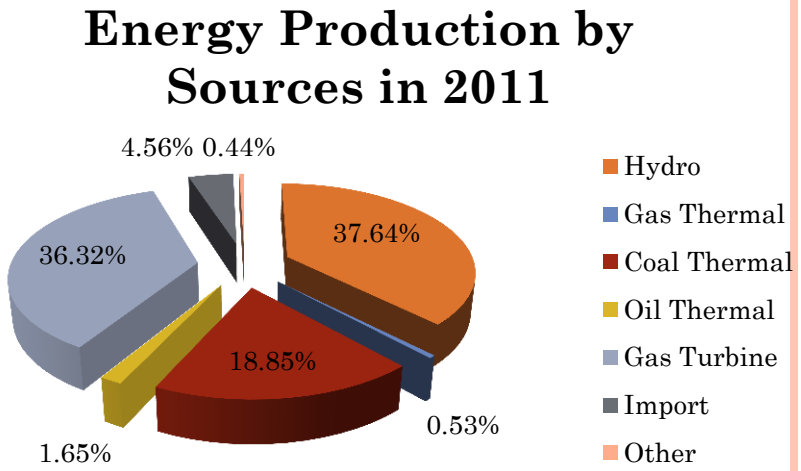


CURRENT SITUATION OF VIETNAM POWER SYSTEM

1. POWER GENERATION

By the end of 2011

Source	Energy (GWh)	Percentage
Hydro	40924	37.64 %
Gas Thermal	576	0.53 %
Coal Thermal	20500	18.85 %
Oil Thermal	1793	1.65 %
Gas Turbine	39492	36.32 %
Import	4959	4.56 %
Other	481	0.44 %
Total	108725	100 %

