

Summary of Discussions
Fifth Meeting of the Planning Working Group (PWG-5) of the
Regional Power Trade Coordination Committee (RPTCC)
Vientiane, Lao PDR, 17 June 2008

1. **Objectives.** The PWG-5 meeting was held to: (i) decide on chairmanship for the PWG and FG, and firm up the system for rotation and tenure of chairmanship; (ii) update on and advance the progress of priority RPTCC studies and activities, such as the studies on performance standards and transmission regulation, training programs, and the power sector database and website; (iii) provide updates of each GMS country's power generation and transmission development plans; (iv) discuss priority GMS interconnections for ADB support and other priority projects in the master plan and their relation to country power programs; and (v) mobilizing support from development partners to achieve the milestones for initial GMS power trading as provided in the power trade road map.

2. The PWG-5 meeting was held in Vientiane, Lao PDR and co-organized by the Department of Electricity of the Ministry of Energy and Mines (DOE-MEM) of Lao PDR and the Asian Development Bank (ADB). It was attended by PWG nominees of the six GMS member countries, as well as by representatives of ADB, Agence Francaise de Developpement (AFD), Japan Bank for International Cooperation (JBIC), Japan International Cooperation Agency (JICA), World Bank (WB) and Soluziona. Attached is the agenda and program of the meeting (Appendix 1) and the list of PWG-5 participants (Appendix 2).

Opening Session

3. Mr. Daovong Phonekeo, Deputy Director General, DOE-MEM, welcomed the participants and noted the significance of the MOU on the power trade road map signed at the Third GMS Summit, which reflected, along with other gains, the good progress in the pursuit of power trading in the subregion. He emphasized the important role of ADB and other development agencies in realizing the GMS vision. He wished the meeting a complete success and enjoined everyone to have a pleasant stay in Vientiane.

4. Mr. Yongping Zhai, Principal Energy Specialist, Infrastructure Division, Southeast Asia Department (SEID), ADB, welcomed the participants and thanked the host, DOE-MEM, for the hospitality and excellent meeting arrangements. He explained the objectives of the meeting, and gave a preview of the various agenda items, which are aimed at making progress in realizing the GMS power trade road map.

Election of New Chair, Rotation and Tenure of Chairmanship

5. Mr. Zhai thanked PRC for having effectively served as Chair of the PWG and FG. Mr. Liang Zhou, Director of International Department, China Southern Power Grid Company (CSG) shared his experience in chairing the PWG and expressed continuing support for RPTCC activities. The meeting discussed two criteria for the selection of chairmanship for the PWG/ FG, namely (i) the alphabetical sequence of rotation (after PRC) and (ii) the most active country in terms of the focus of RPTCC activities. Based on the discussions, it was found that Lao PDR fit both criteria and will therefore be the next chair of the PWG/ FG for a term of two years.

Performance Standards and Transmission Regulation

6. Soluziona (Mr. Castrillo) provided an update of the study based on what was agreed and achieved since the last meeting. Among priority activities mentioned are preparation of information request, review of the regional grid code, development of performance standards, methodology for power system studies, guidelines for new transmission facilities, guidelines on transmission regulation, and conduct of workshops.

7. **Discussions.** Soluziona clarified that the regional grid code developed during the previous technical assistance could be the basis for the review and noted that the updated questionnaire would cover broader technical issues. Mr. Gulati (WB) commented on the issues that need to be addressed in harmonizing standards in the GMS, considering for example, the various transmission lines being developed for the IPPs. Mr. Zhai suggested that the questionnaire contain a background note explaining the purpose of the survey and the outputs expected to be achieved. Soluziona (Mr. Patino) explained that the aim for the GMS would be to agree on minimum standards that would enable power trading, but to work toward more advanced standards later based on feedback from the countries. Mr. Gulati suggested that the PWG first look into performance standards at the 500 kV level. He said that a technical working group composed of members from each country's power utility, be tapped to define said standards.

Training Program

8. **Training Program: Lessons Learned.** Soluziona (Mr. Castrillo) reviewed the implementation arrangements for the training program and presented the suggested/ requested training courses covering national and regional grid code, tariff mechanism for cross border trading, structure for technical system operator (TSO) and market operation, etc. However, most of these could no longer be financed out of remaining resources of the current RETA. Mr. Zhai clarified that funding resource should not pose a constraint given the strong support from development partners in extending assistance to the RPTCC. The focus of discussions should be on what courses are really essential and should be prioritized for implementation.

9. **Discussions.** Lao PDR noted the importance of the tariff structure for cross border trading given that this follows from the market structure that will be decided by the countries. Mr. Zhai suggested that the participants continue discussions on their preferred courses and noted that the course content presented by Soluziona (Appendix 3) would be considered for the next phase of the training program.

Regional Power Database/ Website

10. Soluziona (Mr. Castrillo) provided an overview of the recent milestones, and gave a recap of the key features of the database. He discussed the user profiles, indicating the responsibilities (e.g. for the website and country administrator, and public and private user) and followed up on the appointment of country administrators for Cambodia and Viet Nam. He added that issues/ next steps include the following: completion of country administrators, website launch, data updating/ completion, website maintenance, subscription fees, and other considerations (enhancements, system maintenance).

11. **Discussions.** Soluziona clarified the remaining tasks prior to the launching of the website and demonstrated that it can now be accessed online (www.GMSRPTCD.com). PRC expressed concern on system maintenance, and handling of sensitive information in the

website. Soluziona explained that additional procedures may be designed for management of sensitive data. PRC, as system administrator, agreed to pay almost \$15000 for the server room and China Telecoms fee, and would be able to maintain the data and user. However, PRC said it will not be able to handle problems which may be caused by system programming. PRC requested ADB to clarify who is responsible for the \$1000 fee for software (MySQL) support and domain name, as well as the maintenance fee for the web system.

12. A handbook will be distributed detailing the functions of the administrators and users. Thailand suggested that the RPTCC website be linked from the ADB GMS website. Mr. Zhai explained the importance of agreeing on the overall system arrangements and reiterated that as a matter of principle, the GMS countries will own the website/ database and thus share responsibility for its maintenance, with necessary support from ADB in the course of operating the website/ database.

Updates on Progress of Power Development Plans and Transmission Interconnection Projects (Country Presentations, Appendix 4)

13. **Cambodia.** Mr. Heng Kunleang of the Energy Development Department, Ministry of Industry, Mines and Energy (MIME) gave an overview of Cambodia's power sector (demand and capacity), energy policy, institutional structure of the electricity sector, and the power sector strategy. He presented the country's generation and transmission development plans, detailing the projects, their location and financing sources. He noted the projects with power trade and provincial/ rural electrification elements.

14. **PRC.** Mr. Zhou Anshi of the Planning Department, CSG, provided the status of CSG in 2007 (provincial coverage, generation mix and capacity, consumption, transmission capacity, and power exchange between regions). He explained the basis of power grid planning and detailed the various international cooperation projects with neighboring countries (Viet Nam, Lao PDR, Cambodia, Thailand, and Myanmar).

15. **Lao PDR.** Mr. Chansaveng Buongnong of the DOE-MEM presented the status of power generation, national transmission network and demand forecast (2007-2020). He discussed the power development plan and the projects (i) under construction and (ii) in the advanced stage (both for export and domestic use). He listed the projects located on the Mekong mainstream subject to MOU. He detailed the projects that would involve cross border trading with Thailand and Viet Nam.

16. **Myanmar.** U Aung Myo Win of the Department of Electric Power, Ministry of Electric Power No. 2 (MOEP 2), explained the institutional changes in the sector and the resulting functions assigned to MOEP 1 and MOEP 2 under the reorganization. He detailed the existing hydropower projects and transmission facilities, as well as those under construction and to be implemented in the future. He discussed the location and power export objectives of projects with foreign investment components.

17. **Thailand.** Mr. Varavoot of the Electricity Generating Authority of Thailand (EGAT) updated on the status of EGAT's installed capacity and transmission system as of 2008. He discussed the progress of projects that would enable power purchase from neighboring countries (Lao PDR, Myanmar and Cambodia). He updated on the revised power demand projections, adjusted by lowering the starting point but retaining the same growth rate.

18. **Viet Nam.** Mr. Nguyen Anh Tuan of Electricity of Viet Nam (EVN) provided the progress of the country's power generation and transmission development plan. He showed the locations of the new power plants (coal-fired, and gas/ oil) and discussed the priority transmission interconnections that would allow hydropower imports from Lao PDR. He noted the promising interconnections with PRC, Cambodia and Lao PDR, and outlined the key issues involved in pursuing interconnection lines for power trading.

19. **Discussion.** Clarifications were requested and given on, among others, (i) the timing and capacities of Lao PDR's hydropower plants for export, and (ii) the planning considerations for development of generation plants in the northern, central and southern regions of Viet Nam.

