

# **GMS Regional Power Cooperation**

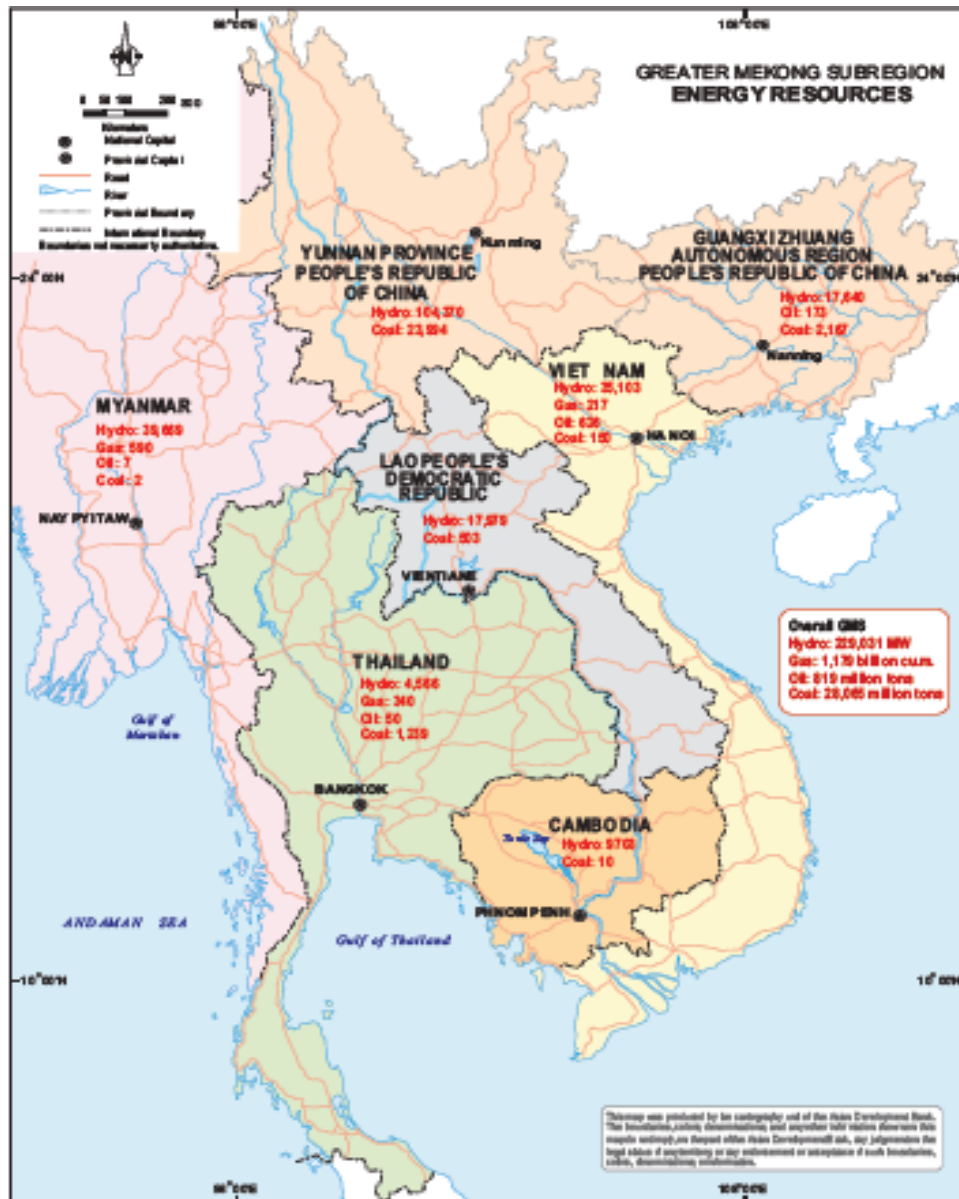
Sohail Hasnie  
Regional Energy Trade Workshop  
8-9 September 2014  
ADB, Manila



# Content

- GMS power infrastructure
- GMS regional power trade
- Institutional building

# The Greater Mekong Subregion - GMS



# **GMS POWER INFRASTRUCTURE**

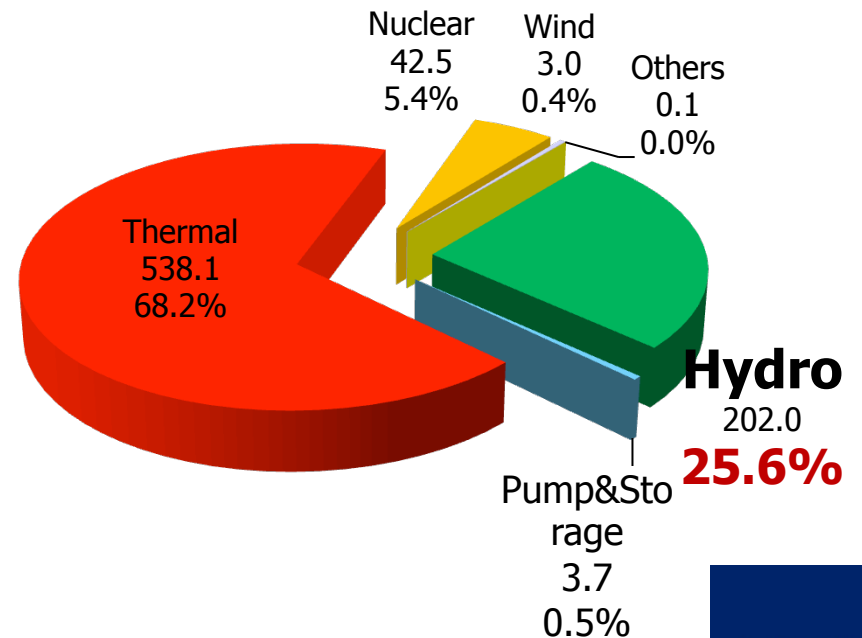
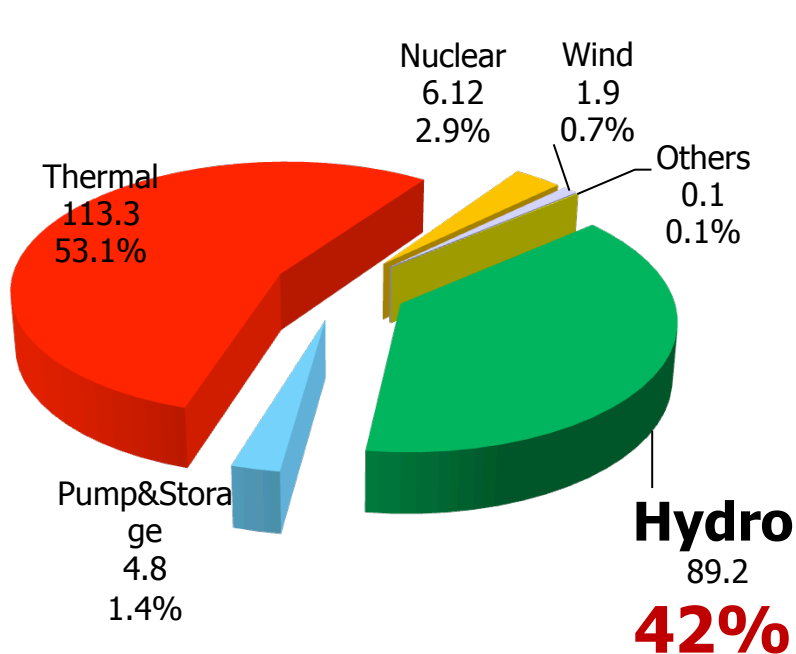
# Generating Capacities

- China (CSG only) - **214,000** MW
- Thailand : **35,591** MW
  - EGAT: 15,010 MW
  - IPPs +SPPs + Import: 20,081 MW
- Laos - Dominant export capacities: **3,203** MW
  - EdL: 391 MW
  - IPPs: 2,812 MW
- Cambodia (EdC): **600** MW
- Myanmar incl IPPs: **4,035** MW
- Viet Nam incl IPPs: **28,172** MW

