

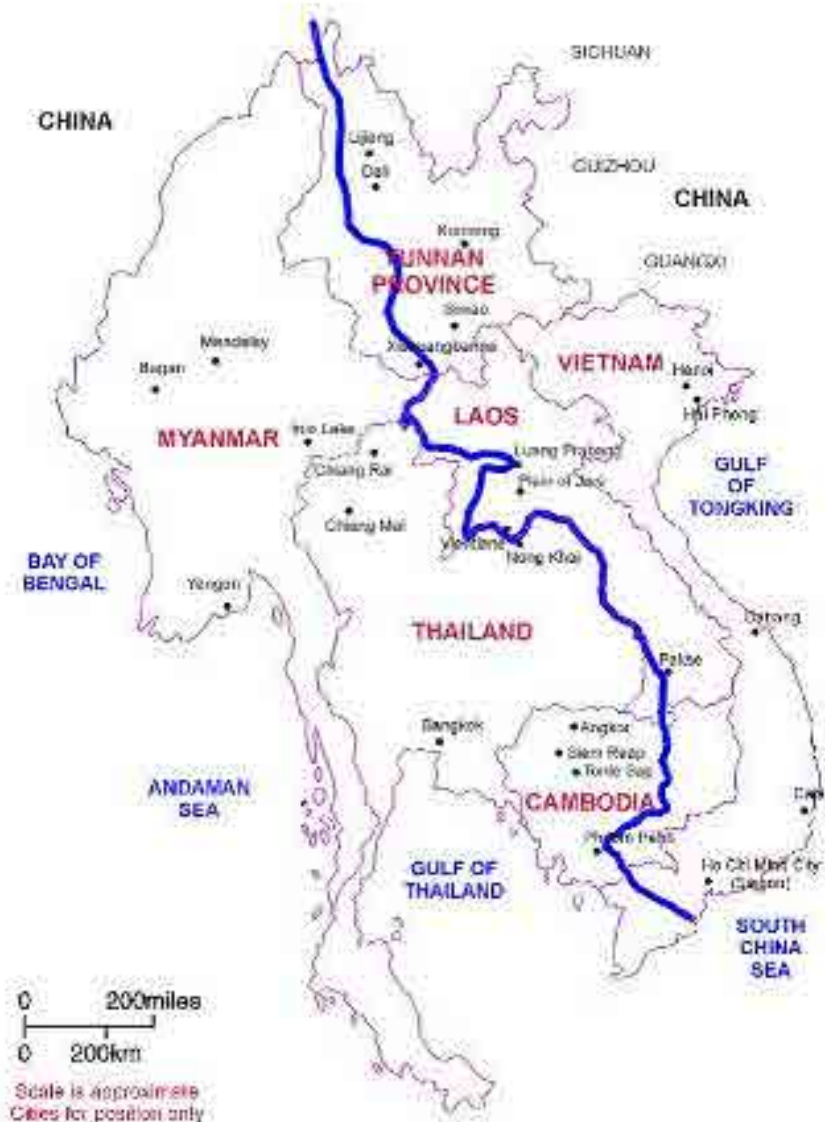
# **Prospects of Energy Resources, Power Industry and Electric Power Cooperation in Greater Mekong Sub-region**

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**8<sup>th</sup> Sept 2014**



- The GMS groups 6 countries in an activity-based sub-regional economic cooperation program.
- Energy cooperation in the Greater Mekong sub-region (GMS) began as part of the GMS Economic Cooperation Program launched in 1992.
- Aims at fostering regional cooperation to contribute to growth and poverty reduction and to address the provision of regional public goods.



- Energy was identified at the inception of the GMS program as one of nine areas of sub-regional cooperation in view of the benefits of sharing the sub-region's diverse energy resources and of optimizing power supply to meet varying demand profiles across the region.
- The savings resulting from expanding the interconnection of GMS power systems alone are estimated at \$15billion, mainly due to the substitution of fossil fuel generation with hydropower. Integration of power systems is also expected to result in slower growth of carbon emission as compared to business as usual.