Updates: PRC-Thailand Interconnection Via Lao PDR

20. In PRC's and Thailand's country presentations, the meeting noted that discussion on this line was suspended due to the gap between CSG's offer and the avoidable cost of EGAT. Thailand proposed a new alternative to narrow the price gap, in that the CSG could look into the possibility of implementing a special purpose power plant dedicated for power export to Thailand. This power plant should be non-fossil fuel based, i.e., a hydropower plant so that its production cost can be controllable and not vary with world fuel prices. Mr. Zhai said however that with current high fuel prices, it could be useful to take another look at the effect of fuel cost on the avoided cost of EGAT. Mr. Gulati (WB) said that the project should have correct fundamentals for it to proceed, and suggested virtual separation of the project (in terms of transmission cost and generation charges), which could be the basis for contractual negotiations between PRC and Thailand.

Proposed GMS Interconnection Projects for Possible ADB Support

21. Mr. Xavier Humbert, Senior Energy Specialist, SEID, ADB, briefly described the three interconnection projects that would have possible ADB involvement: (i) Na Bon-Udon Thani, (ii) Ban Sok-Pleiku, and (iii) Ban Sok-Stun Treng-Tay Ninh, with the latter arising from a power system master plan analysis of Lao-Viet Nam interconnection possibilities. He noted the issues to be looked at in pursuing GMS interconnections for power trade, namely, on contractual agreements, investment cost sharing, stakeholders, technical issues in design and during operation/ maintenance, and benefit sharing. He discussed in detail the three approaches for ownership of cross border transmission facilities, and the four approaches for operation of transmission facilities. Lastly he discussed the issues to be looked at with the view to interconnecting 2-3 major grids (Thailand-Viet Nam and PRC through Cambodia and Lao PDR).

22. **Discussions.** Mr. Humbert stressed the important role of governments in deciding on the ownership, operation and maintenance arrangements for the cross border transmission lines for power trade. Mr. Patino noted the similarity of the model presented by Mr. Humbert with the current system in South America. Mr. Gulati raised an issue concerning the cost recovery of a transmission line which may be fully utilized only much later, when additional plants that would use the said line, are rendered operational.

Update on JBIC Assistance to Regional Power Trade Development

23. Mr. Hideyuki Satsuma, Representative, JBIC Bangkok Office, discussed the two pillars of JBIC's functions and presented JBIC's recent operational results and project pipelines in Thailand, Lao PDR and Cambodia. He explained the lending scheme of JBIC in general comprising the overseas investment loan (OIL) and buyer's credit. He presented JBIC's

activities for capacity building and gave an overview of its organizational restructuring and how this will affect JBIC operations.

24. Mr. Satsuma clarified that JBIC focuses on support to generation projects sponsored by Japanese companies. In response to Thailand's query, Mr. Satsuma mentioned that JBIC has a subsidiary that is tasked with purchase of carbon credits and other clean development mechanism (CDM)-type initiatives.

Regional Power Development Master Plan and Relation to Country Power Development Programs

25. Soluziona (Mr. Patino) provided a recap of the master plan activities, and explained the master plan methodology and its two main qualities, i.e., ability to state appropriate scenarios and having a powerful optimization model. He gave the model's basic assumptions, based on the GMS model, national master plans, standardized candidates and transmission expansion alternatives. He presented the selected transmission expansion projects and showed their robustness based on sensitivity analysis of discount rate, area protection criteria, demand growth, energy price, and CO2 emissions. He explained the additional sensitivity analysis of the case without new cross border expansion. He then discussed the recommendations on the results of least cost expansion analysis, and the achievements and uses of the master plan exercise. He outlined the future improvements that may be made in terms of GMS power master planning.

26. **Discussions.** ADB (Mr. Zhai) requested the consultant to confirm if the five priority transmission lines presented earlier are consistent with the results of the model simulation. The participants raised concerns on the improbability of some of the model results over the longer term, given their inconsistency with the power development plans (PDPs) of some GMS countries. An example was raised by Viet Nam (Mr. Tuan) on the unlikely event of Viet Nam exporting power by 2015. Soluziona would take a closer look at some of the model assumptions and make sure the results are consistent with the PDPs. ADB said the participants' comments should provide the opportunity to review the model assumptions, calibrate its results, and examine the model's relevance and applicability.

Closing Session

27. **Summary of Agreements.** ADB presented a summary of the meeting highlights as follows:

- (i) Chairmanship: Lao PDR was elected chair of PWG/ FG for a two-year term following the system of alphabetical rotation and given its active involvement in priority RPTCC activities.
- (ii) Performance Standards and Transmission Regulation: Employ more systematic consultation processes, such as creation of the TWG or organizing a workshop, to help define study approaches and in addressing key study issues.
- (iii) Training: PWG members to be consulted on priority focus of additional training; SIDA TA and AFD could be tapped to support additional training.
- (iv) Database: Website ready for launching, and to be operated on the principle of GMS country ownership, with flexibility during operations; stressed importance of handbook detailing functions of administrators and users.

- (v) Country reports: Provided useful updates on generation and transmission projects that could be useful inputs in the master planning exercise.
- (vi) Master Plan: Extensive comments given by the participants would provide the basis for the review of the master plan model's assumptions, calibrate its results, and examine the model's relevance and applicability

28. **Consideration and Adoption of Proceedings.** Mr. Zhai announced the distribution of the draft summary of proceedings for review by the participants. After the PWG members reviewed the draft summary of proceedings, and after incorporation of suggested changes, the body therefore approved the minutes of the PWG-6 meeting *ad referendum*.

29. **Summary and Closing Remarks.** Mr. Zhai thanked the participants and appreciated the participants' contributions during the extensive discussions that took place.

Draft as of 9 June 2008



**Greater Mekong Subregion
Regional Power Trade Coordination Committee (RPTCC)
Fifth Meeting of the Planning Working Group (PWG-5)
Vientiane, Lao PDR, 17 June 20087**

Agenda and Program

- 16 June (Mon)** Arrival of Delegates
- 17 June (Tue)** **Day 1: PWG-5 Meeting**
- 08:30am- 08:45am Registration
- 08:45am- 09:00am Opening Session
- 09:00am- 09:15am Election of New Chair for PWG and FG/Discussion on Rotation
System for Chairmanship and Hosting Meetings/ Tenure of Chair
- ADB
- 09:15am- 10:00am Status Report and Proposed Next Steps of Studies on Performance
Standards and Transmission Regulation
- ADB
- Open discussions
- Discussion on Implementation Arrangements and Defined/Detailed
Structure for Training Program Implementation, Agreements
- Soluziona, ADB
- Open Discussions
- 10:00am- 10:15am Coffee Break
- 10:15am- 10:45am Regional Power Database/Website: Launching, Appointment of Focal
Point for Each Country
- Soluziona/ ADB
- Confirmation/Agreement on Maintenance of Database/ Proposed Next
Steps
- Soluziona/ ADB
- Open Discussions
- 10:45am- 11:45nn Country Reports on Progress of Power Development Plans and
Transmission Interconnection Projects (10 minutes each country)
- Cambodia
People's Republic of China
Lao PDR
Myanmar
Thailand
Viet Nam

- 11:45am- 12:00nn Updates on PRC-Thailand Interconnection Via Lao PDR
- 12:00nn- 01:30pm Lunch Break
- 01:30pm- 02:00pm Proposed GMS Interconnection Projects for Possible ADB Support
- Na Bon- Udon Thani Interconnection
 - Bansok- Pleiku Interconnection
 - Bansok- Stung Treng- Tay Ninh Interconnection
- Xavier Humbert, SEID, ADB
- 02:00pm- 02:30pm Discussions of Progress of Country PDPs
- ADB/PWG members
- 02:30pm- 03:30pm Priority Projects Identified in the Master Plan Study: Implementation Plan in Relation to Country PDPs
- Soluziona/ADB
- Discussions
- 03:30pm- 03:45pm Coffee Break
- 03:45pm- 04:15pm Proposed Work Program per the Milestones for Power Trade Road Map Outlined in the “*MOU on the Road Map for Implementing Cross-Border Power Trading*” (Signed at the Third GMS Summit)
- Presentation of Matrix of Power Trade Milestones and Discussions on Activities that can be covered by ongoing technical assistance
 - ADB
- Updating of the GMS Map on Cross Border Interconnections for Power Trading
- ADB
- Discussions
- 04:15pm- 04:30pm Update on JBIC Assistance to Regional Power Trade Development
- JBIC
- 04:30pm- 04:45pm Presentation of Summary of Recommendations on Revised Activities and Timelines for Priority PWG Studies and Activities
- Soluziona
- 04:45pm- 05:00pm Consideration and Adoption of Proceedings
- 05:00pm- 05:10pm Closing Remarks
- 7:00 pm Dinner Hosted by ADB
(Venue to be announced)



**Greater Mekong Subregion
Regional Power Trade Coordination Committee (RPTCC)
Sixth Meeting of the Focal Group (FG-6)
Lao PDR, 18 June 2008**