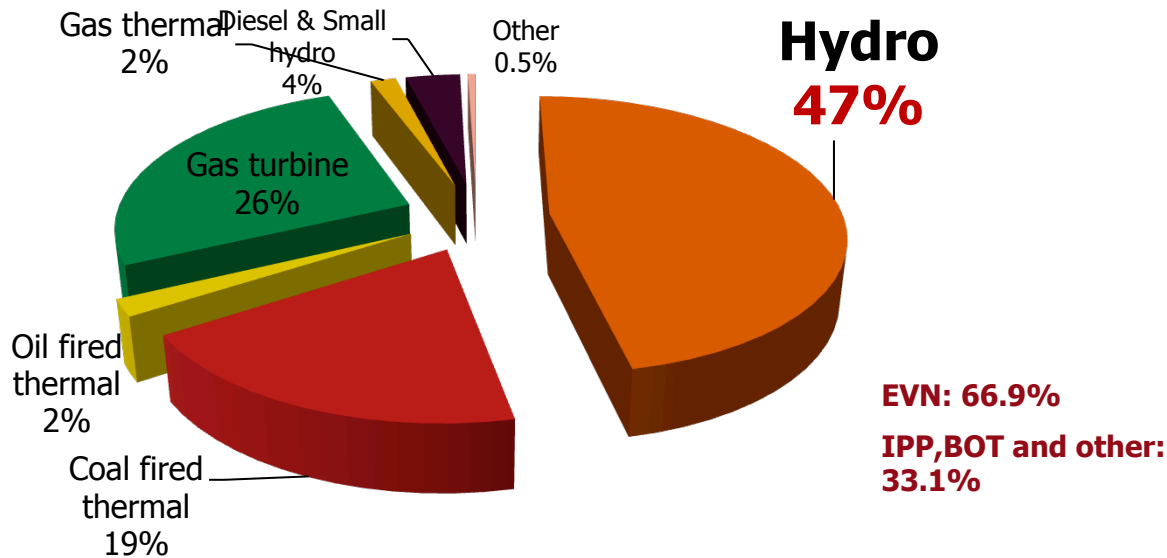
# China Southern Grid

**Installed Capacity:  
214,000 MW**

**Generation: 789,000 GWh**



# Viet Nam



<b>Total (MW)</b>	<b>28,172</b>
Hydro	13,197
Coal fired thermal	5,430
Oil fired thermal	550
Gas turbine	7,455
Gas thermal	468
Diesel & Small hydro	1,000
Other	140

# Lao PDR

## Installed Capacity (as of 2012)

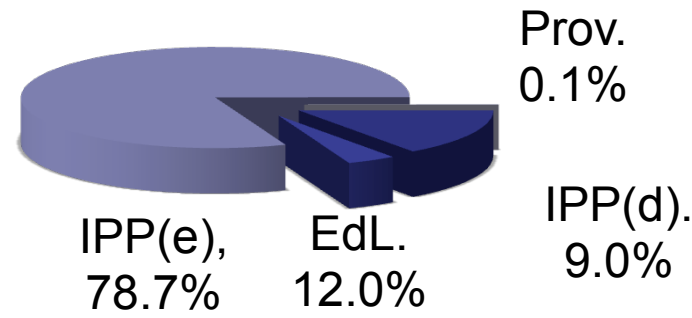
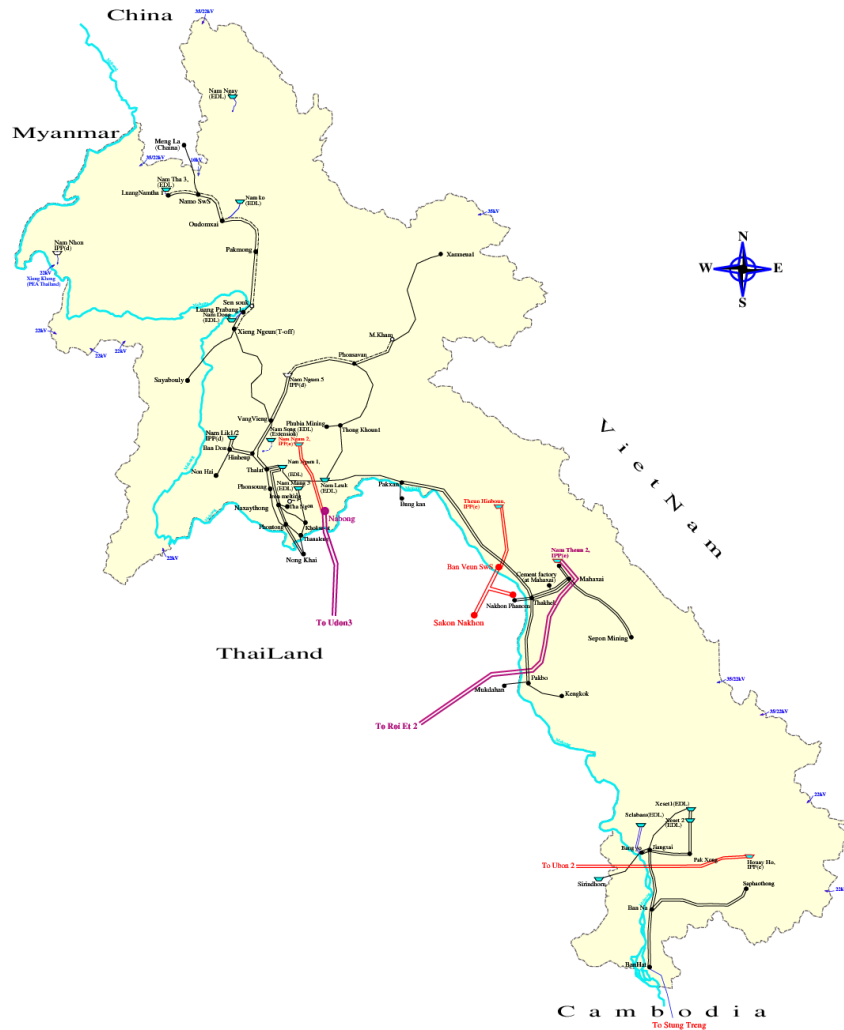
Total : 3,203 MW