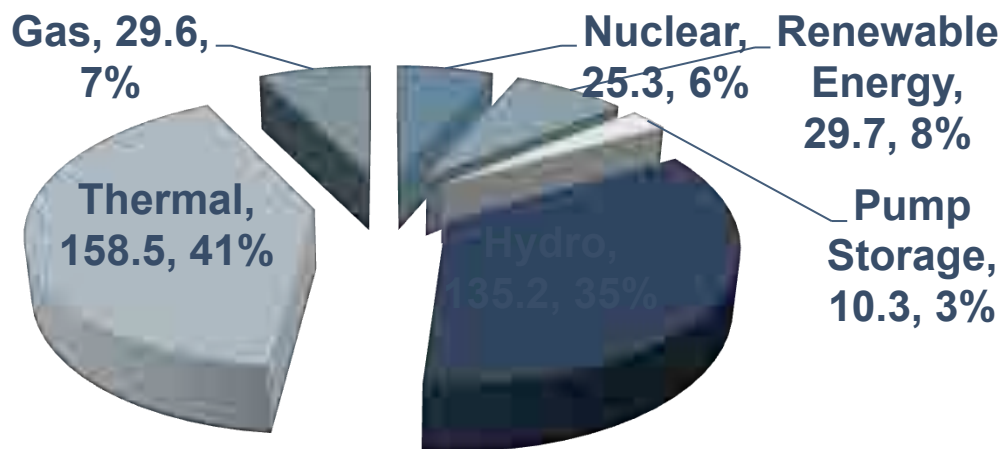
Covers 5 provinces, and connected with Vietnam, Laos and Myanmar. The service area of CSG is up to 1.02 million km<sup>2</sup>, with a population of 230 million.

- In 2013, the total installed capacity of the whole grid is 230 GW, 46% of which is clean energy. The peak load is 129 GW, the total electricity consumption is 900 TWh.
- In 2013, Main business revenue is \$70 billion with total assets of \$90 billion.



	2010	2015	2020	2010-2020
<b>Peak Load (GW)</b>	<b>118</b>	<b>181</b>	<b>244</b>	<b>9.5%</b>
<b>Consumption (TWh)</b>	<b>710</b>	<b>1086</b>	<b>1467</b>	<b>9.75%</b>

### Installed Capacity 388 GW (2020)





The total installed capacity is 3.62 GW in Myanmar, including 540MW sent to China, the peak load is 1.64 GW; total electricity consumption is 8.5 TWh and about 160 kWh per capita.

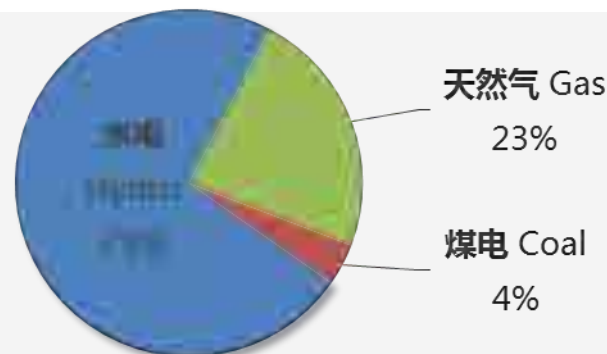
➤ Myanmar has rich water resources, abundant natural gas reserves, and also some of coal and oil.

DATA resources : RPTCC, IEA, CIA

	2015	2020	2030
Load	3210	5690	16980
Reserve	960	1710	5090
Required capacity	4180	7390	22070
Exported power	0	0	0
Installed capacity	5730	16100	51320
Power surplus	1560	8610	29250

## Overview of Power grids

- ❑ Myanmar grid consists of national interconnected grid and remote isolated grids, and some areas without electricity;
- ❑ The highest voltage level is 230 kV, with frequency of 50 Hz;
- ❑ Northern Hydropower sent to China Southern Power Grid (500 kV and 220 kV).



Installed Capacity



The total installed capacity is 3.22 GW in Laos, all of generating units are hydropower; total electricity consumption is 2.7 TWh and is about 400 kWh per capita.

- Laos has relatively abundant hydropower resources, and concentrated on the Mekong river basin, and some reserves of coal and oil. The current oil and natural gas all rely on imports.