Agenda and Program

18 Jun (Wed)

Day 2: FG-6 Meeting

- 08:45am – 09:00am Registration
- 09:00am-09:30am Opening Session
- 09:00am – 09:30am Additional Issues/ Suggestions Regarding PWG Agreements/
Recommendations on next steps for: (i) Study on Performance
Standards; (ii) Study on Transmission Regulation; (iii) Additional
Training Program/ Proposed Arrangements; (iv) Regional Power
Database/ Website Launch and Maintenance; (v) GMS Power Master
Plan in Relation to Country PDPs; (vi) Power Trade Road Map
Milestones
- Soluziona, ADB
- 09:30- 10:30am Presentation on Results of the Energy Sector Strategy Study
- Ms. Rita Nangia, ADB
- 10:30am- 10:45am Coffee Break
- 10:45am- 11:00am Update on RETA “Facilitating Regional Power Trading and
Environmentally Sustainable Development in the GMS” financed by
the Swedish International Development Cooperation Agency (SIDA)
- Duy Thanh Bui, SEID, ADB
- 11:00am- 11:45am Comments and Updates from Development Partners on Assistance for
the Development of GMS Power Trading
- Agence Francais de Developpement (AFD), SIDA, World Bank (WB)
- 11:45am- 12:15pm Closing Session
- Synthesis of Discussions/ Agreements in PWG and FG
- Chair of FG
- Consideration and Adoption of Proceedings
- Closing Remarks
- 12:15nn– 1:30pm **Lunch Break**
- 01:30pm– 04:30pm Technical Presentation by Industry Player (RTE France)

**Greater Mekong Subregion (GMS)
Fifth Planning Working Group (PWG-5) and Sixth Focal Group (FG-6) Meetings
of the Regional Power Trade Coordination Committee (RPTCC)
17–18 June 2008
Green Park Boutique Hotel, Vientiane, Lao PDR**

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Training Program Implementation Arrangements & Structure

Vientiane, June 2008

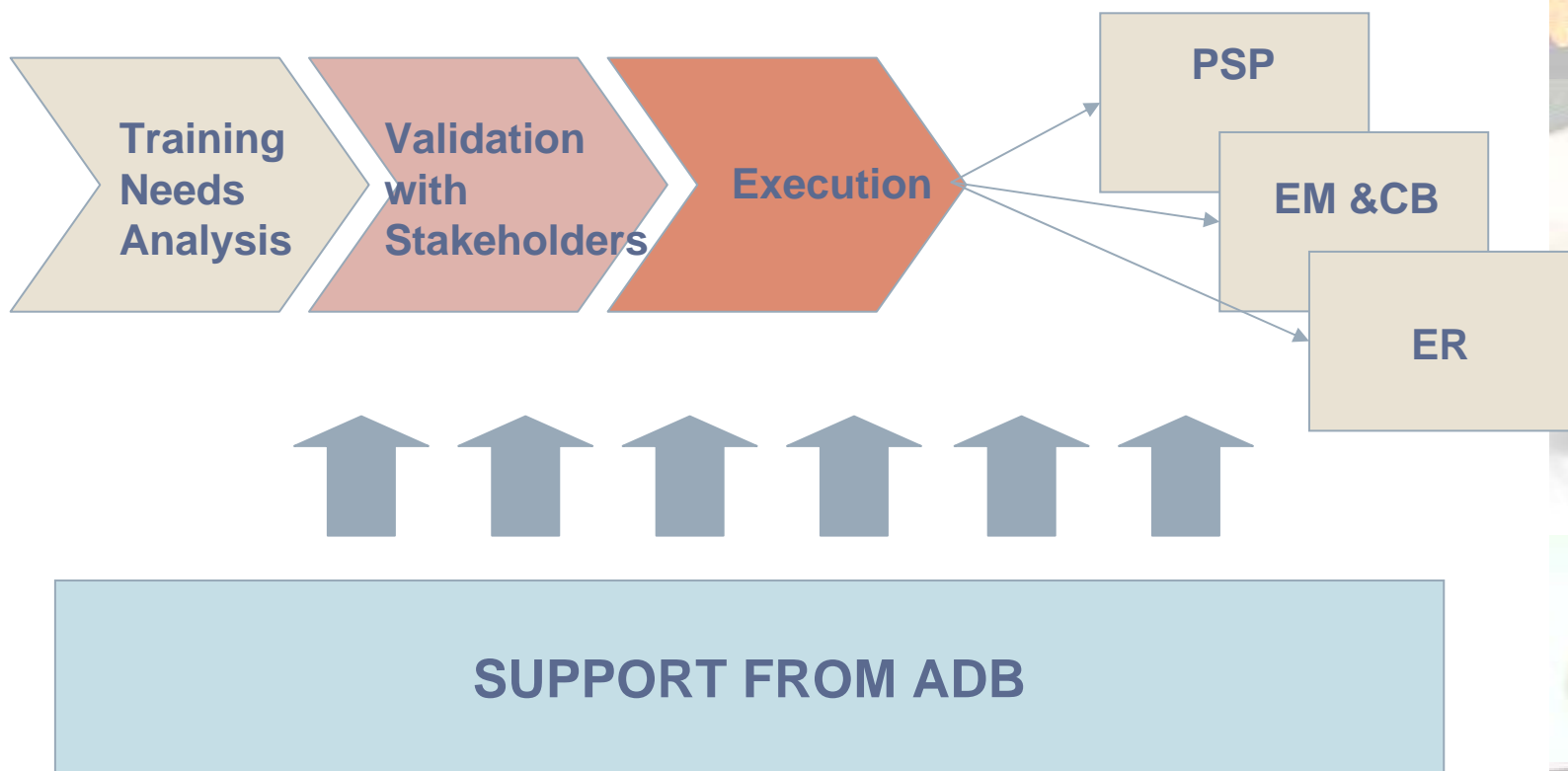


Training Program Implementation

- Implementation Arrangements
- Suggested/Requested training courses
- Training program implementation for future courses (for discussion)



Implementation Arrangements



Suggested/Requested Training Courses

1. National and Regional Grid Code
 - Performance Standards
 - Systems Support (ex. network management, simulation tools, meter reading mgmt, etc.)
2. Tariff Mechanism for Cross Border Trading
3. Organizational Structure, Duties & Responsibilities of Regulator, System Operator, TSO and Market Operator
4. Other suggestions?

For discussion

- Estimate per training course: 3-5 days, 2-4 participants per country
- Remaining resources to be used for Performance Standards study validation/presentation workshop



Greater Mekong Subregion (GMS)

Fifth Meeting of the Planning Working Group
(*PWG-5*)

Cambodian Power Development Plans

Ministry of Industry, Mines and Energy
Electricité du Cambodge

Vientiane, Lao PDR, 17 June, 2008

Overview of Power Sector

- Cambodia's power sector was rehabilitated since 1995
- EDC's Capacity output in 2007 : 194.8 MW and 1071 GWh
- Projection in 2024 : 3045.33 MW and 16244.61 GWh
- At present, only 18% of households has access to electricity (54% of Urban HH and 13% of Rural HH)
- Annual energy consumption per capita: 55 kWh
- 22 small isolated power system
- High potential of hydro source : more than 10,000 MW

Energy Policy

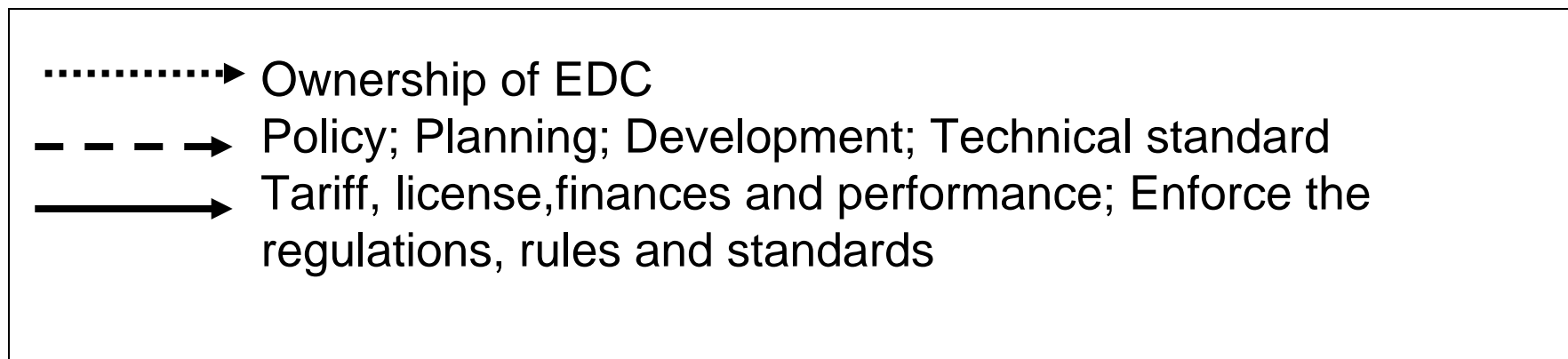
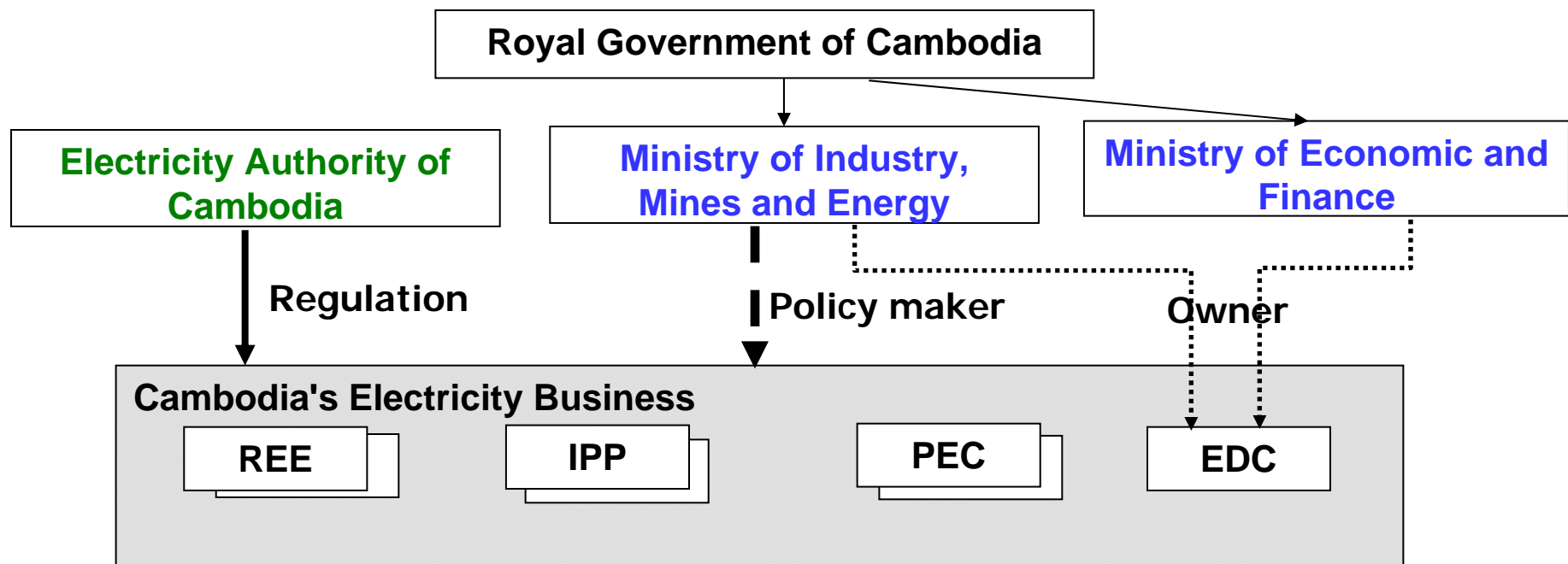
To provide an adequate supply of energy throughout Cambodia at reasonable and affordable price,