EDL : 391 MW

IPP(e) : 2,520 MW

IPP(d) : 289 MW

Prov. : 3 MW





# Myanmar

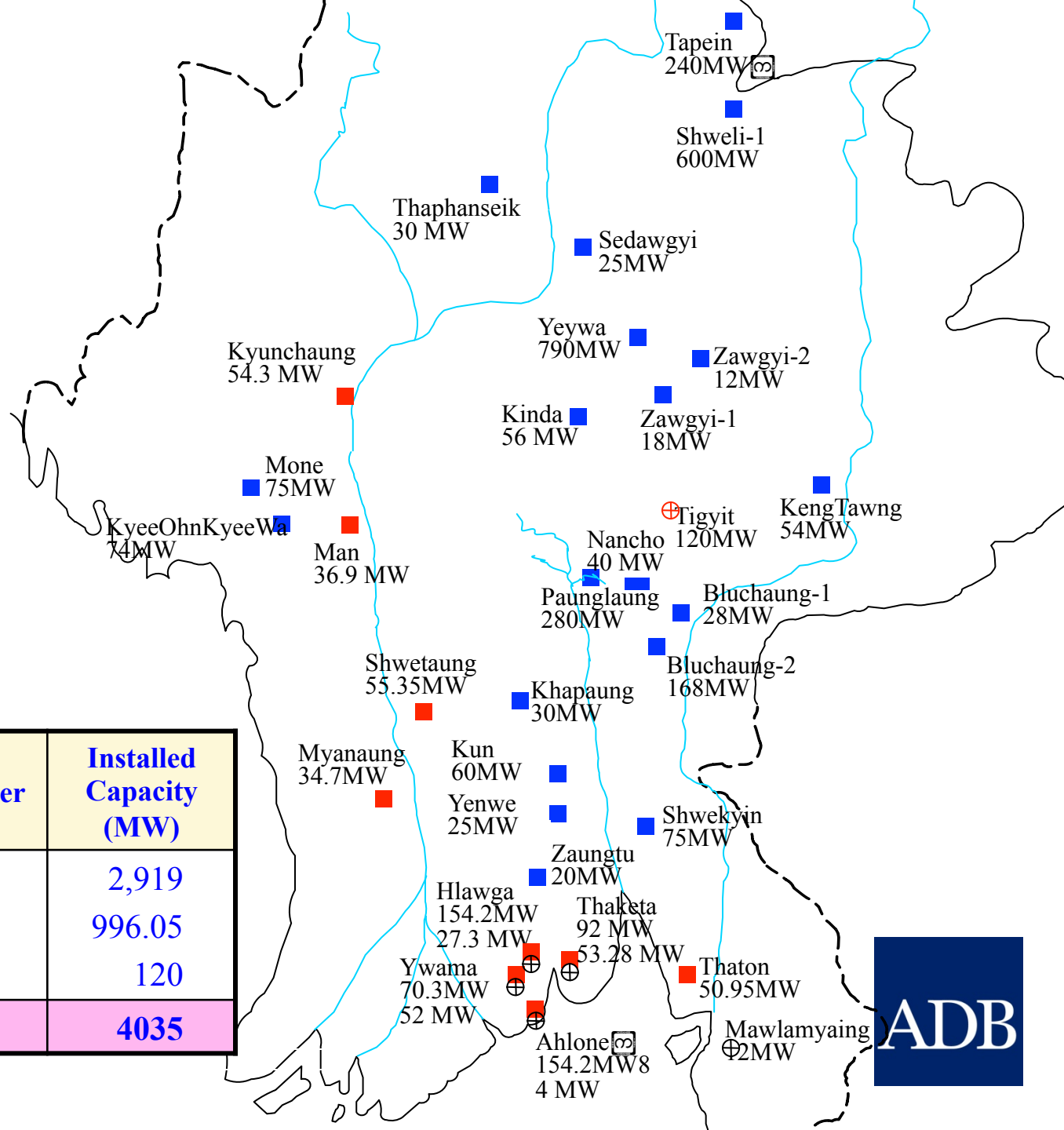
## Hydro

202.0

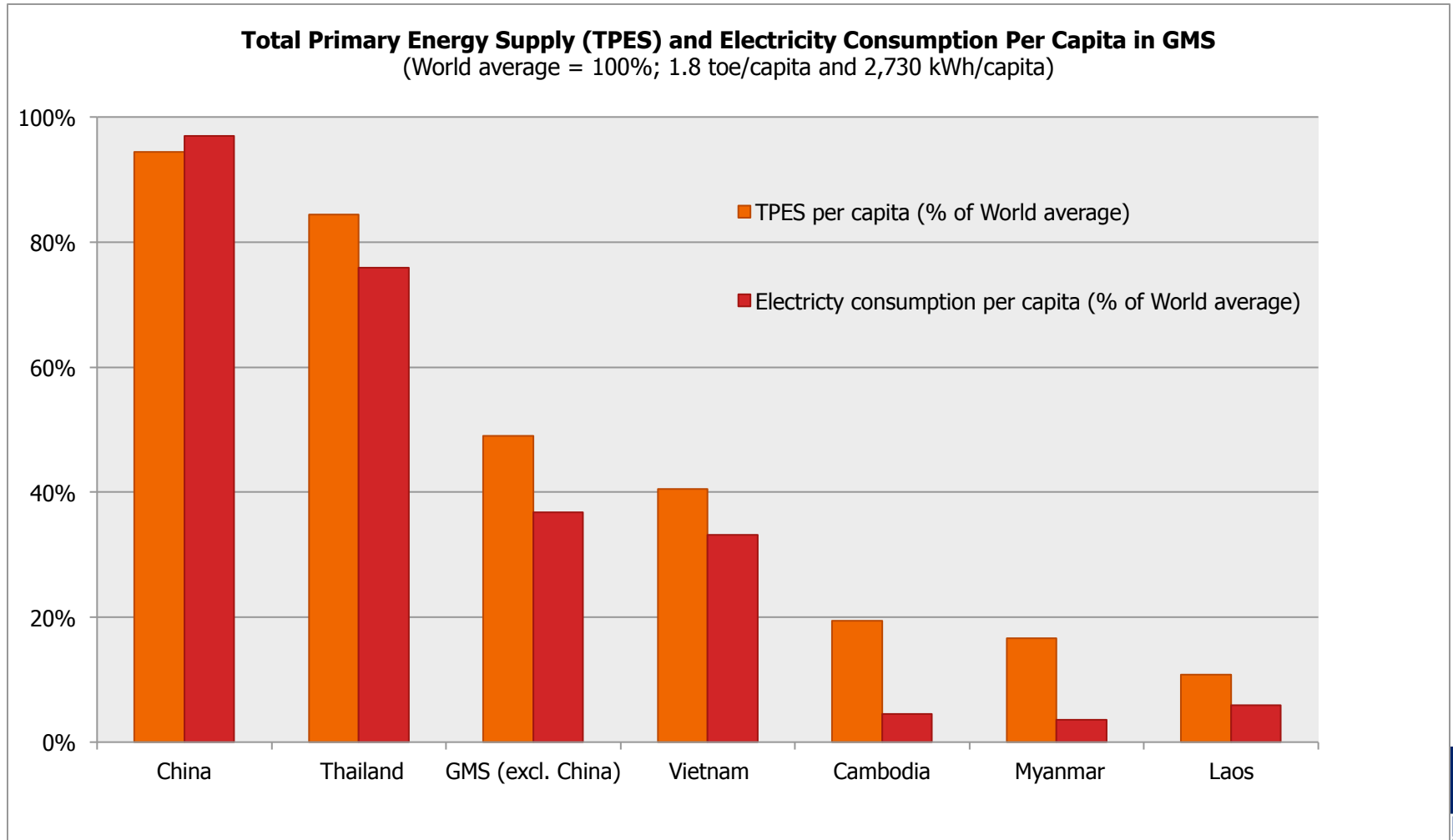
**72.4%**

- Hydro Power Plant
- Gas Power Plant
- ⊕ Steam Power Plant
- ⊕ Coal Fired

Sr No.	Type of Power Plant	Number	Installed Capacity (MW)
1.	Hydro Power	22	2,919
2.	Gas	14	996.05
3.	Coal	1	120
<b>Total</b>		<b>37</b>	<b>4035</b>

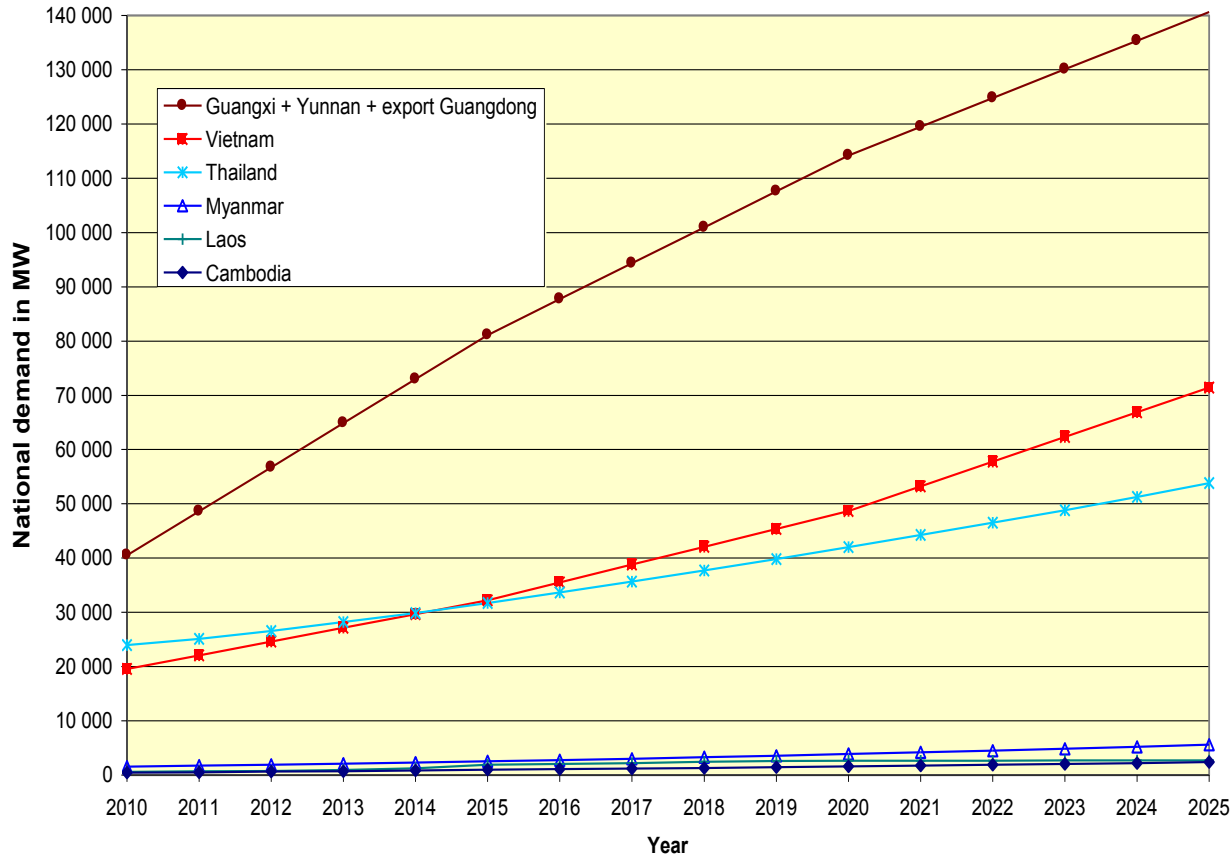


# GMS energy/electricity consumption (per capita)



# Vast demand growth towards 2025

Demand projection in the GMS countries



Annual growth in 2025:  
 China: + 5,300 MW  
 Thailand: + 2,600 MW  
 Vietnam: + 4,600 MW  
 GMS : + 13,000 MW