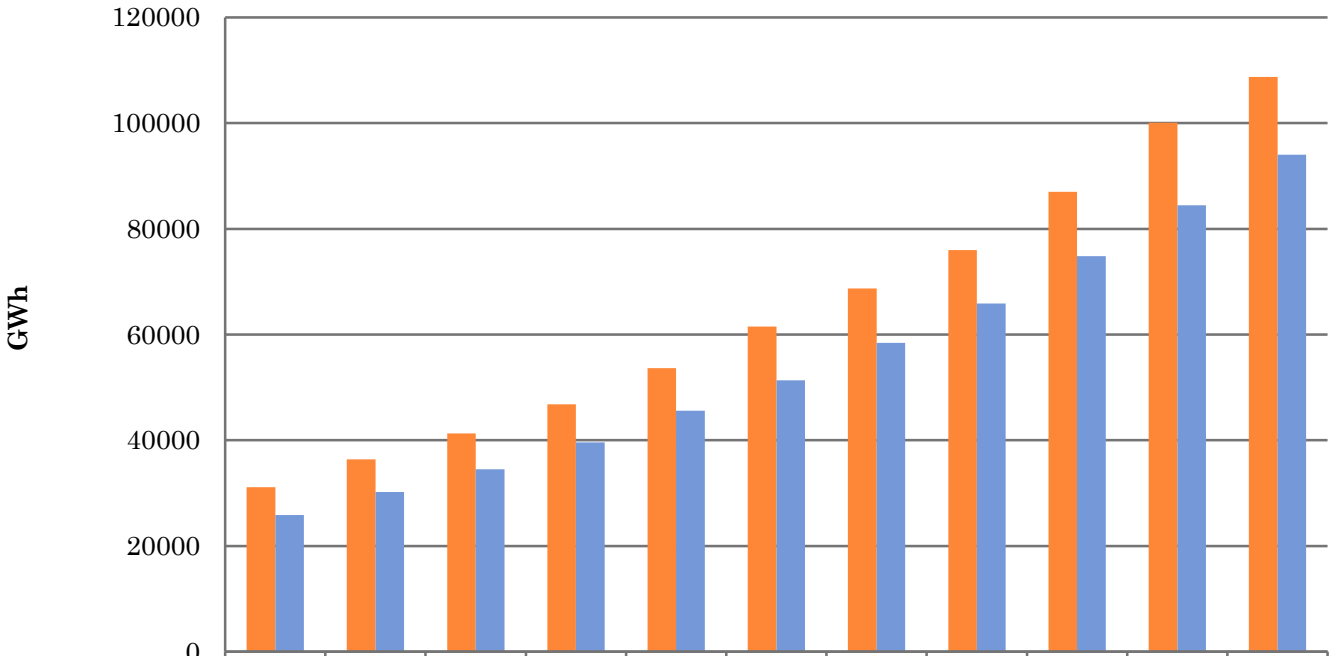


Peak Load	MW	16490
Sale	GWh	94040
Capacity added in 2011	MW	3188

CURRENT SITUATION OF VIETNAM POWER SYSTEM

2. POWER CONSUMPTION

Power generation and power consumption period 2001 - 2011

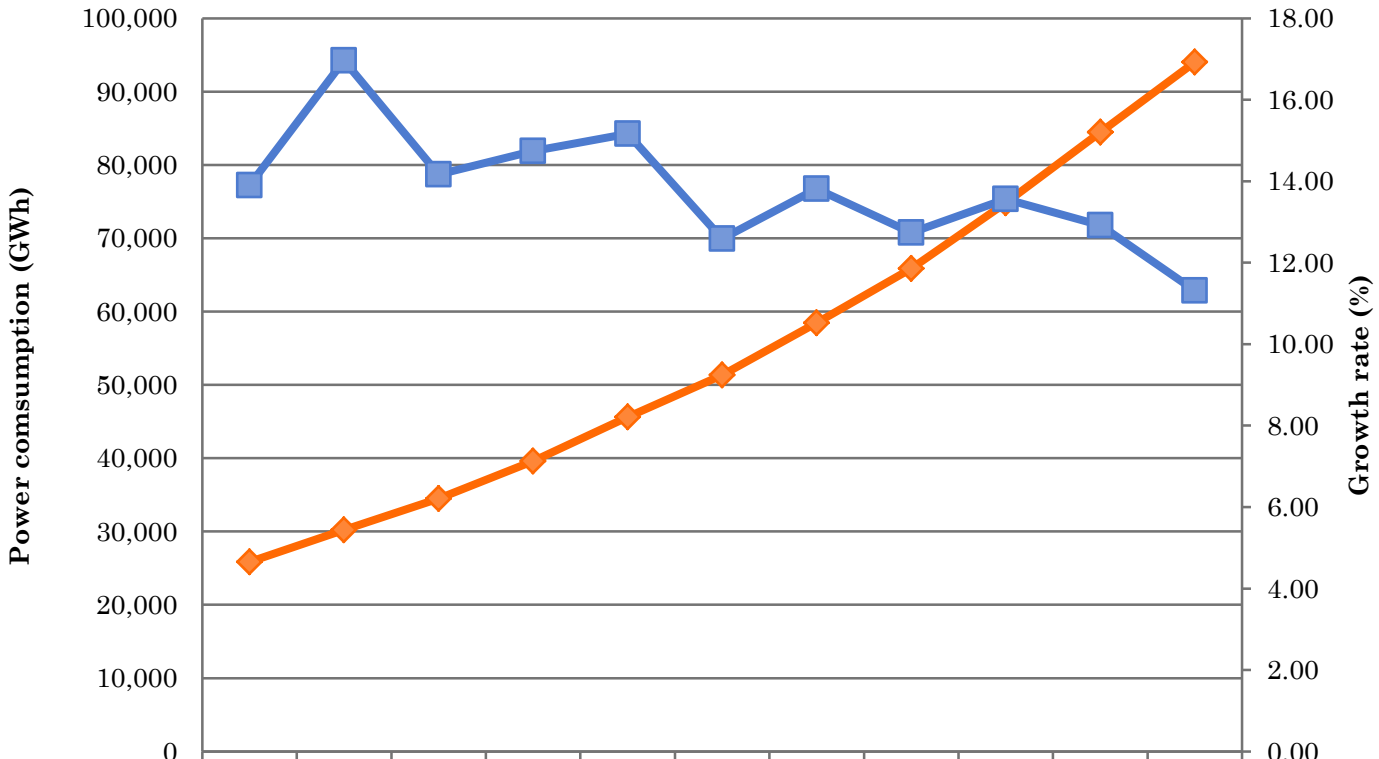


	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Power generation	31137	36410	41275	46790	53647	61533	68699	75955	87019	100071	108725
Power consumption	25,843	30,228	34,510	39,597	45,603	51,345	58,438	65,880	74,816	84,480	94,040

CURRENT SITUATION OF VIETNAM POWER SYSTEM

2. POWER CONSUMPTION

Power consumption growth from 2001 to 2011



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Power consumption	25,843	30,228	34,510	39,597	45,603	51,345	58,438	65,880	74,816	84,480	94,040
Growth rate	13.90	16.97	14.16	14.74	15.17	12.59	13.82	12.73	13.56	12.92	11.32

CURRENT SITUATION OF VIETNAM POWER SYSTEM

3. POWER TRANSMISSION SYSTEMS

Power transmission systems by voltage level until the end of 2011

Voltage level	500 kV	220 kV	110 kV
Total length of transmission line (km)	4132	9388	13141
Total capacity of transformer (MVA)	13950	25839	30284