To ensure a reliable and secured electricity supply at reasonable prices, which facilitates the investments in Cambodia and developments of the national economy,

To encourage exploration and 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 effects resulted from energy supply and consumption.

Current Structure of Electricity Sector



Cambodia Power Sector Strategy

Cambodia Power Strategy Components:

- A- Development of Generation and Transmission
- B- Power trade with neighboring countries
- C- Provincial and Rural Electrification Program

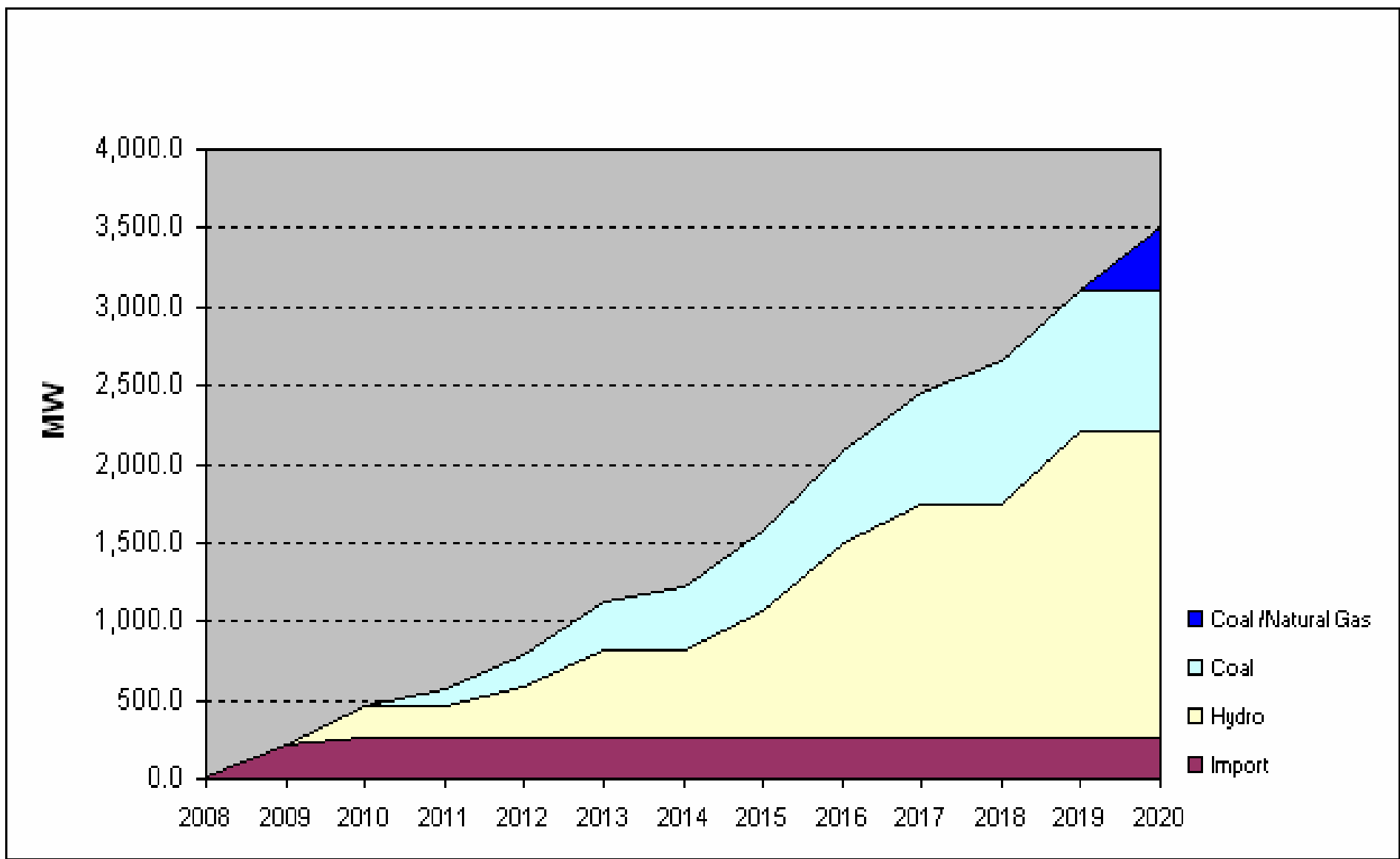
A-Development of Generation and Transmission

Generation

- 193 MW Kamchay Hydro-project BOT by Synohydro from China (2010)
- 200 MW Coal Power Plant, BOO project by Power Synergy Corporation in SHV (2011)
- 120 MW Atay Hydropower Plant, BOT by CYC from China (2012)
- 338 MW Lower Russei Chhrum Hydro Power Plant, BOT by Chinese Company (2013)
- 246 MW Tatay Hydro power plant (2013)
- 420 MW Lower Sesan II & Lower Srepok II Hydro power plant (2016)
- 260 MW Stung Chay Areng Hydro power plant (2017)
- 2600/450 MW Sambor Hydro power plant (2019)

No.	Generation Expansion Plan	Fuel	Power (MW)	Year Operation
1	Kirirom III Hydro power Plant	Hydro	18	2010
2	Kamchay Hydro Power Plant	Hydro	193	2010
3	200 MW Coal Power Plant (I) in Sihanouk Ville - Phase 1	Coal	100	2011
4	Atay Hydro Power Plant	Hydro	120	2012
5	200 MW Coal Power Plant (I) in Sihanouk Ville - Phase 2	Coal	100	2012
6	700 MW Coal Power Plant (II) in Sihanouk Ville -Phase 1	Coal	100	2013
7	Lower Stung Rusey Chhrum Hydro Power Plant	Hydro	235	2013
8	Tatay Hydro Power Plant	Hydro	246	2013
9	700 MW Coal Power Plant (II) in Sihanouk Ville -Phase 2	Coal	100	2014
10	700 MW Coal Power Plant (II) in Sihanouk Ville -Phase 3	Coal	100	2015
11	700 MW Coal Power Plant (II) in Sihanouk Ville -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) in Sihanouk Ville -Phase 5	Coal	100	2017
15	700 MW Coal Power Plant (II) in Sihanouk Ville -Phase 6	Coal	200	2018
16	Sombor Hydro Power Plant	Hydro	2600/450	2019
17	Coal Power Plant (III) or Gas Power Plant	Coal/Natural Gas	400	2020
Total			3,242	