Total GMS demand:  
**270,000 MW** in 2025

Source: GMS Master Plan Study

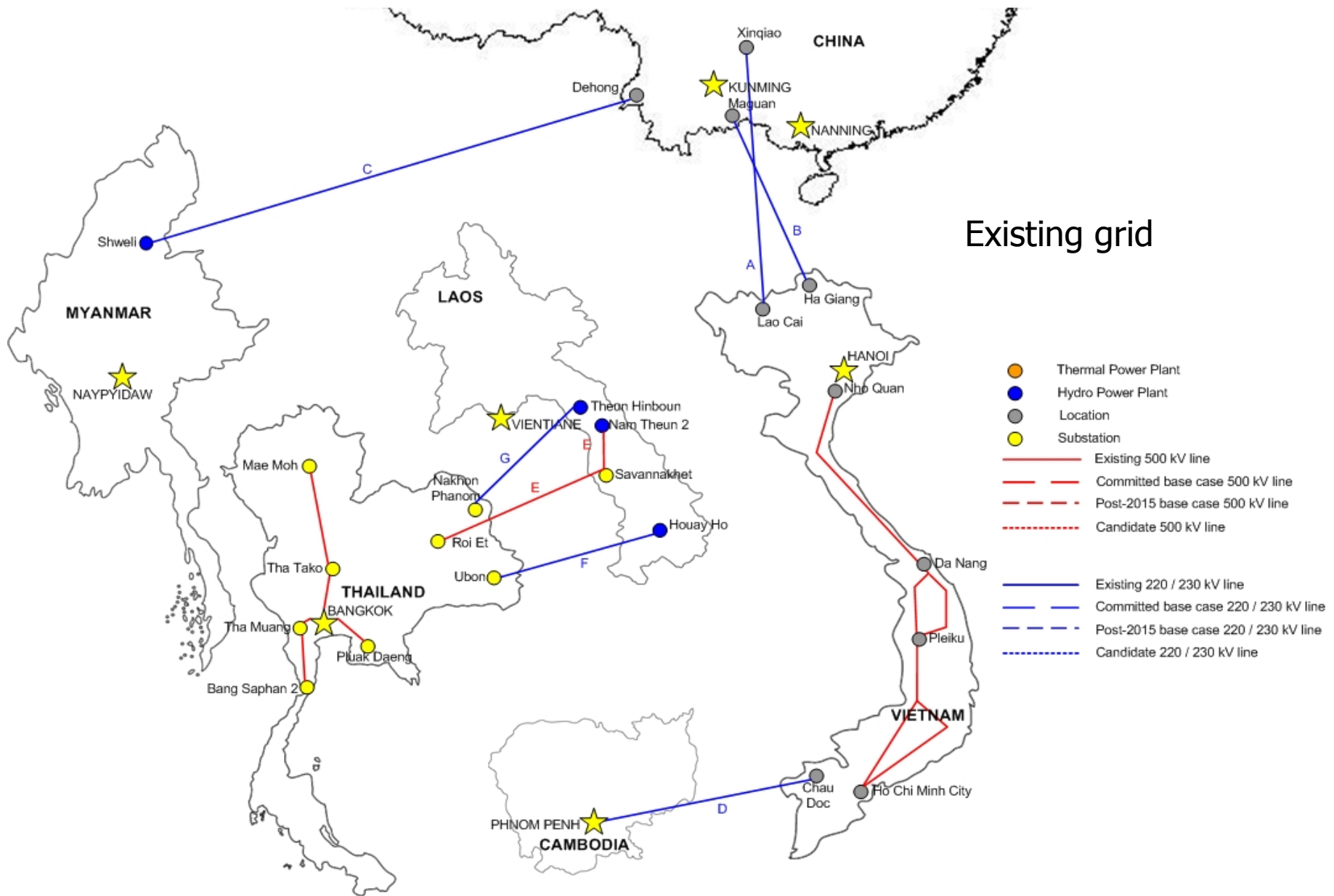
# **GMS POWER TRADE – CURRENT STATUS**

# GMS cross-border connections

From	To	Voltage	Capacity	Length	Year
Xinquao, Yunnan, China	Lao Cai, Vietnam	220 kV	<b>250 – 300</b> MW	56 km (in China)	2006
Maguan, Yunnan, China	Ha Giang, Vietnam	220 kV	200 MW	51 km (in China)	2007
Shewli I HPP, Myanmar	Dehong, Yunnan, China	220 kV double circuit	600 MW	2 x 120 km	2008
Chau Doc, Vietnam	Phnom Penh, Cambodia	220 kV (Vietnam) 230 kV (Cambodia) double circuit	200 MW	111 km	2009
Ban Nabong, Lao PDR	Udon 3 sub Thailand	500 kV (opr at 230 kV)	615 MW	100 km	2010
Nam Theun 2 HPP, Lao PDR	Roi Et 2 sub Thailand	500 kV double circuit	1,000 MW	304 km (Roi Et to NT2)	2009
Houayho HPP, Lao PDR	Ubon 2, Thailand	230 kV	150 MW	230 km	1999
Theun Hinboun HPP, Lao PDR	Sakhonnakhon, Thailand	230 kV	200 MW	176 km	1998

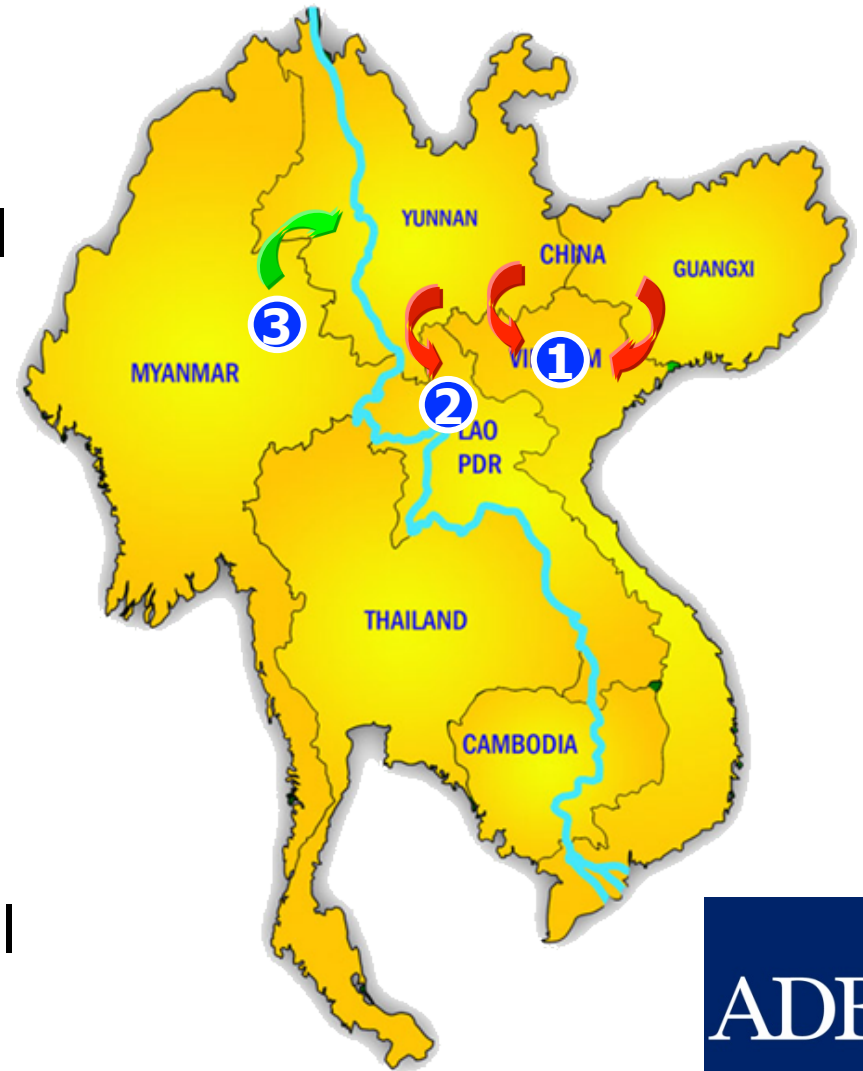
# GMS Power Trade, 2010 (GWh)