CURRENT SITUATION OF VIETNAM POWER SYSTEM

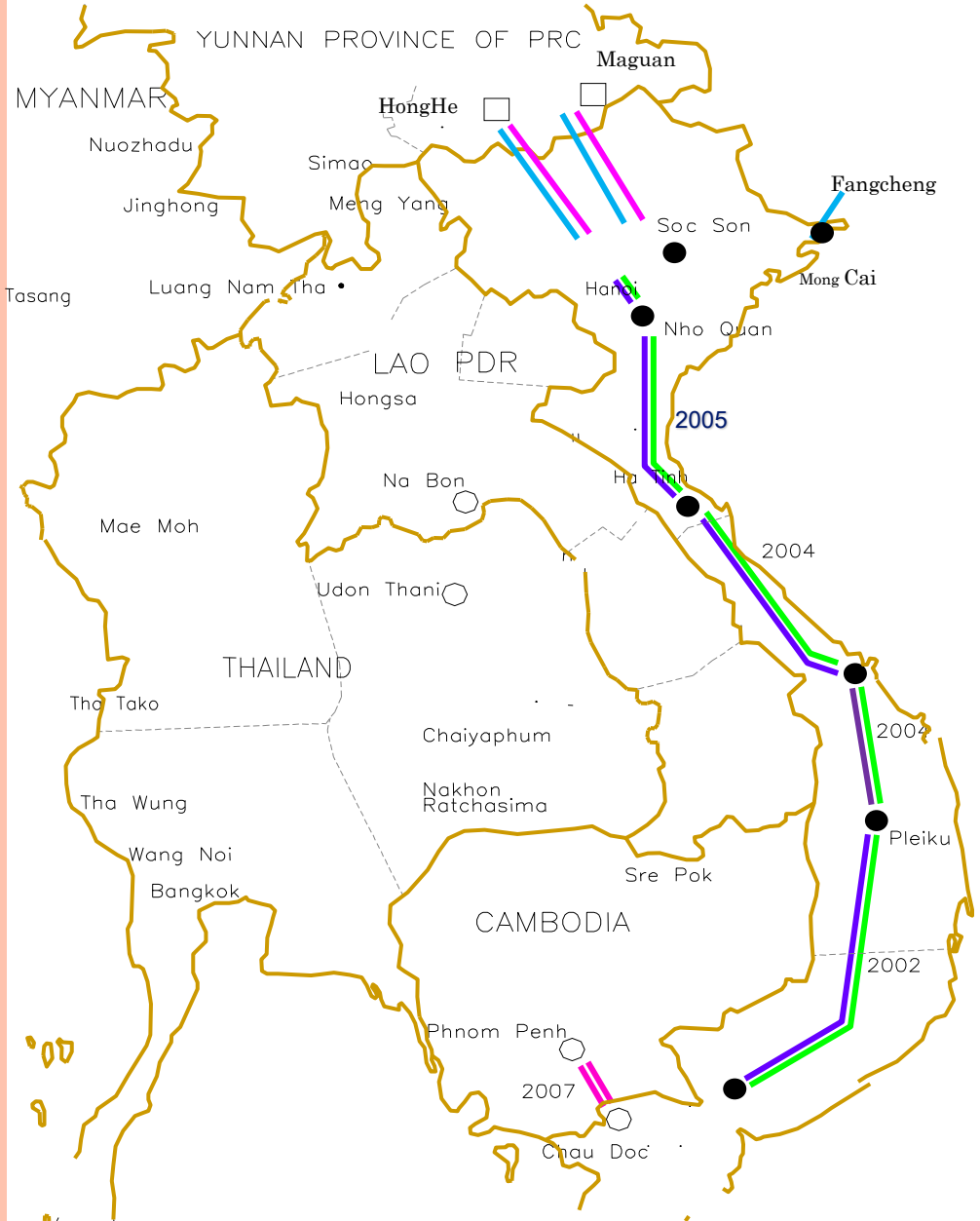
4. UPDATE IMFORMATION ABOUT POWER SECTOR

- Operating competitive power generation market since 1st ,July 2011

- National Dispatching Center has responsibility to operate competitive power generation market

CURRENT SITUATION OF VIETNAM POWER SYSTEM

5. INTERCONNECTION POWER TRANSMISSION SYSTEMS



By the end of 2011

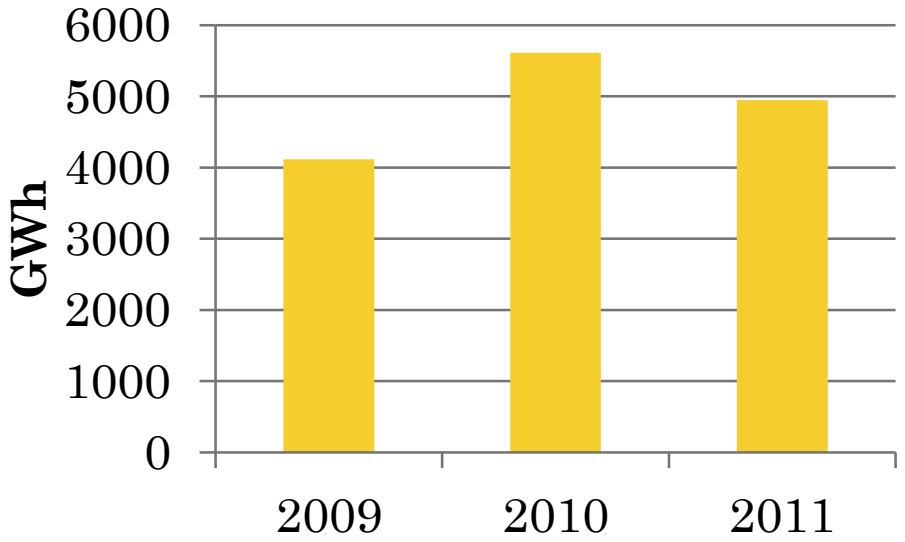
Transmission line	Total energy trade (GWh)
With China (Import)	**4948**
220 kV HongHe - Lao Cai	
220 kV Maguan - Ha Giang	
110 kV HongHe - Lao Cai	
110 kV Maguan - Ha Giang	
110 kV Fangcheng- Mong Cai	
With Cambodia (Export)	**1087**
220 kV Chau Doc- Phnom Penh	