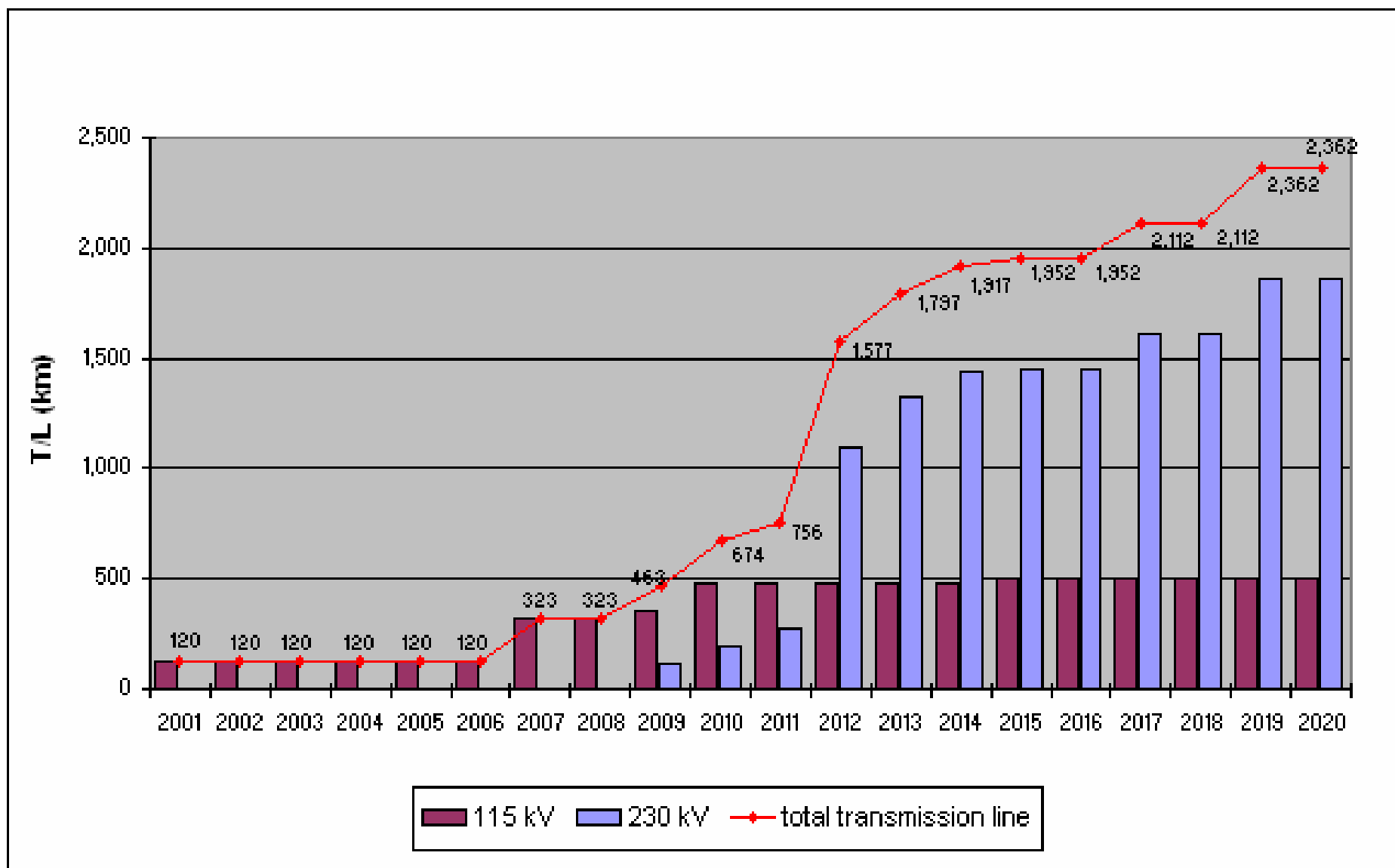
Generation Expansion Plan (2008 – 2020)



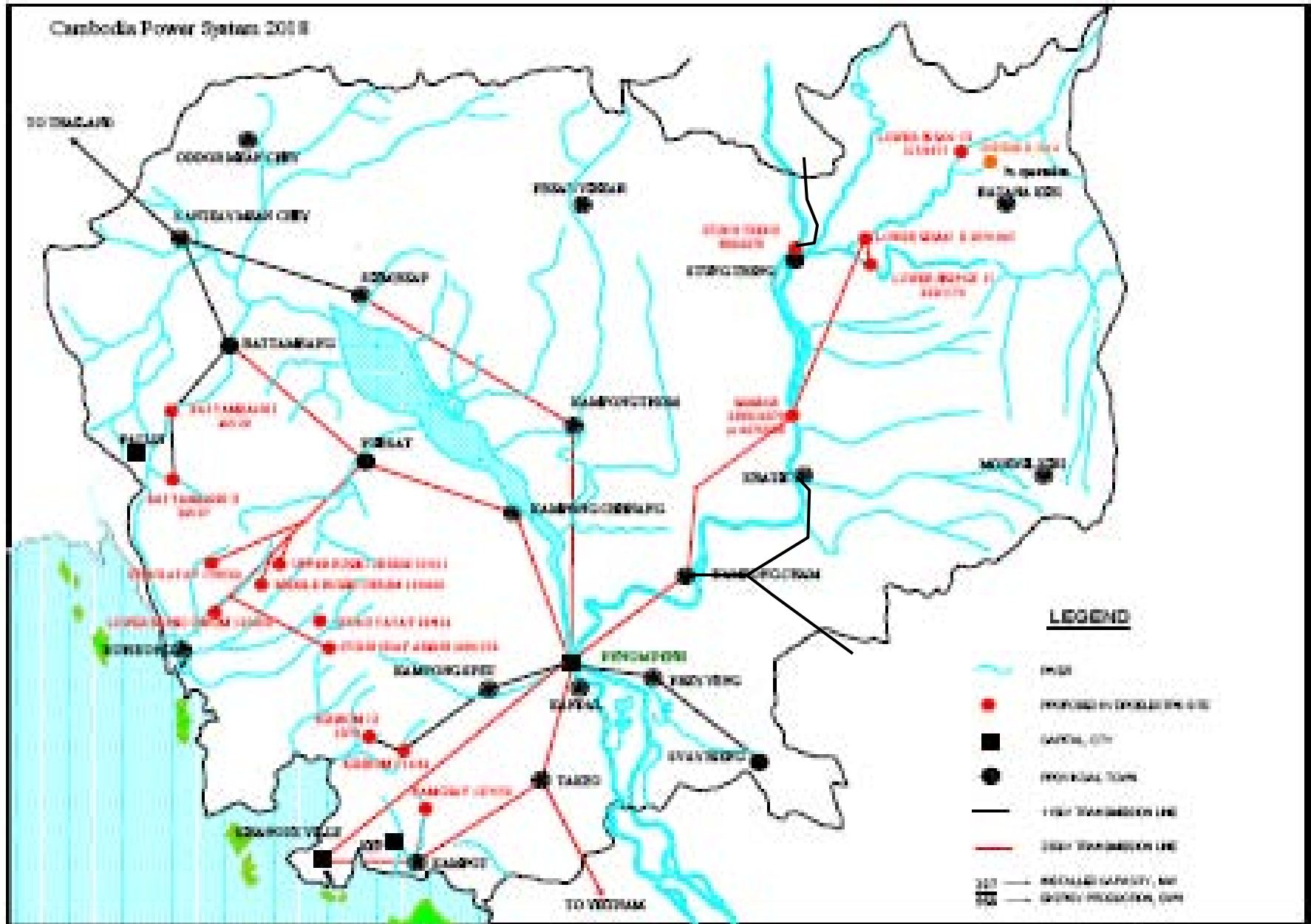
Transmission

- 115 kV BOT interconnecting with Thailand to supply Banteay Meanchey, Siem Reap and Battambang
- 115 kV Vietnam (Tai Ninh) - Kampong Cham, WB (2009)
- 115 kV Lao (Ban Hat) - Stung Treng, WB (2009)
- 230 kV Phnom Penh - Kampong Cham, WB (2009)
- 230 kV Phnom Penh Battambang via Kompong Chhnang-Pursat, BOT(2012)
- 220 kV Phnom Penh Viet Nam via Takeo ,ADB+NDF (2008)
- 230 kV Takeo – Kampot, KfW (2009)
- 230 kV Kampot – Sihanoukville , ADB+JBIC (2010)

Transmission Expansion Plan (2001 – 2020)



Cambodia Transmission 2018



B-Power Trade

- Import from Vietnam at High voltage 220 kV with capacity of 200 MW by 2009
- Import from Thailand at 115 kV starting 2007 to serve northern grid up to 80 MW
- Import from Vietnam to Kampong Cham Province at high voltage 115 kV with capacity of 20 MW by 2009
- Import from Lao to Stung Treng Province at 115 kV with capacity until 20 MW by 2009
- 5 Cross border MV links from Vietnam and 8 from Thailand at 22 kV to serve Cambodian communities close to the border.

C-Provincial and Rural Electrification

- Completion rehabilitation of 8 provincial towns supported by ADB (\$18.6 mil.) and AFD (€3.75 mil.),
- Grid extension & Rural Elect. Program: WB SDR27.9 mil., GEF \$5.75 mil.
- Renewable energy master plan study and 3 micro hydro development by JICA
- Rural Electrification target:
 - 100% of villages has access to electricity services by 2020
 - 70% of rural population has access to quality electricity services by 2030
- Rural Electrification Fund to subsidize part of rural electricity project investment



End of Presentation



Thank you for your attention.