DATA resources : RPTCC, IEA, CIA

	2015	2020	2030
Load	1560	3340	5830
Reserve	470	1000	1750
required capacity	2020	4340	7570
exported power	2170	4120	4730
installed capacity	4170	12970	22250
power surplus	-20	4510	9950

## Overview of Power grids

- ❑ Some areas without electricity;
- ❑ The highest voltage of the grid is 115 kV, with part of outer power transmission line of the 230 kV, the frequency of 50 Hz;
- ❑ Built some point to grid transmission projects for export to Thailand and Vietnam.



**Installed Capacity**



The total installed capacity is 0.87 GW in Cambodia, including 0.29 GW purchasing from Vietnam and Thailand; total electricity consumption is 3.3 TWh per capita and electricity consumption is about 220kWh.

- Cambodia has some water resources, less coal reserves, and the current coal mainly rely on imports.

DATA resources : RPTCC, IEA, CIA

	2015	2020	2030
Load	1100	1900	5400
Reserve	330	570	1620
required capacity	1430	2470	7020
exported power	0	0	0
installed capacity	1960	2980	2980
power surplus	530	510	-4040

## Overview of Power grids

- ❑ By 2013, the 13 major load centers have been interconnected;
- ❑ The highest voltage level is 230 kV, with frequency of 50 Hz;
- ❑ Grid Interconnected with Thailand and Vietnam, for power import.



Installed Capacity





The total installed capacity is 33.59 GW in Thailand, the biggest load of 27.08 GW; total electricity consumption is 162.7 TWh per capita in 2012 and electricity consumption is about 2400 kWh.

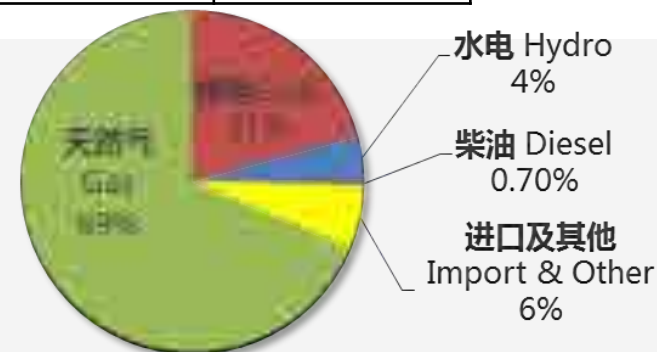
- Thailand is relative lack of water, which has a certain reserves of coal, oil and gas, energy self-sufficiency is about 50%.

DATA resources : RPTCC, IEA, CIA

	2015	2020	2030
Load	30230	37320	52250
Reserve	13180	14900	21900
required capacity	43410	52220	74150
exported power	2470	3880	3880
installed capacity	39770	44630	62060
power surplus	-1170	-3700	-8210

## Overview of Power grids

- ❑ The highest voltage level of 500 kV, the frequency of 50 Hz;
- ❑ Connection with Laos (110 kV AC) and Malaysia ( $\pm$  330 kV DC and 110 kV AC).



Installed Capacity



The total installed capacity is 28.17 GW in Vietnam; total electricity consumption is 111.1 TWh per capita in 2012 and electricity consumption is about 1200 kWh.

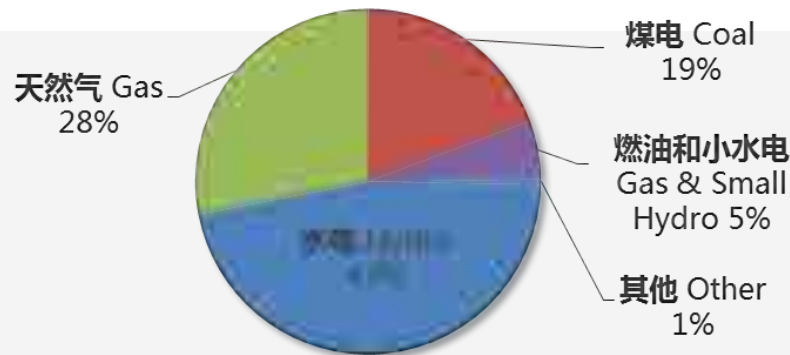
- Vietnam has abundant water and coal resources, the reserves of oil and gas are also rich, exports coal and oil.