CURRENT SITUATION OF VIETNAM POWER SYSTEM

5. INTERCONNECTION POWER TRANSMISSION SYSTEMS

Electricity imported from China according to year

Year	Unit	Energy
2009	GWh	4118
2010	GWh	5612
2011	GWh	4948

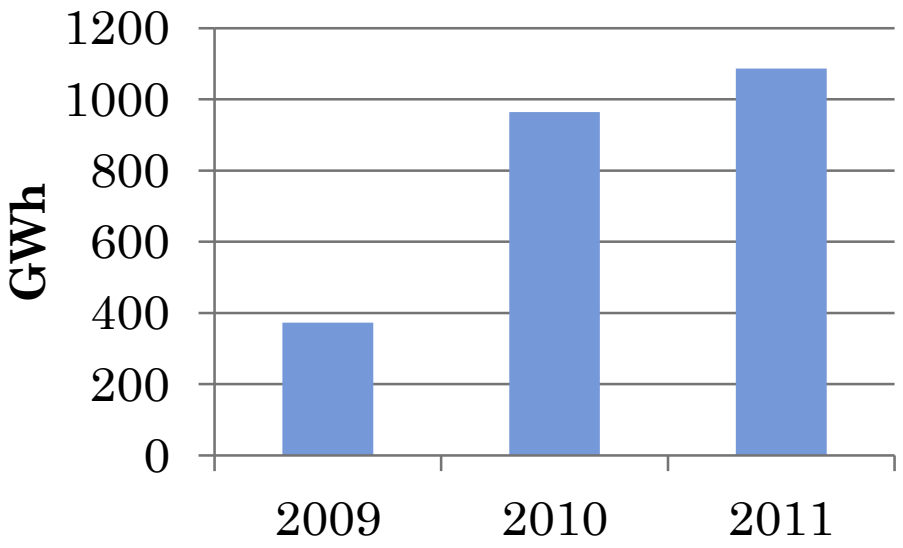


CURRENT SITUATION OF VIETNAM POWER SYSTEM

5. INTERCONNECTION POWER TRANSMISSION SYSTEMS

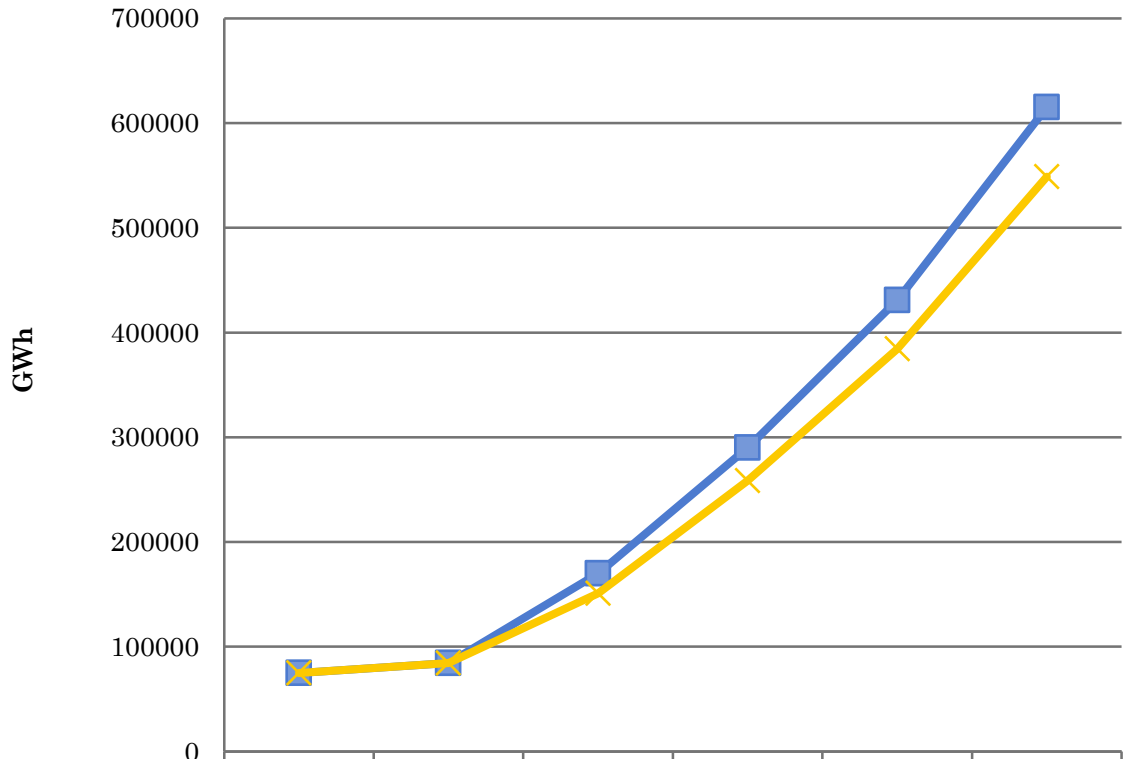
Electricity exported to Cambodia according to year