	Imports	Exports	Total Trade	Net Imports
Cambodia	1,546	-	1,546	1,546
Lao PDR	1,265	6,944	8,210	(5,679)
Myanmar	-	1,720	1,720	(1,720)
Thailand	6,938	1,427	8,366	5,511
Viet Nam	5,599	1,318	6,917	4,281
PRC	1,720	5,659	7,379	(3,939)
<b>Total</b>	<b>17,069</b>	<b>17,069</b>	<b>34,139</b>	-



# CSG Cross-Border Power Trade

- 1 CSG to Vietnam  
Power: **1,100** MW  
Electricity: 24.9TWh in total
- 2 CSG to Laos :  
Power: **34.4** MW  
Electricity: 0.27TWh in total
- 3 Myanmar to CSG  
Power: **484** MW  
Electricity: 7.65TWh in total





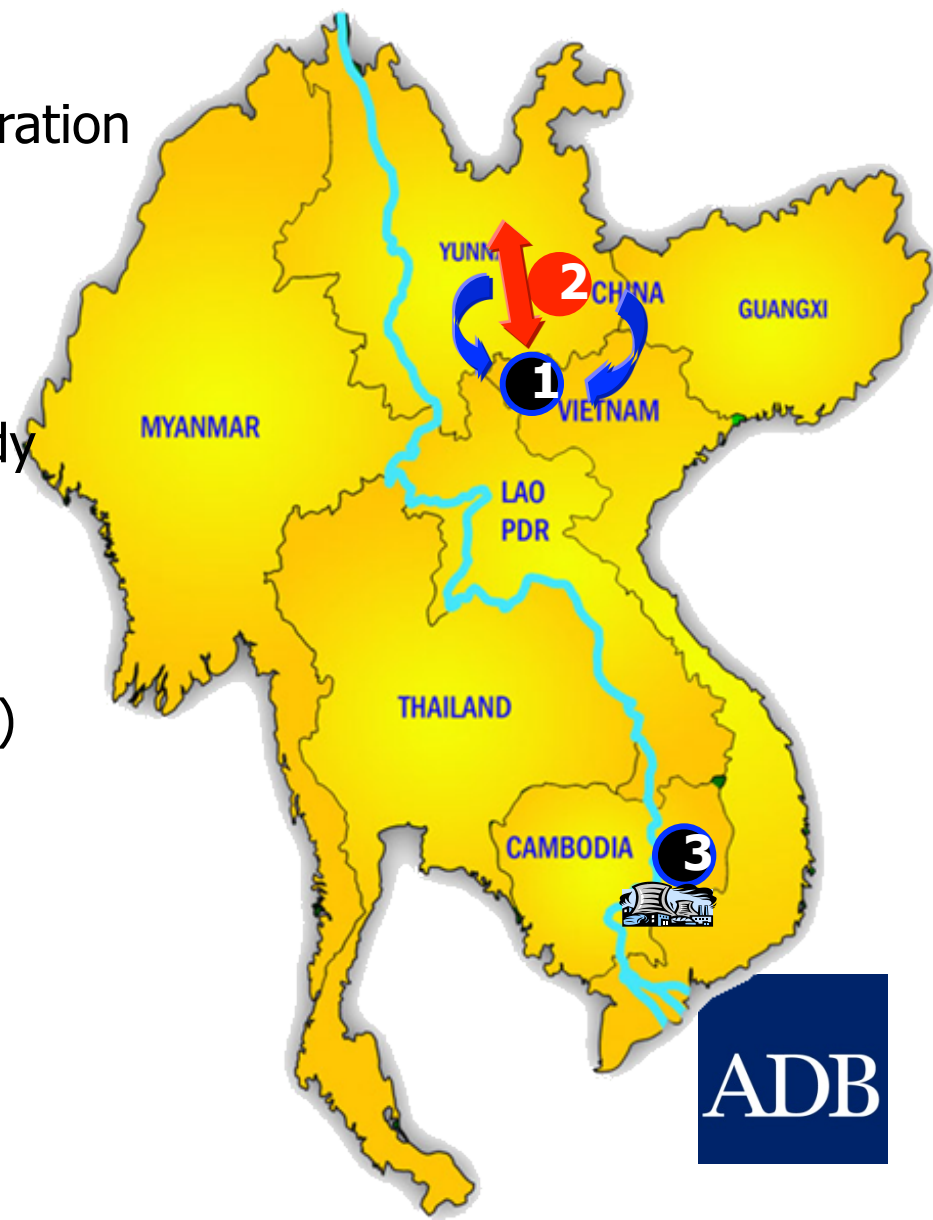
# Sino-Vietnam Cooperation

- 1 3 220kV & 4 110kV links: In operation  
Accumulated Electricity Sale :

**27,000** GWh  
(since Sep. 2004 to Nov.2013 )

- 2 The 500kV links: Feasibility Study  
on the power selling curve

- 3 Vinh Tan 1, 2\*600MW:  
BOT contract signed (Dec.,2013)



# Sino-Laos Cooperation

115kV AC links: Mongla-Namo, Dec. 6<sup>th</sup>, 2009  
(CSG) Accumulated Electricity Sale:

0

**458,000** MWh

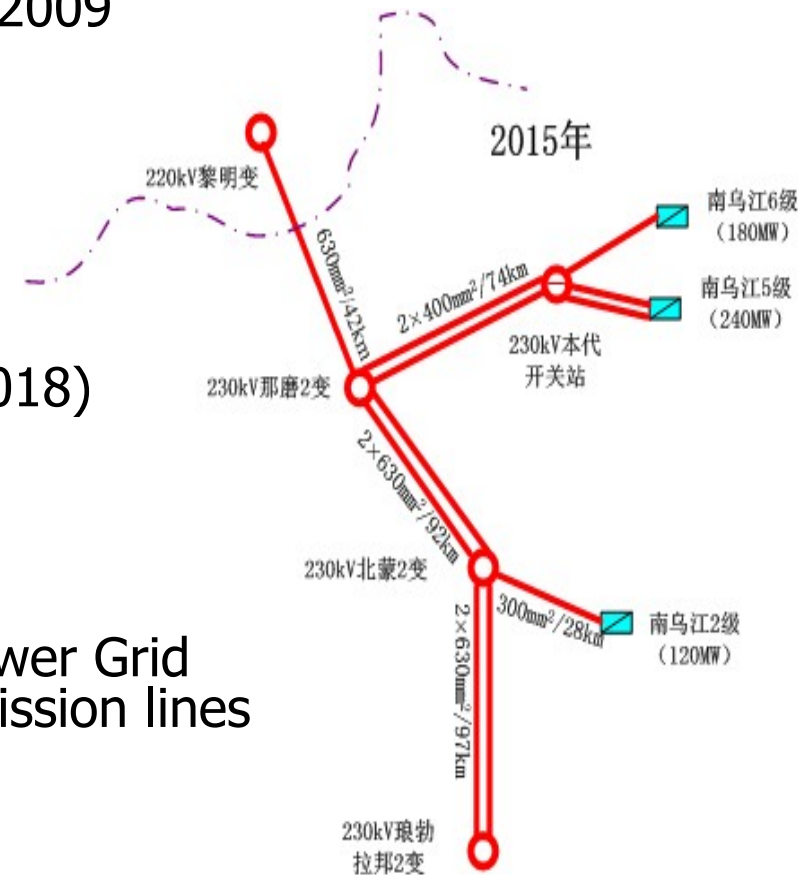
(since Dec. 2009 to Nov.2013 )

1

230kV AC links: Liming-Pakmong, (~2018)  
(CSG)

2

EPC Power Project of Northern Laos Power Grid  
Construction, including 5 230kV transmission lines  
and 4 substations.



# Sino-Myanmar Cooperation

220kV/500kV AC links: in operation (CSG)  
Accumulated Imported Electricity from Shwili (1):

0

**8,170** MWh

(since Dec. 2008 to Nov.2013 )

1

Two hydro power stations with total capacity of 840MW (Shweli(1) and Dapein) have been commissioned.