DATA resources : RPTCC, IEA, CIA







	2015	2020	2030
Load	30800	52040	110220
Reserve	9240	15610	33060
required capacity	40040	67650	143280
exported power	700	1240	1850
installed capacity	45470	72750	139460
power surplus	6130	6340	-1970

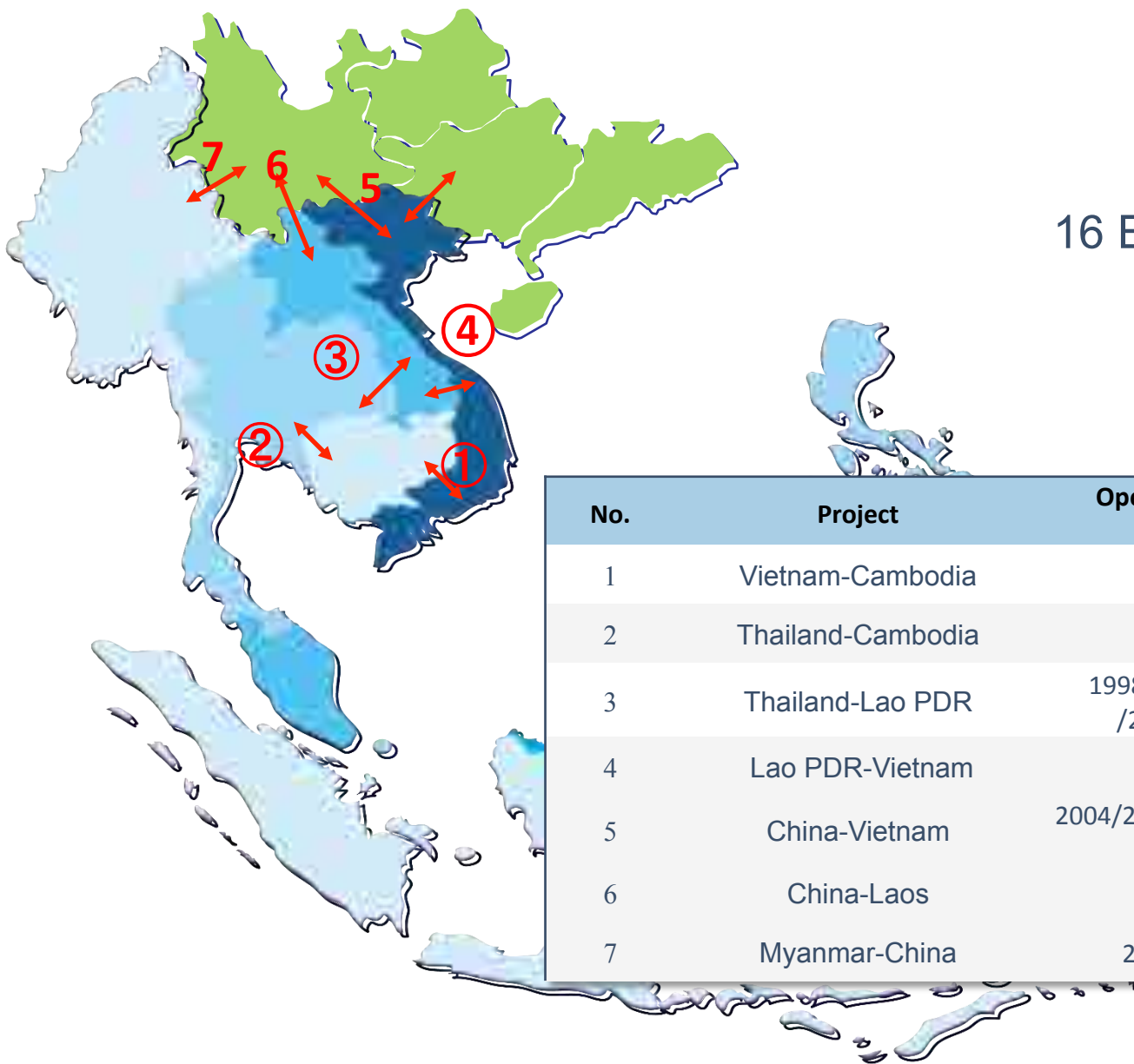
## Overview of Power grids

- ❑ Vietnam divided north, central and south power grid, the type of long and narrow;
- ❑ The highest voltage level of 500 kV, the frequency of 50 Hz;
- ❑ Connection with China (220 kV and 110 kV) and Cambodia (220 kV and 110 kV).