Year	Unit	Energy
2009	GWh	373
2010	GWh	964
2011	GWh	1087



ELECTRIC POWER DEVELOPMENT PLAN

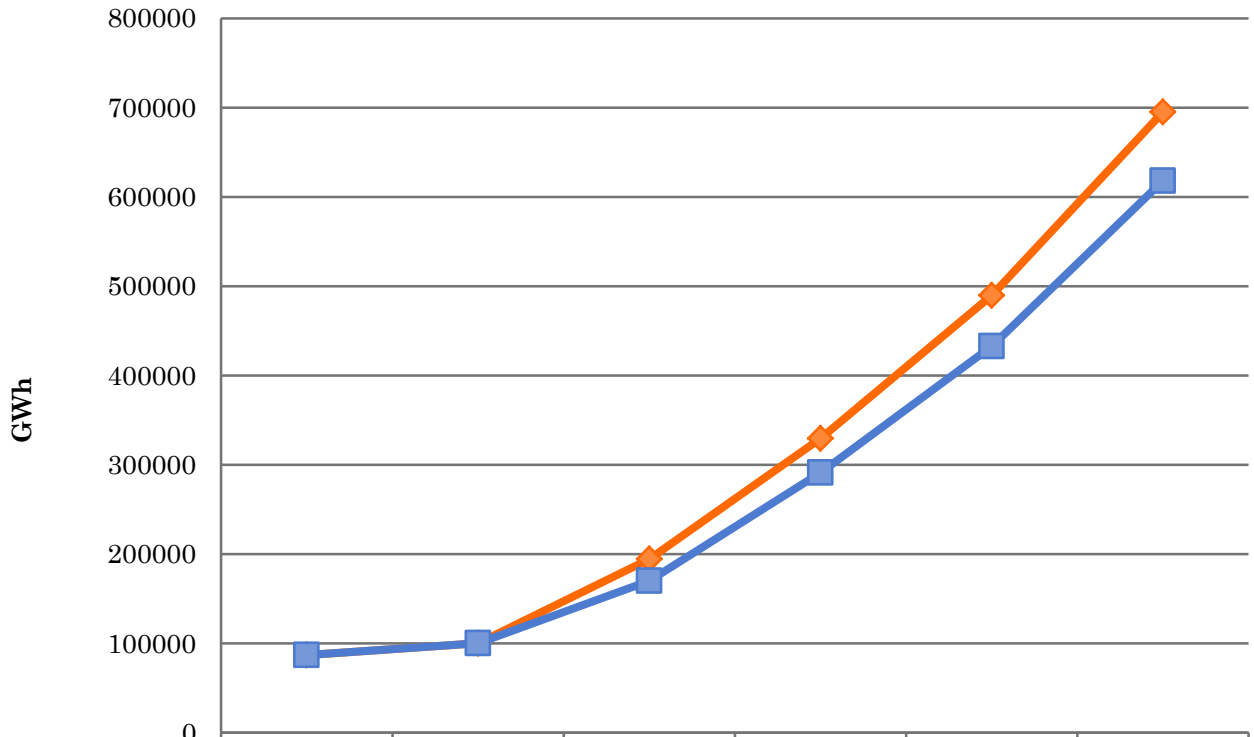
1. ELECTRICITY POWER DEMAND FORECAST



	2009	2010	2015	2020	2025	2030
Base case (according to PDP 7)	74816	84480	169821	289882	430867	615205
Upating forecast	74816	84480	151035	258603	384366	548823

ELECTRIC POWER DEVELOPMENT PLAN

2. POWER GENERATION DEVELOPMENT PLAN



	2009	2010	2015	2020	2025	2030
Base case (according to PDP 7), GWh	87019	100071	194304	329412	489621	695147
Upating forecast,GWh	87019	100071	170066	291187	432796	617974

ELECTRIC POWER DEVELOPMENT PLAN

3. POWER GRID DEVELOPMENT PLAN

Summary of construction volume added to power grid at different voltage level

Voltage level	Period					Total	
	Current	2011-2015	2016-2020	2021-2025	2026-2030	2011-2020	2021-2030
Transmission system							
Transmission line, km							
500 kV	3438	1846	2499	1453	1480	4345	2933
220 kV	8497	5056	3313	2617	2444	8368	5061
110 kV	13449	5960	5140	4580	4040	11100	8620
Substation, MVA							
500 kV	12000	16200	26850	27450	22800	43050	50250
220 kV	24607	34000	39450	41950	53750	73450	95700
110 kV	39629	29800	25700	45800	60600	55500	161900
Distribution system							
Medium voltage line, km		46000	39700	35000	30300	85700	65300
Distribution substation,MVA		27600	26600	45800	60000	54200	105800
Low voltage line, km		44200	37200	34400	30000	81400	64400

ELECTRIC POWER INTERCONNECTION SYSTEM DEVELOPMENT PLAN

1. EFFICIENCY OF ELECTRIC POWER INTERCONNECTION GRID

- Enhance resource use according to geographic location by optimizing generating complexes in region.

- Reduce common power reserve of interconnection grid, therefore lower investment cost in power plan projects.

- Create chance to expand electricity market.

- Increase operation efficiency of power system and reduce common peak power of system.