Update For CSG Power Grid Planning & International Cooperation Projects

China Southern Power Grid Co., LTD

June, 2008

Contents :

- ✓ **Status of CSG in 2007**
- ✓ **Power Grid Planning**
- ✓ **International Cooperation Projects**

Status of CSG in 2007

CSG : Status in 2007



Area :
1,000,000km²

GDP 4.5 Trillion Yuan
RMB 17.6% of China

Population :
236 Million
17.8% of China

CSG : Status in 2007

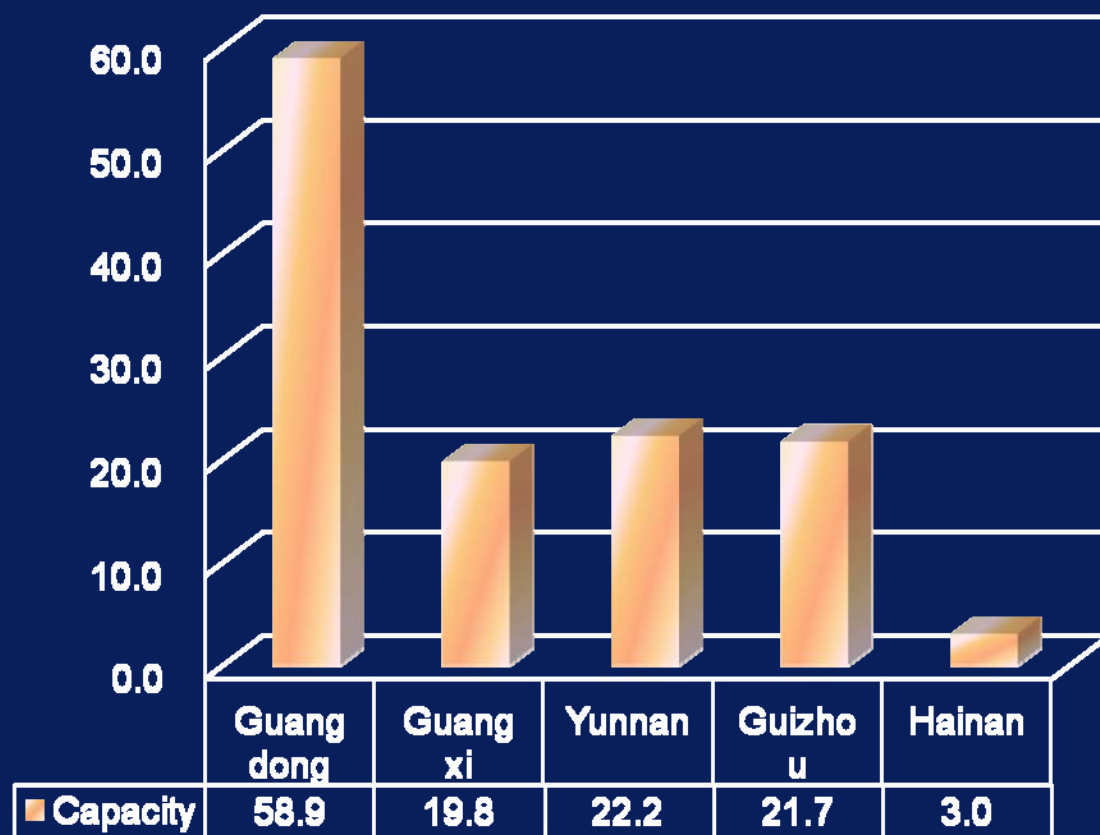
Total Capacity: 128GW ▲ 16.7%

Hydro : 38.6GW

Thermal: 83.0GW