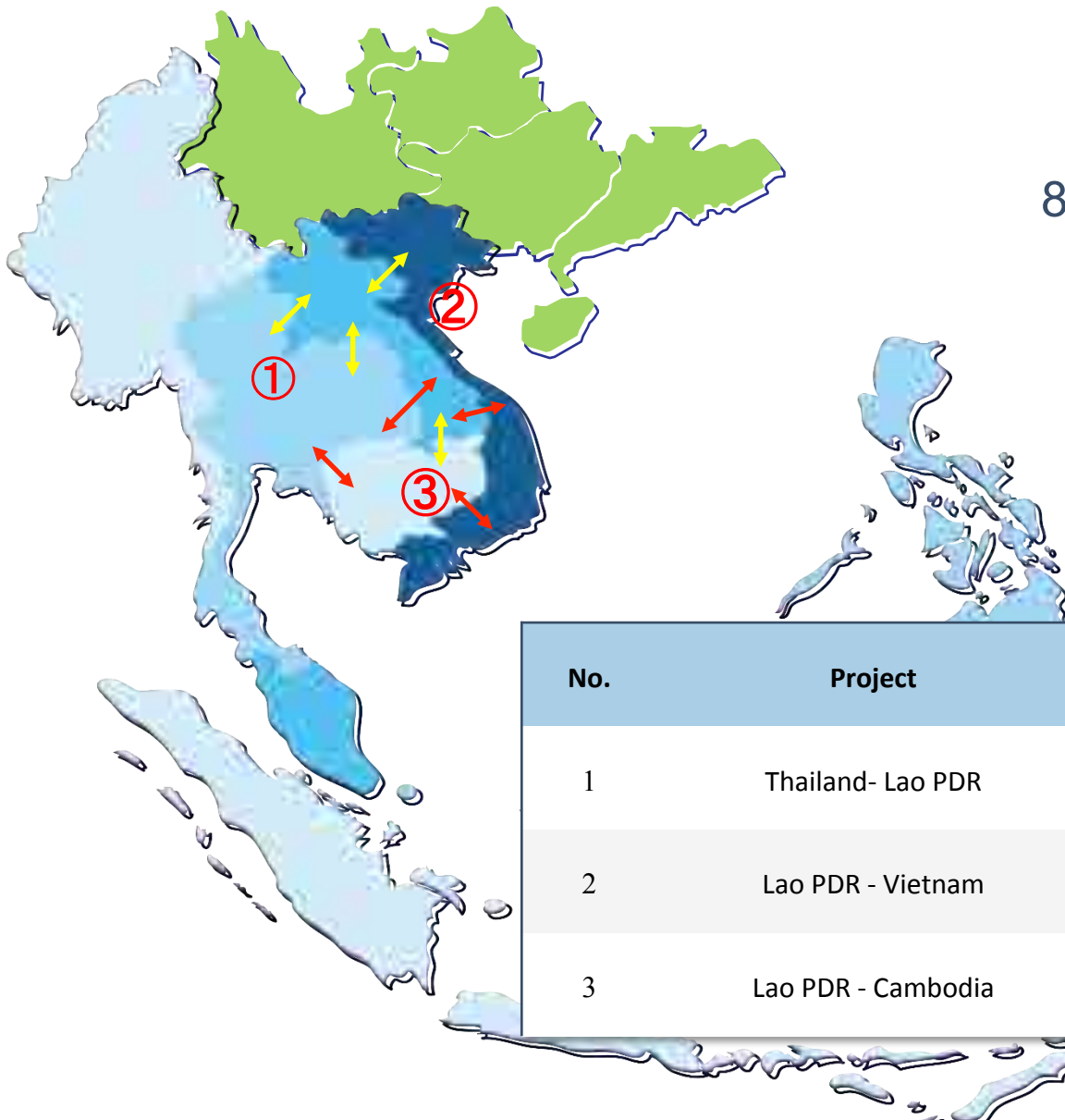
Installed Capacity

Country	Energy Cooperation Demands	Power Supply and Demand (Recent)	Power Supply and Demand (mid-and-long term)	Role Partner
 Myanmar	Convert resources into economic benefits	Balanced	Ability to be delivered to the outside	Mainly to be delivered to the outside
 Laos	Convert resources into economic benefits	Balanced	Ability to be delivered to the outside	Mainly to be delivered to the outside
 Cambodia	Energy diversification	Balanced	Balanced	Two-Way Exchange
 Thailand	Ensure energy security, promote economic development	shortage	With certain Market	Mainly to be received
 Vietnam	Convert resources into economic benefits , improve the renewable energy percentage	Balanced	Balanced	Two-Way Exchange
 China	Utilize water resources, better energy supply channels	With potential to be delivered to the outside	With large Market	Two-Way Exchange