- Be able to use bigger generation unit sizes in comparison with those of with out interconnection case.

- More flexible than separated system.

- Decrease fossil fuel use and environmental pollution by exploiting hydro power resources in the region.

ELECTRIC POWER INTERCONNECTION SYSTEM DEVELOPMENT PLAN

1. EFFICIENCY OF ELECTRIC POWER INTERCONNECTION GRID

Electricity import from China:
-Cost of electricity imported from China is lower than that of generation by replacing imported coal thermal power plan in Vietnam.

Electricity export for Cambodia:
-Cost of electricity export: 8.35cent/kWh
- Cost of generation by replacing Diesel thermal power plan in Cambodia: 20 ÷ 30 cent/ kWh

Using interconnection grid is more economy than using replacing power plant

ELECTRIC POWER INTERCONNECTION SYSTEM DEVELOPMENT PLAN

2. INTERCONNECTION WITH LAOS

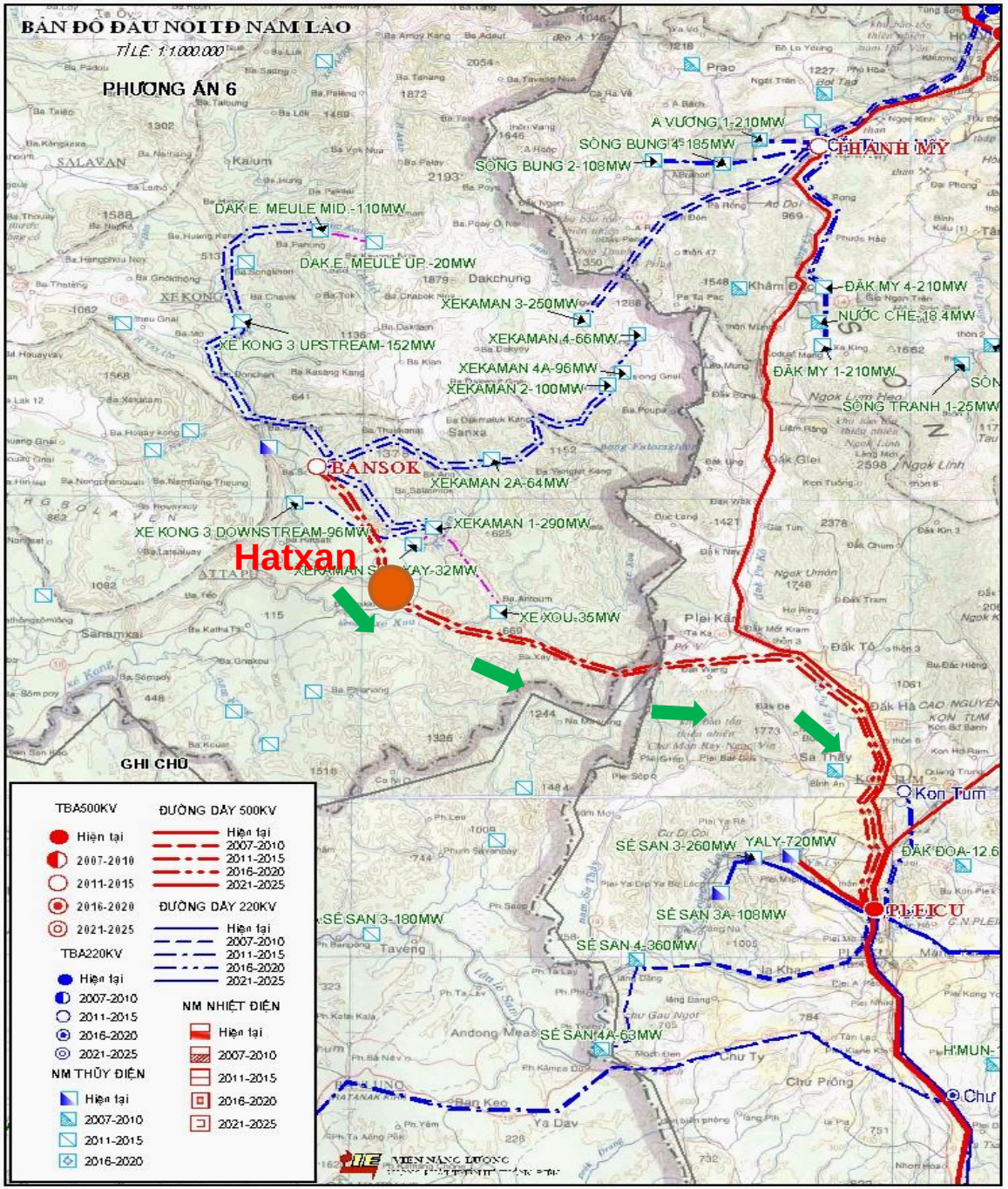
Name of project	Capacity (MW)	Operation year expect	Synchronous transmission line
Xekaman 3	250	2011-2013	220kV Thanh My- Khanh Hoa
Xekaman 1	320	2014-2015	500 kV Hatxan- PleiKu
Xekaman 4	74	2013-2015	500 kV Hatxan- PleiKu
Xekong 3A	152	2014-2015	500 kV Hatxan- PleiKu
Xekong 3B	96	2014-2015	500 kV Hatxan- PleiKu
Nam Kong 2	70	2014-2015	500 kV Hatxan- PleiKu
Nam Mo	100	Before 2015	220 kV Nam Mo- Ban Ve
Nam Sum	290	after 2015	220kV Nam Sum- Thanh Hoa
Nam Mo 1 (Nam Kan)	72	after 2015	Transit on 220 kV Nam Mo- Ban Ve
Nam Theun	400	after 2020	220 kV Nam Theun - Vinh
Total	**1824**		