2

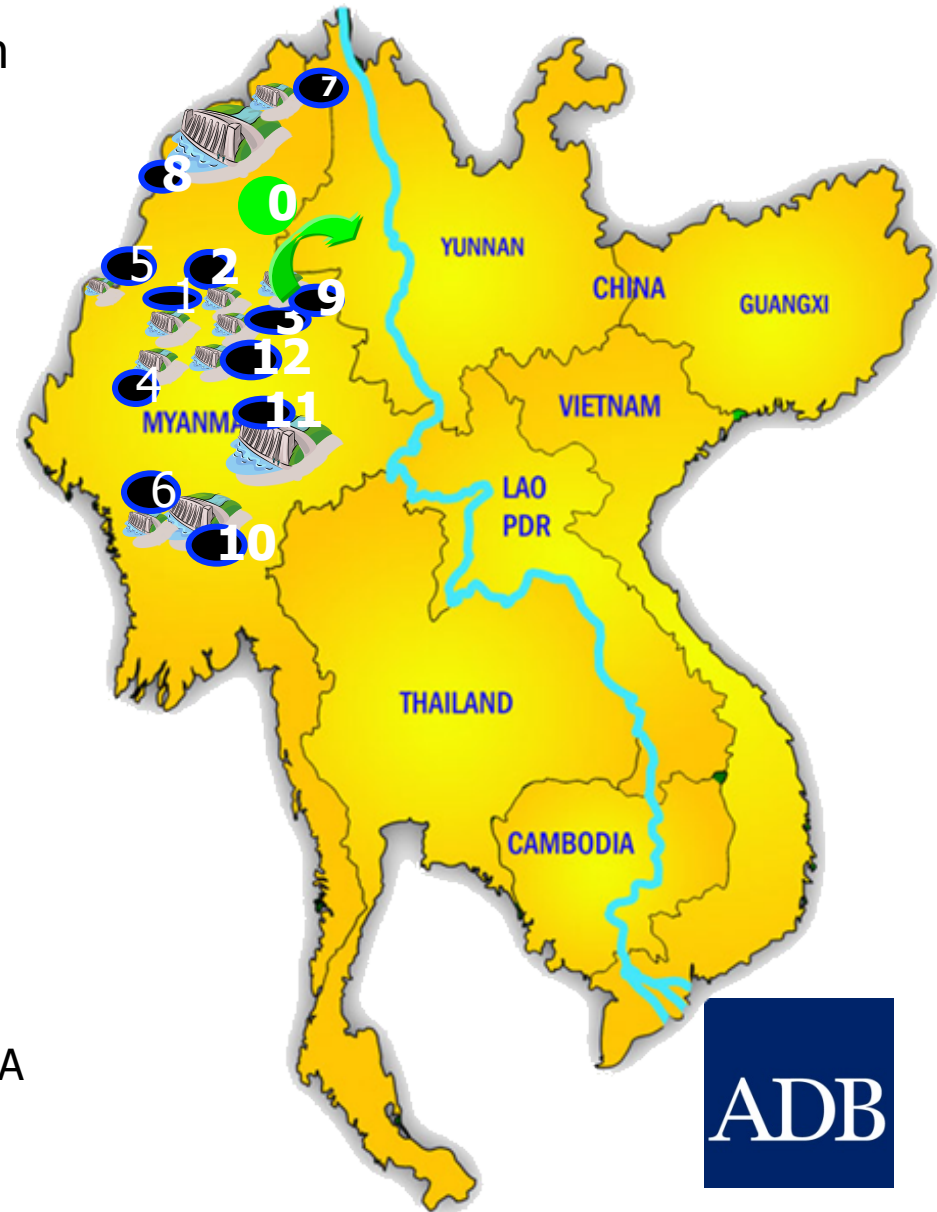
The total capacity of the projects carrying out the prefeasibility and feasibility studies is about 40GW.

# Sino-Myanmar Cooperation

220kV/500kV AC links: in operation (CSG)  
Accumulated Imported Electricity from

Shweli (1): **8,170** GWh  
(since Dec. 2008 to Nov.2013 )

- 0** Shweli (1) **600** MW, operated since 2009  
Huaneng Group
- 1** Dapein (1) **240** MW, operated since 2010,  
suspended  
Datang Co.,Ltd
- 2** Dapein (2) **140** MW, MOU(~2014)  
Datang Co.,Ltd
- 3** Shweli (2) **520** MW, PDA(~2015)  
Huaneng Group
- 4** Saing Din **47** MW, MOA(~2015)  
Datang Co.,Ltd
- 5** Nam Pawn & Nam Tamhpak, **765** MW, MOA  
(~2020)  
Datang Co.,Ltd



# Sino-Myanmar Cooperation

- 7** Ngaw Chan Kha **1,200** MW, MOA (~2018)  
Yunnan Power Investment Co.,Ltd
- 8** North-Myanmar **21,500** MW, MOA  
(2016 -2021) may be suspended  
China Power Investment Corp.
- 9** Kunlong **1,400** MW, MOA (~2018)  
Hanneng Holding Group
- 10** Ywathit **4,000** MW, MOA (~2019)  
Datang Co.,Ltd
- 11** Mongton **7,000** MW, MOU (~2023)  
Three Gorges Corp./ CSG / sinohydro
- 12** Hagyi **1,400** MW, (planning)  
sinohydro

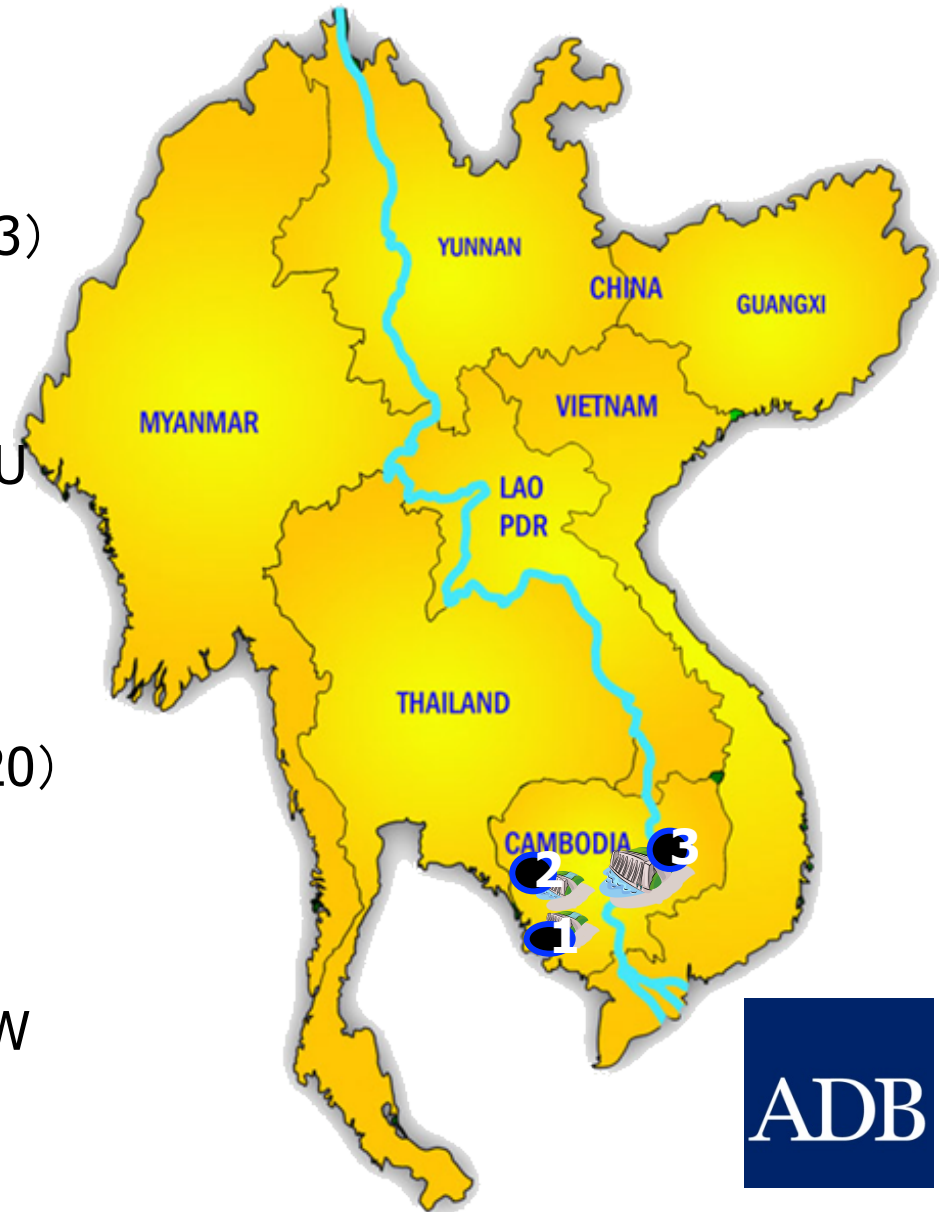
**Total installed capacity over:  
40,000 MW**



# Sino-Cambodia Cooperation

- 1 Stung Atay **120** MW, PPA (~ 2013)  
Datang Co.,Ltd
- 2 Stung Cheay Areng **108** MW, MOU (~2017)  
China GuoDian Corp.
- 3 Sambor **2,600** MW, MOU (~2020)  
China GuoDian Corp.