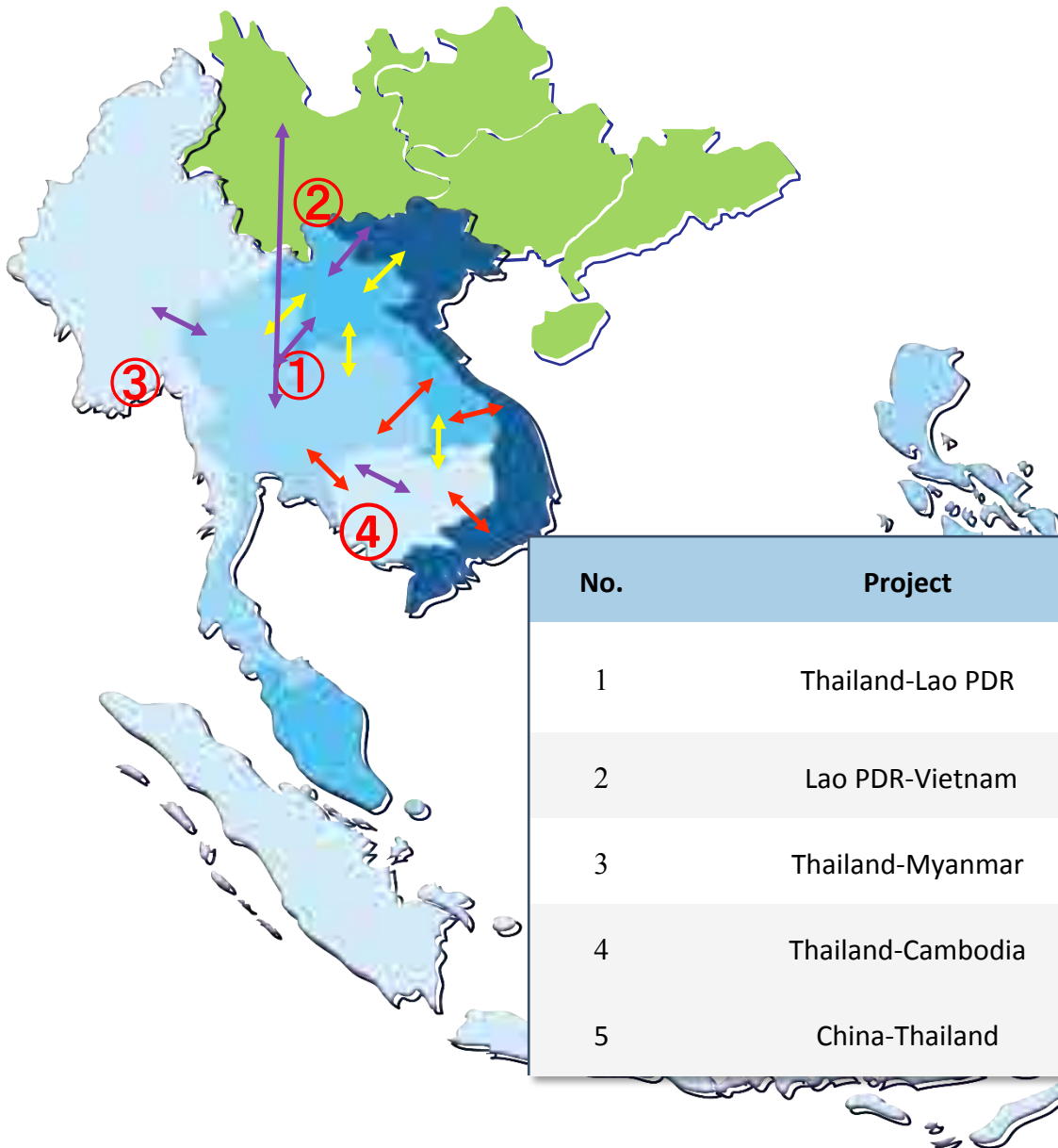
## 16 Existing Projects

No.	Project	Operation date	MW
1	Vietnam-Cambodia	2009	170
2	Thailand-Cambodia	2007	100
3	Thailand-Lao PDR	1998/1999/2010 /2011/2012	214/126/948 /597/220
4	Lao PDR-Vietnam	2011	248
5	China-Vietnam	2004/2005/2006/2008 /2009	1080
6	China-Laos	2009	170
7	Myanmar-China	2008/2010	3000/2400



## 8 Projects Under Construction

No.	Project	Operation date	MW
1	Thailand- Lao PDR	2015/2018/ 2018/2019	1473/269/ 390/1220
2	Lao PDR - Vietnam	2013/2015/ 2016	488/1000/ 1410
3	Lao PDR - Cambodia	2016	300



## 13 Projects Under Planning

No.	Project	Operation date	MW
1	Thailand-Lao PDR	2015/2018/ 2019/ 2020/ 2023	600/210/ 315/ 630/ 1040
2	Lao PDR-Vietnam	To be confirmed	To be confirmed
3	Thailand-Myanmar	2016/2022/ 2024/ 2025	369/1190/ 7000/ 3150
4	Thailand-Cambodia	2015/2017/ 2020	300/11900/ 1800
5	China-Thailand	2020	3000

- ❖ **LAO – THA** (Tariff MOU signed)
  - Nam Ngum 3: 440 (2X220MW), Jan 2017
  - Xe Pian Xe Namnoy: 390 (3X130MW), Jan 2018
  - Nam Ngiep 1: 269 (2X134.5MW), Jan 2018
  - Na Bong - Udon Thani, 500kV,
- ❖ **CAM –VIE**
  - Stung Treng – Chau Doc: 220kV, Pmax 207MW, 2014
- ❖ **CAM - THA**
  - Stengnam – Chanthaburi, 100 MW
  - Koh kong – Pluak Daeng, Rayong, 1800MW