ELECTRIC POWER INTERCONNECTION SYSTEM DEVELOPMENT PLAN

3. INTERCONNECTION WITH CAMBODIA

Name of project	Capacity (MW)	Operation year expect	Synchronous transmission line
Lower Sesan 2	400	2016-2020	220 kV L. Sesan 2- PleiKu
Lower Sesan 3	180	2016-2020	Need to be studied
Lower Sesan 5	90	2016-2020	Need to be studied
Sam Bor	467	2020	220 kV Sam Bor- Tay Ninh
Total	**1137**		

Hatxan–Pleiku 500kV line projects

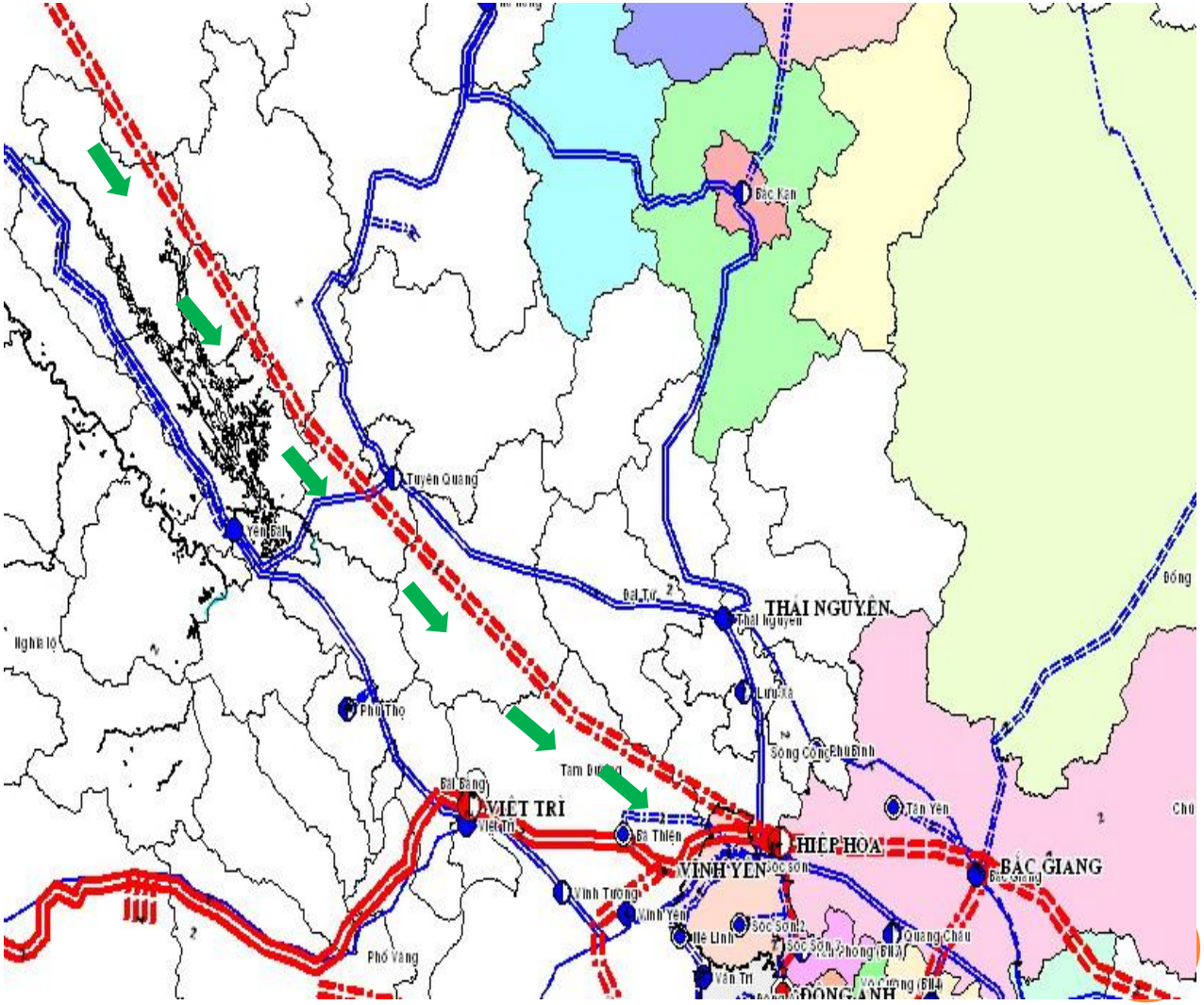


Note: Bansok move to Hatxan

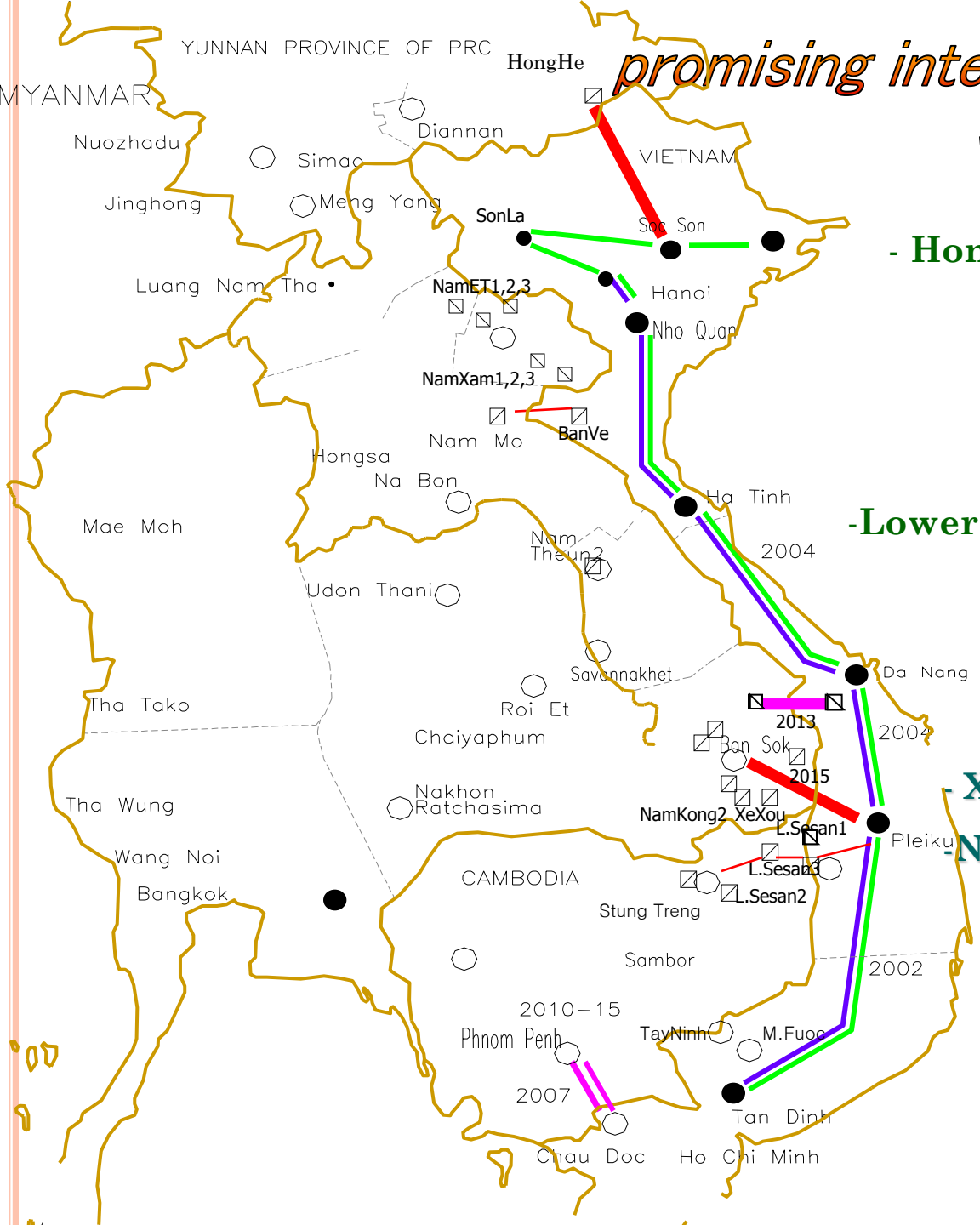
ELECTRIC POWER INTERCONNECTION SYSTEM DEVELOPMENT PLAN

4. INTERCONNECTION WITH CHINA

Honghe – Hiep Hoa
500kV line projects



promising interconnection projects



With China

- HongHe - Hiep Hoa: 500kV

With Cambodia

-Lower Sesan 2 - Pleiku: 220 kV

With LAO PDR

- Xekaman3 – Thanh My: 220 kV

-Nam Mo – Ban ve: 220kV

- Hatxan - Pleiku: 500kV

POWER INTERCONNECTION SYSTEM DEVELOPMENT PLAN

- In the period between 2015 and 2020, Vietnam will be a energy import country, and will import electricity from Laos, Cambodia and China through interconnection grid.

- Power interconnection grid will ensure energy sustainability in global integration and regional co-operation condition.

-Power interconnection grid will create deeply effective condition to exploit hydro power sources in Vietnam.

KEY ISSUES

-Consider two options of 500 kV Hong He – Hiep Hoa: using DC or AC transmission line.

-It is necessary to build a transmission system with 500 kV level recommended as a mainstay that is strong enough to interconnect Vietnam – Laos – Cambodia grids and power grids in some other ASEAN countries.

- Need to build up general standard between countries participating in interconnection grid for safety and effective operation purpose.

THANK YOU FOR YOUR ATTENTION