Total installed capacity: **2,800** MW

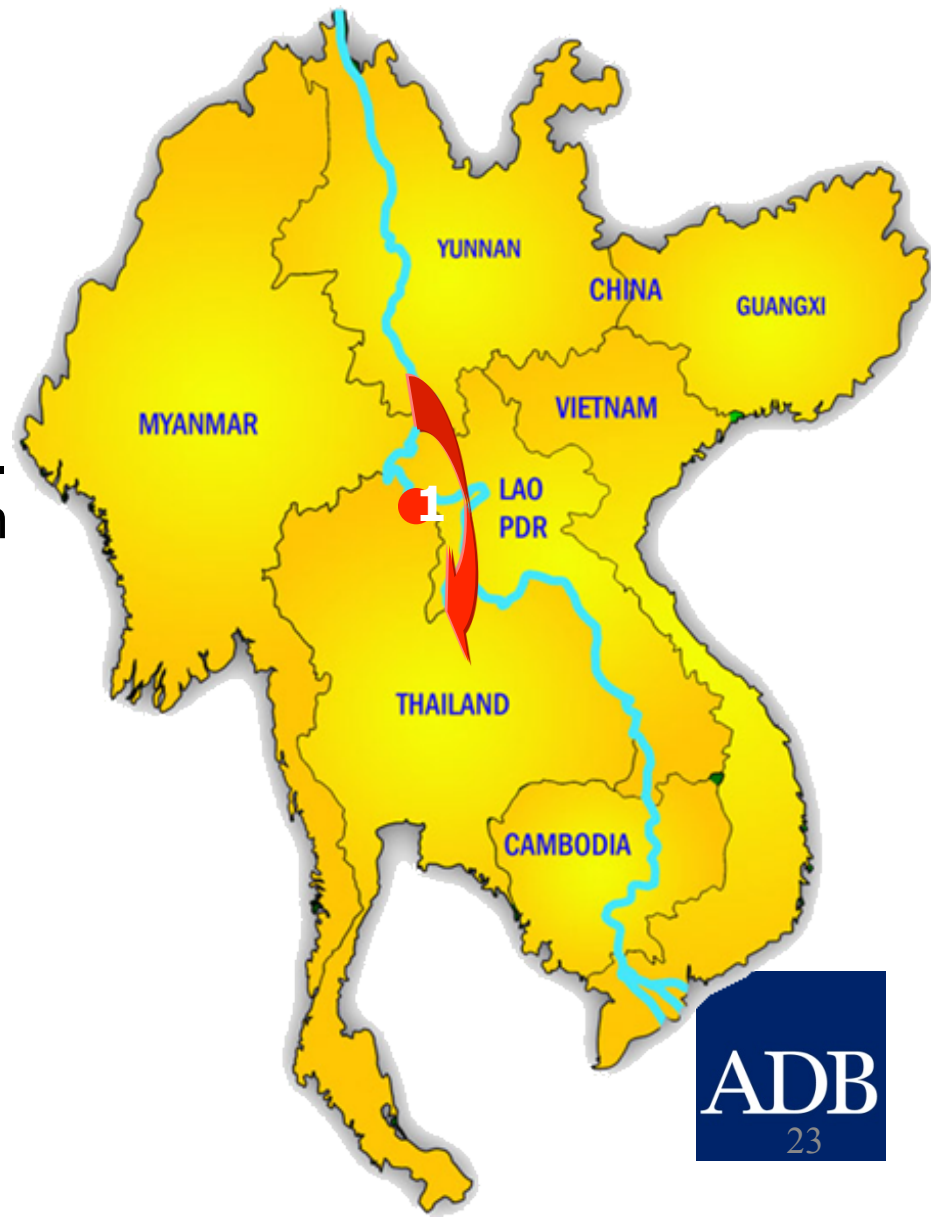




# Sino-Thai Cooperation

The **MOU on Power Purchase Program** from China to Thailand was signed on June 6, **2013**.

China--Thailand  $\pm 600\text{KV}$  Transmission Project actively speed up. Both sides had made the consensus on technical scheme and commercial mode of the project is under negotiation.



# Cambodia MV connections

- **With Thailand**

- Actual: 8 points of 22 kV cross border, 115 kV in 2007
- Request For New Connection points: 7 points of 22 kV and 35 kV cross border

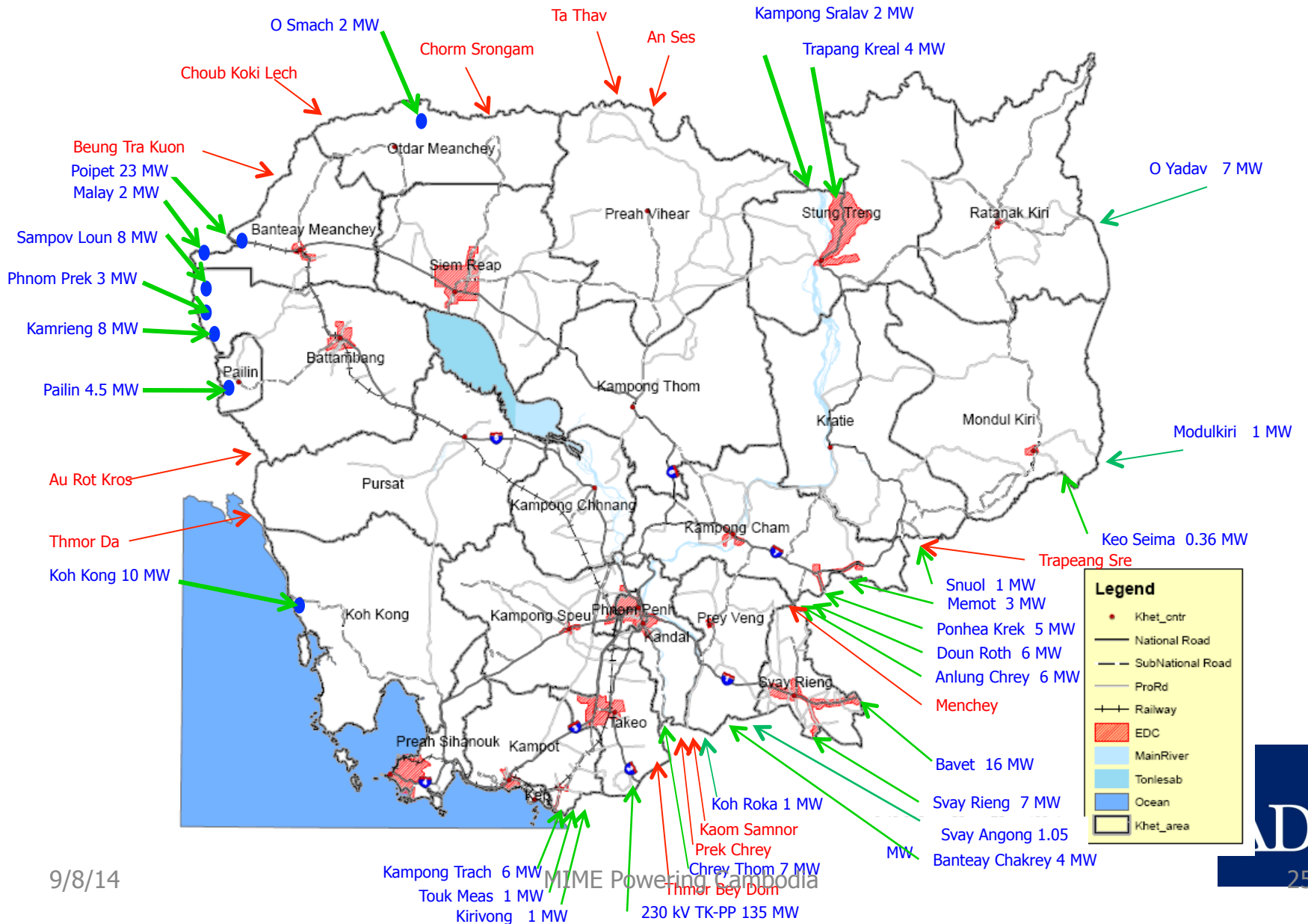
- **With Vietnam**

- Actual:
  - 18 points of 22 kV and 35 kV cross border
  - 230 kV in 2009
- Request For New Connection points: 5 points of 22 kV and 35 kV cross border