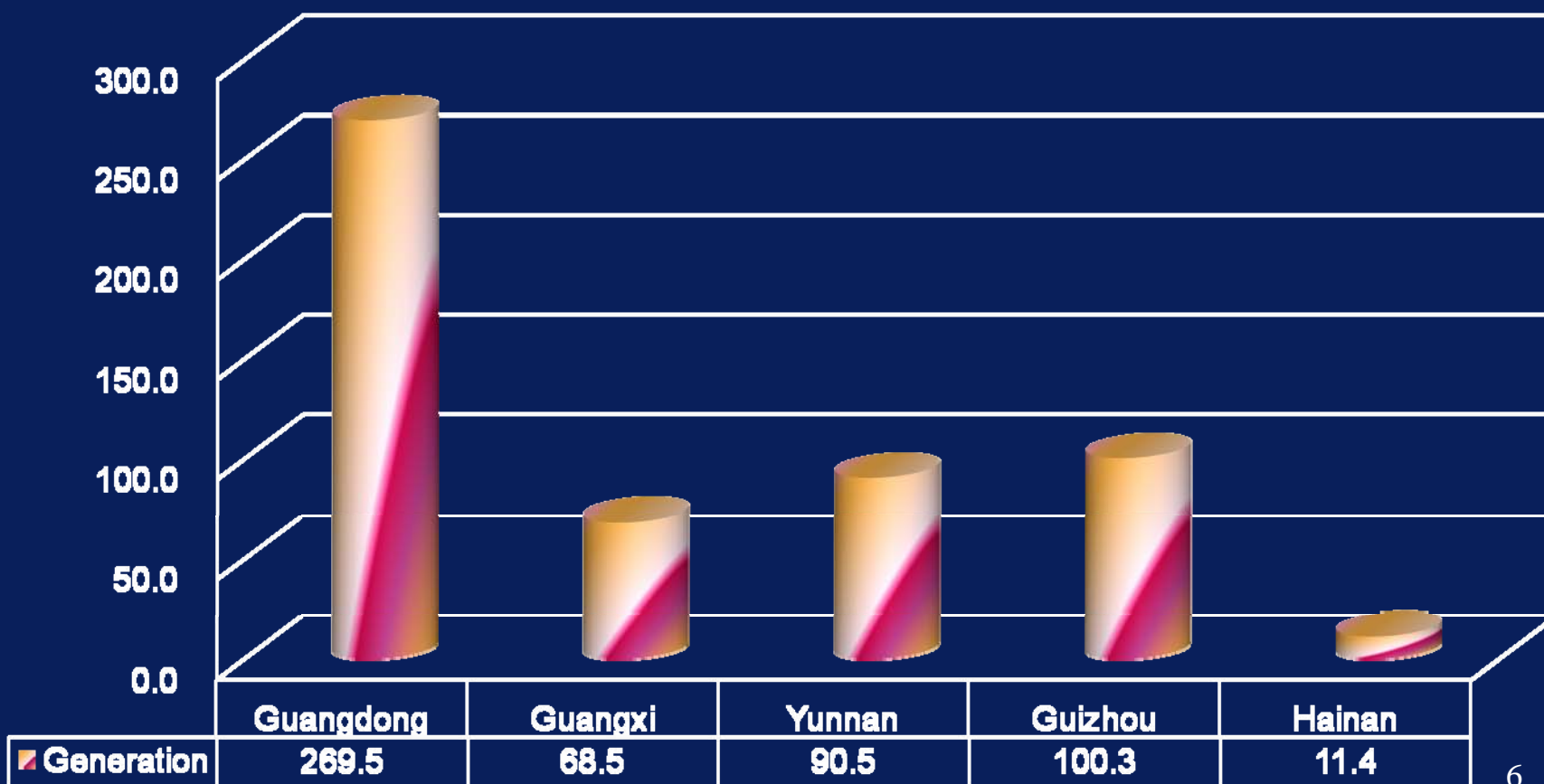
Nuclear: 3.78GW

Renewables : 0.30GW



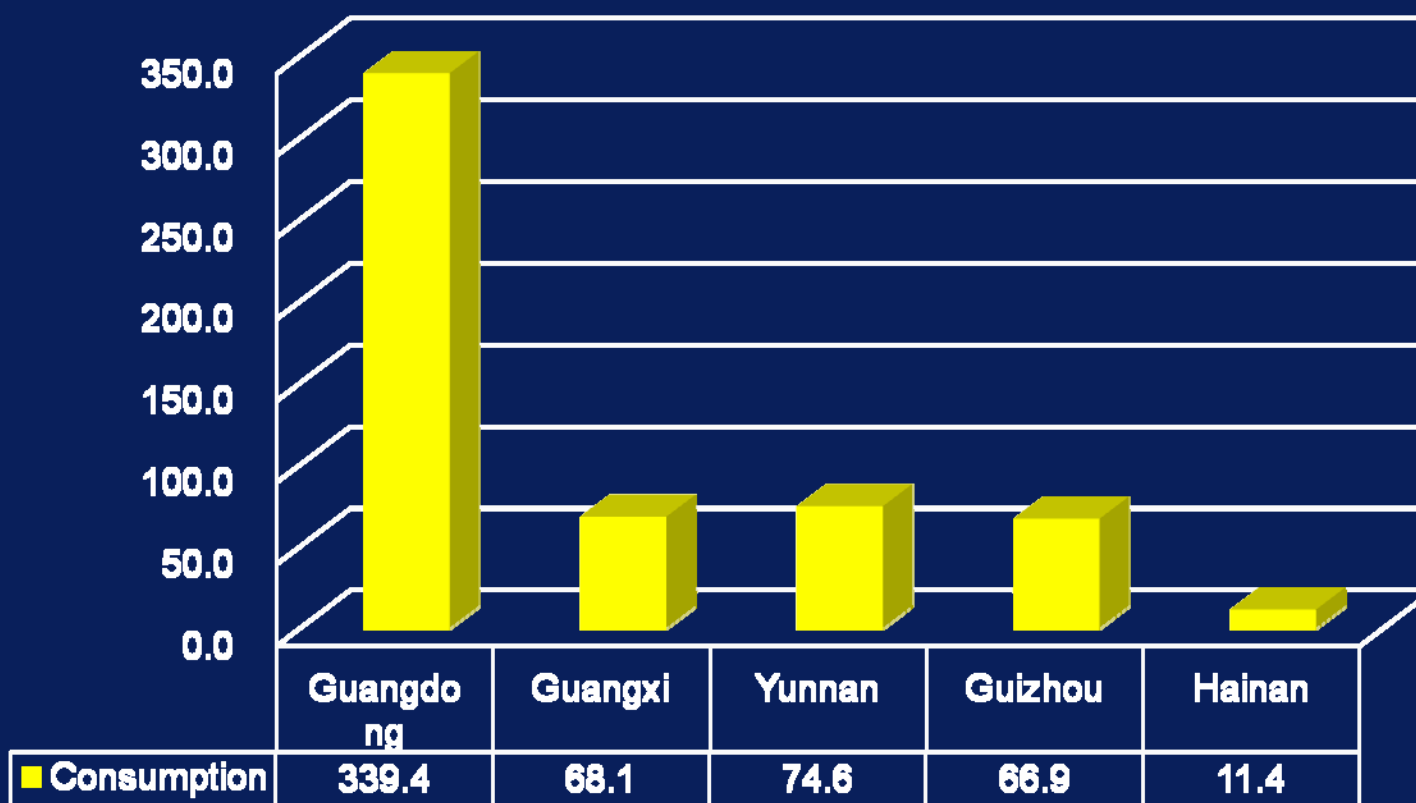
CSG : Status in 2007

Generation: **553 TWh** ▲ **14.6%**



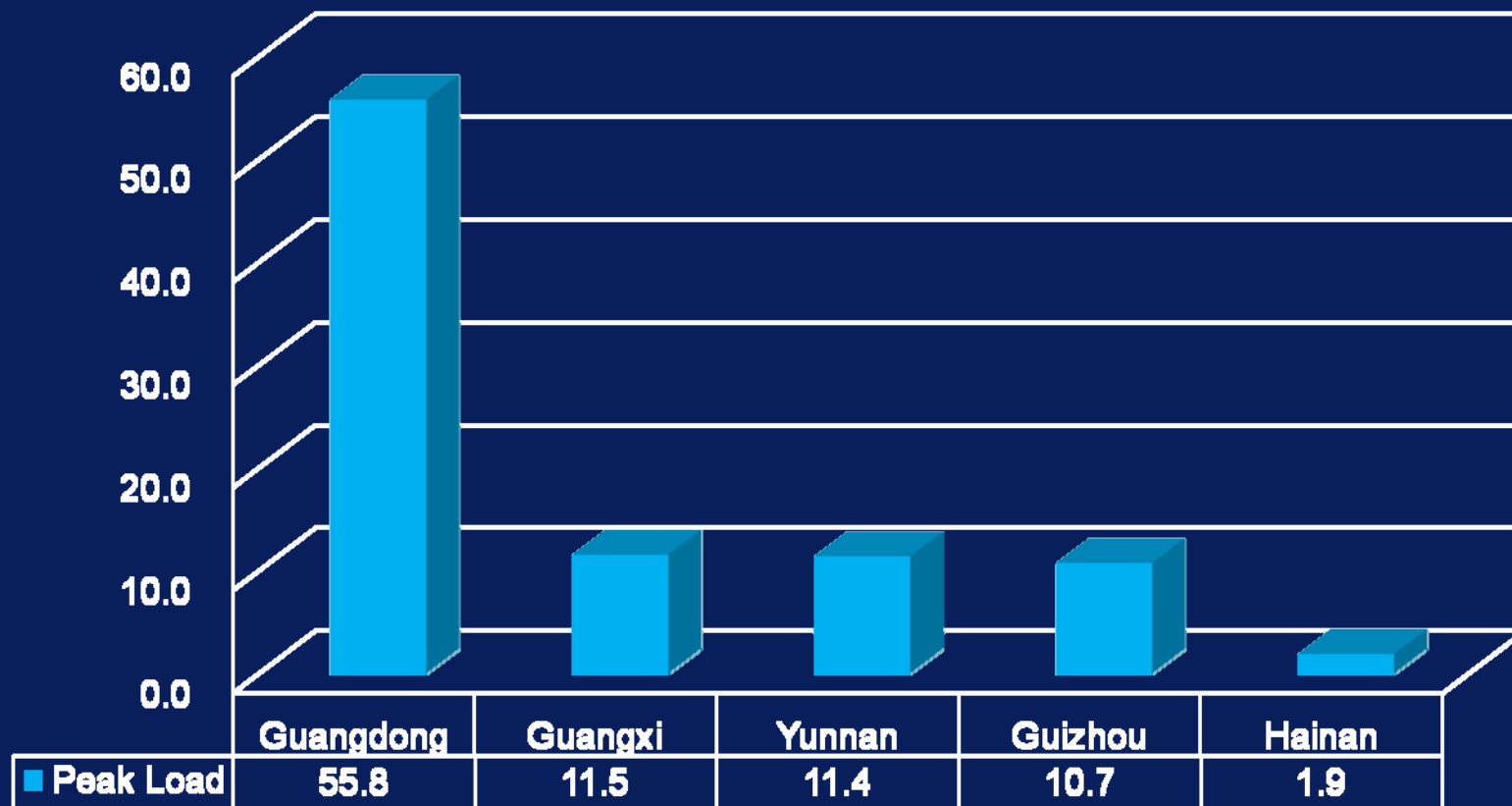
CSG : Status in 2007

Consumption: **564TWh** ▲ **14.3%**



CSG : Status in 2007

Peak Load: **87GW** ▲ 10.5%



CSG : Status in 2007

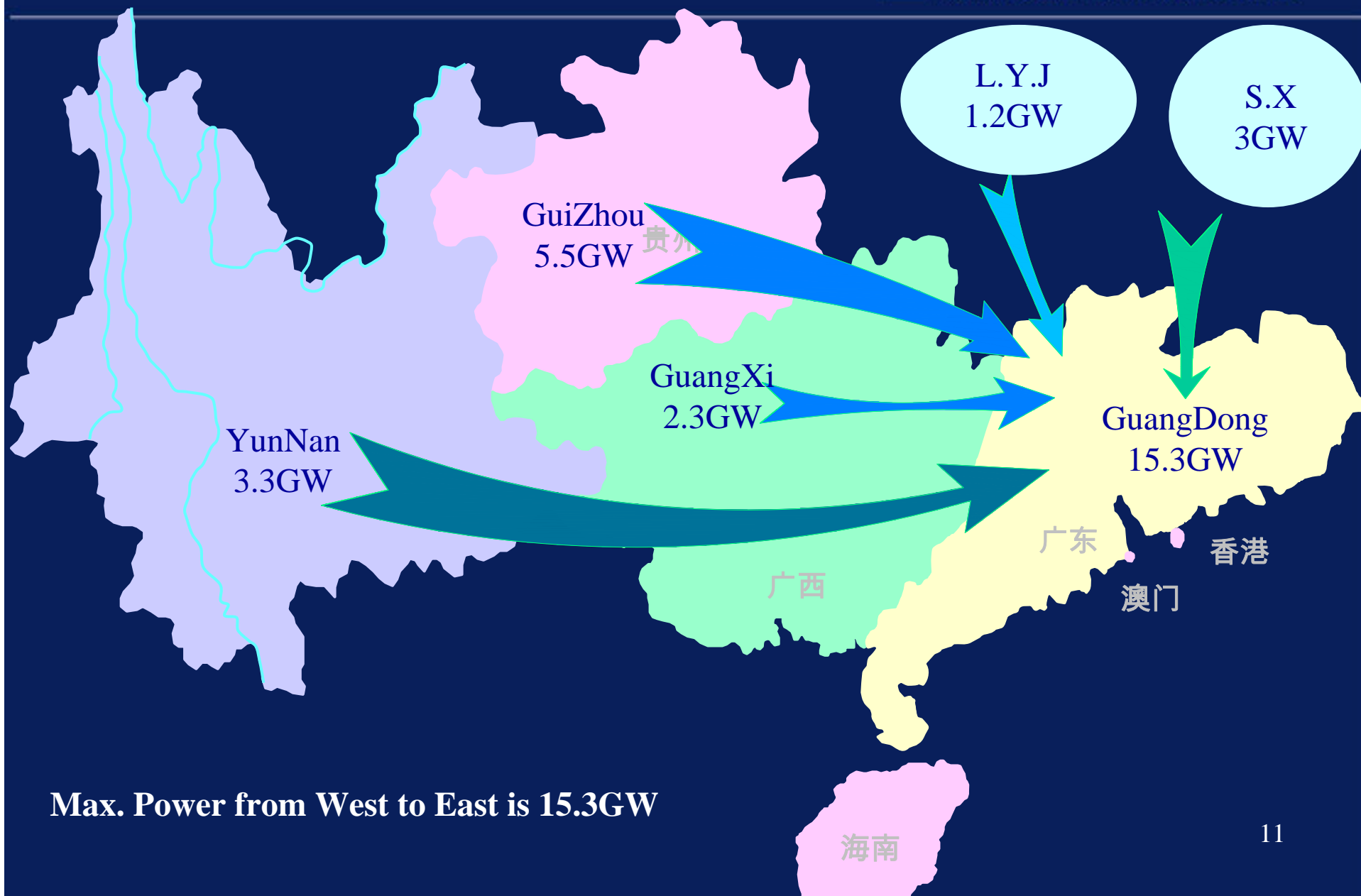
Capacity of 500kV Transformers	83 GVA
Capacity of 220kV Transformers	135 GVA
Capacity of HVDC	18 GW