- ❖ **LAO - THA**
  - Nam Theun 1: 510MW (Udon Thani)
  - Pak Beng: 912MW (Nan)
  - Sanakham: 660MW (Kon Kaen)
  - Xe Kong 4: 300MW (Ubon Ratchathani)
  - Nam Kong 1: 75MW (UR)
  - Xe Kong 5: 330MW (UR)
  - Don Sahong: 240 MW (UR)
- ❖ **MYA – THA (EGAT)**
  - Hutgyi: 1,190MW (Phitsanulok)
  - Dawei: 1,800 MW (Chom Bung Ratchaburi)
  - Tanintayl: 600MW (Prachup Khiri Khan)
  - Mong Ton: 3,500MW (Mao Moh)
- ❖ **MYA – PRC (CSG)**
  - Daipein (2), 140MW, MOU , 2014
  - Shweli (2), 520MW, PDA, 2015
  - Saing Din, 47MW, MOA, 2015
  - Nam Pawn & Nam Tamhpak, 765 MW, MOA, 2020
  - Ngaw Chan Kha, 1.2GW, MOA, 2018
  - North-Myanmar 21.5GW, MOA, 2016-2021, may be suspended
  - Kunlong, 1.4 GW, MOA, 2018
  - Ywathit, 4GW, MOA, 2019
  - Mongton, 7GW, MOU (2023)
  - Lemro 1&2, 690mW, MOU (planning)
- ❖ **MYA (MOEP1)**
  - Tamanthi: 1,200MW
  - Nam Tamhpak (Kachin): 200MW
  - Dapein-2: 168MW
  - Kunlong (Upper Thanlwin): 1,400MW
  - Naopha/ Mantong: 1,200MW
    - Naopha: 1,000, Mantong: 200
  - Shweli-2: 520MW
  - Namlwe: 452MW
    - Keng Tong: 96, Wan Ta Pin: 25, So Lue: 165
    - Mong Wa: 50, Keng Yang: 28, He Kou: 88
  - Namkha: 200MW





中国南方电网  
CSG SOUTH CHINA POWER GRID

# Thanks for your Attention !

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