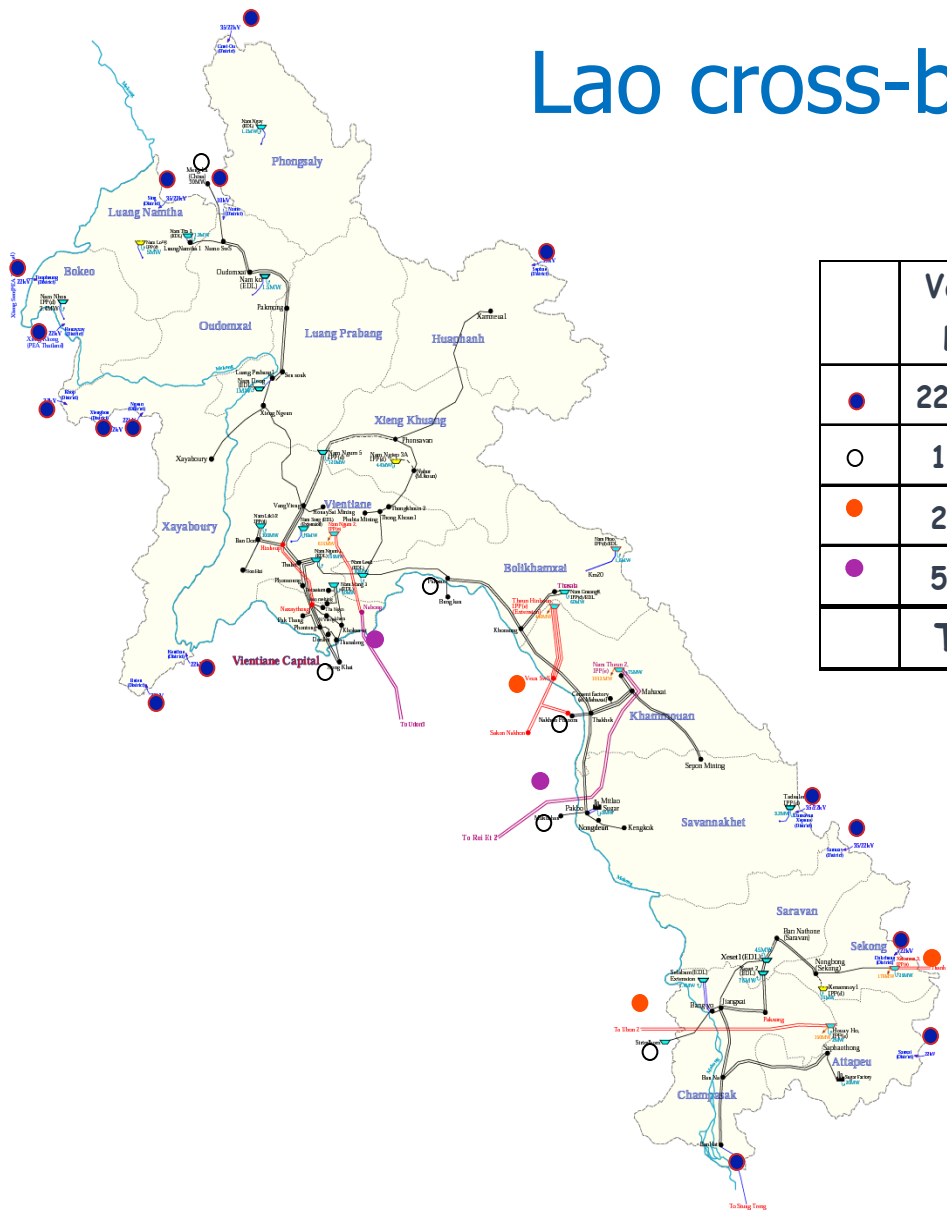
- **With Lao PDR**

- Actual: 2 point at 22 kV, Future: 230 kV in 2017-2018





# Lao cross-border interconnections



	Voltage Level	EDC	EVN	CSG	Thailand		Total
					EGAT	PEA	
●	22/35 kV	1	5	3		7	16
○	115 kV			1	5		6
●	230 kV		1		2		3
●	500 kV				2		2
	<b>Total</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>9</b>	<b>7</b>	<b>27</b>

## Remarks:

- 22/35kV – Import
- 115kV – Exchange
- 230kV – Purely Export
- 500kV – Purely Export

# Viet Nam Interconnections

## Inter-connection with China

- Existing projects:

Project	Voltage level	Description
Xinqiao - Lao Cai	220kV	$P_{\max} = 473$ MW
Malutang – Ha Giang	220kV	$P_{\max} = 447$ MW
Maomaotiao - Hà Giang	110kV	$P_{\max} = 116$ MW
Hekou - Lao Cai	110kV	$P_{\max} = 91$ MW
Fangcheng (Guangxi) - Mong Cai	110kV	$P_{\max} = 25$ MW

- Future connections: EVN and CSG are studying a super high voltage connection between Northern Vietnam and Yunnan – China.

# Viet Nam Interconnections

## Inter-connection with Cambodia

- Existing projects:
  - Chau Doc - Takeo: 220 kV transmission line, Pmax = 175 MW
- Future connections:
  - Stung Treng – Tay Ninh: 220 kV transmission line. Pmax = 207 MW. COD 2015-2016

# Viet Nam Interconnections

## Inter-connection with Lao PDR

- Current connections:
  - Sekaman 3 – Thanh My: 220 kV transmission line, Pmax = 248 MW
- Future connections :

Project	Voltage level	Description
Ban Hatsan – Pleiku	500kV, 220kV	Developing project FS (COD 2015-2016)
HPP Nam Mo - Ban Ve	220KV	In negotiation
Luang Prabang - Nho Quan	500 kV	Pending

# **INSTITUTION BUILDING**

# Key Milestones

- The first **key milestone** of the GMS regional power trade is the endorsement of the **Policy Statement on regional power trade** in GMS by GMS Ministers in **January 2000**
- signing of the **Intergovernmental Agreement** (IGA) on regional power trade in GMS on **3 November 2002** (the Phnom Penh 1<sup>st</sup> GMS Summit)

# Inter-Governmental Agreement

(IGA 2002)

- Objectives:
  - **coordinate and cooperate** in the planning and operation of their systems
  - **fully recover costs** and share equitably the resulting benefits
  - **provide reliable and economic electricity services** to the customers

relationships based on **cooperation** and the **progress** on regional power trade will be **gradual** and **respect for the environment**



# RPTCC

- assigned responsibilities of policy direction and supervision
- established the **Regional Power Trade Coordination Committee** – a high level body with nominees by governments (DG level) to implement IGA

# RPTCC

- Responsible for:
  - **Preparing the Regional Power Trade Operating Agreement (PTOA)**
  - Recommending of **overall policy and management of regional power trade**, including bodies and coordination
  - **Establishing short, medium and long term initiatives** to achieve the objectives of regional power trade within a specified timeframe
  - **Identifying steps for implementation** including means for financing

# Memorandum of Understanding

## Stage 1:

- the initial period when only bilateral power transactions are possible **before a regional transmission network is established**
- Trading in Stage 1 refers to **opportunity exchange** of power between national power utilities using existing cross border transmission lines
- Second MOU (2008), prescribing measures to fully achieve **Stage 1** during the period 2008-2010

# Establishment of the Regional Power Coordination Center

- Consultation process in 2011 – 2012
- Inter-governmental MOU for the establishment of the RPCC and Article of Associations prepared, reviewed, commented by all member countries
- Ministerial meeting endorsed MOU in **December 2012**
- GMS government approved the MOU
- Institutional framework for RPCC prepared
- Governance structure for RPCC prepared
- Criteria for hosting RPCC prepared

# Establishment of RPCC

- Three countries submitted bid for hosting RPCC
- Bids to be opened and evaluated by an independent committee
- Bid evaluation will be reviewed and approved at RPTCC

# ADB support

- Mobilized financial support from development partners (AFD, Sida, AUSAID)
- Provided regional technical assistances
- Coordinated RETA consultants with countries, RPTCC
- Supported RPTCC in its agenda

## For further information

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