CSG : Status in 2007

Length of 500kV Transmission Lines 22,000 km

Length of 220kV Transmission Lines 38,000 km

Length of HVDC Transmission Line 3,000 km



Max. Power from West to East is 15.3GW

CSG : Status in 2007

Power exchange between regions

Hongkong	4.04TWh
Macau	1.69TWh
Chongqing	3.97TWh
Hunan	4.30TWh
Vietnam	2.83TWh

Power Grid Planning



Demand Forecast from 2006 to 2010

- ✓ **GDP** Increase rate **9% ~ 10%/per year**
- ✓ **Consumption** **682TWh in 2010** Increase rate **9.4%/pear year**
- ✓ **Peak load** **114GW in 2010** Increase rate **10.4% /pear year**

	2000	2005	2010	2001-05	2006-10
Consumption (TWh)	230.2	434.7	681.5	13.4%	9.4%
Peak (GW)	37.89	69.59	114.03	12.9%	10.4%

Increased Capacity of Power (2006-2010)

Hydro 28,400MW

Thermal 49,900MW

Coal 42,200MW

Gas 7,700MW

Nuclear 1,000MW

Total 79,300MW

Turn off 6,100MW

Net Increase 73,200MW

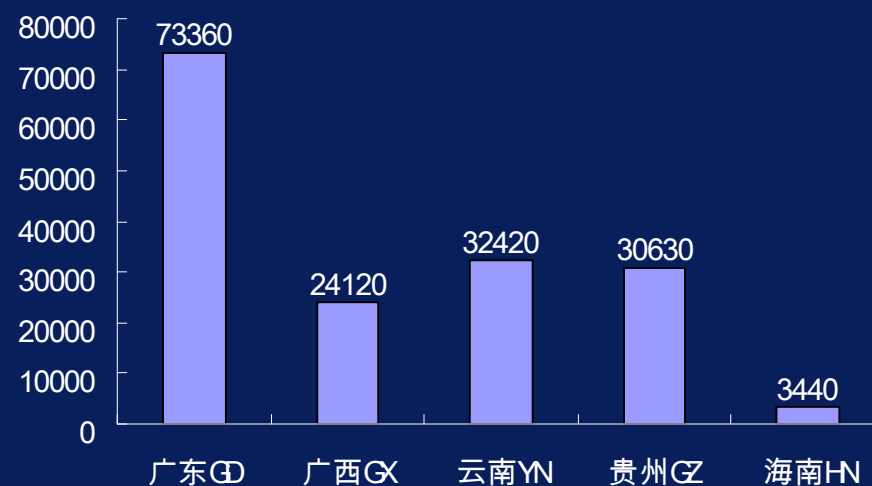
Capacity of Power in 2010

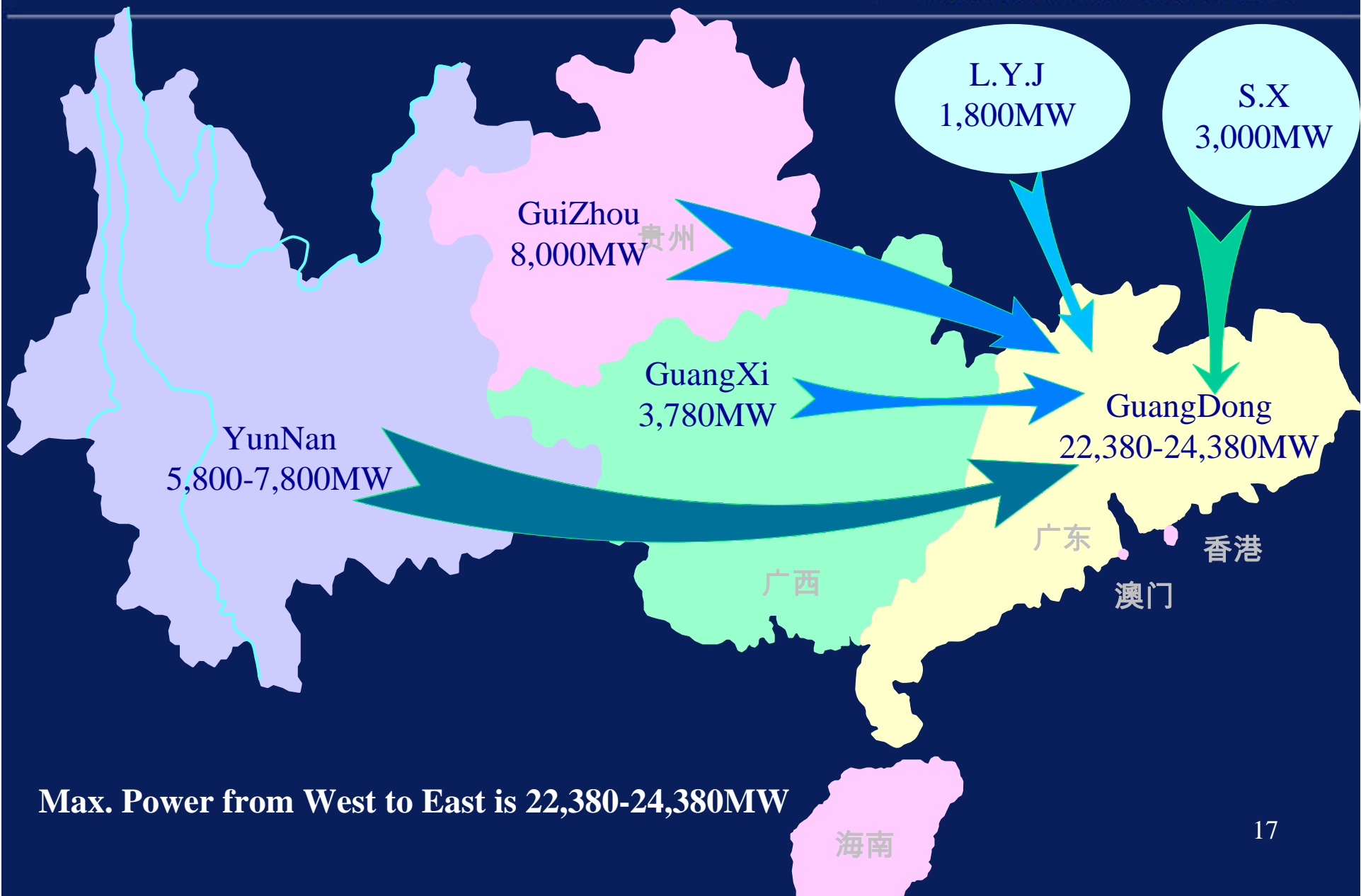
Total Capacity: 164,000 MW

Hydro : 59,390 MW

Thermal: 99,800 MW

Nuclear: 4,780 MW





Max. Power from West to East is 22,380-24,380MW

International Cooperation Projects

International Cooperation Projects

- ☆ **Sino-Vietnam Cooperation**
- ☆ **Sino-Laos Cooperation**
- ☆ **Sino-Cambodia Cooperation**
- ☆ **Sino-Thailand Cooperation**
- ☆ **Sino-Myanmar Cooperation**

Sino-Vietnam Cooperation

1. Power Supply to Vietnam

3 220kV + 4 110kV lines

Total by the end of May 2008: 5.463 TWh

2. 500kV Interconnection Project

Feasibility Study is under progression

3. Vinh Tan 1 BOT Coal-fired Power Plant Project (2×600MW)

Under negotiation

Sino-Laos Cooperation

- 1. Laos' Master Plan on Electric Power Industry**
Finished by the end of 2007 and submitted to Laos on Jan.16, 2008.
- 2. Nam Tha 1 Hydro-Electric Power Project (3×56MW)**
Under Negotiation
- 3. Nam Ou Hydropower Station Project (about 1000MW)**
Initiated by Sinohydro Corporation
- 4. Northern Grid Construction Project**
Under negotiation with YNPG

Sino-Cambodia Cooperation

1. Sambor Hydro-Electric Power Project (2600MW)

Finished the Scheme Research.

Sino-Thailand Cooperation

1. China-Laos-Thailand 500kV Transmission Project

Suspended due to the different views on tariff.

Sino-Myanmar Cooperation

- 1. Master Plan for Hydropower Project in Myanmar**
Finished on June, 2007 and submitted to Myanmar on Aug. 6, 2007.
- 2. Ta Sang Hydro-Electric Power Plant Project (10×711MW)**
Signed Frame Agreement to develop in Thalwan River
- 3. Development of the Myanmar Northern Hydropower Projects**
Initiated by China Power Investment Corporation

Thank You !

LAO PDR

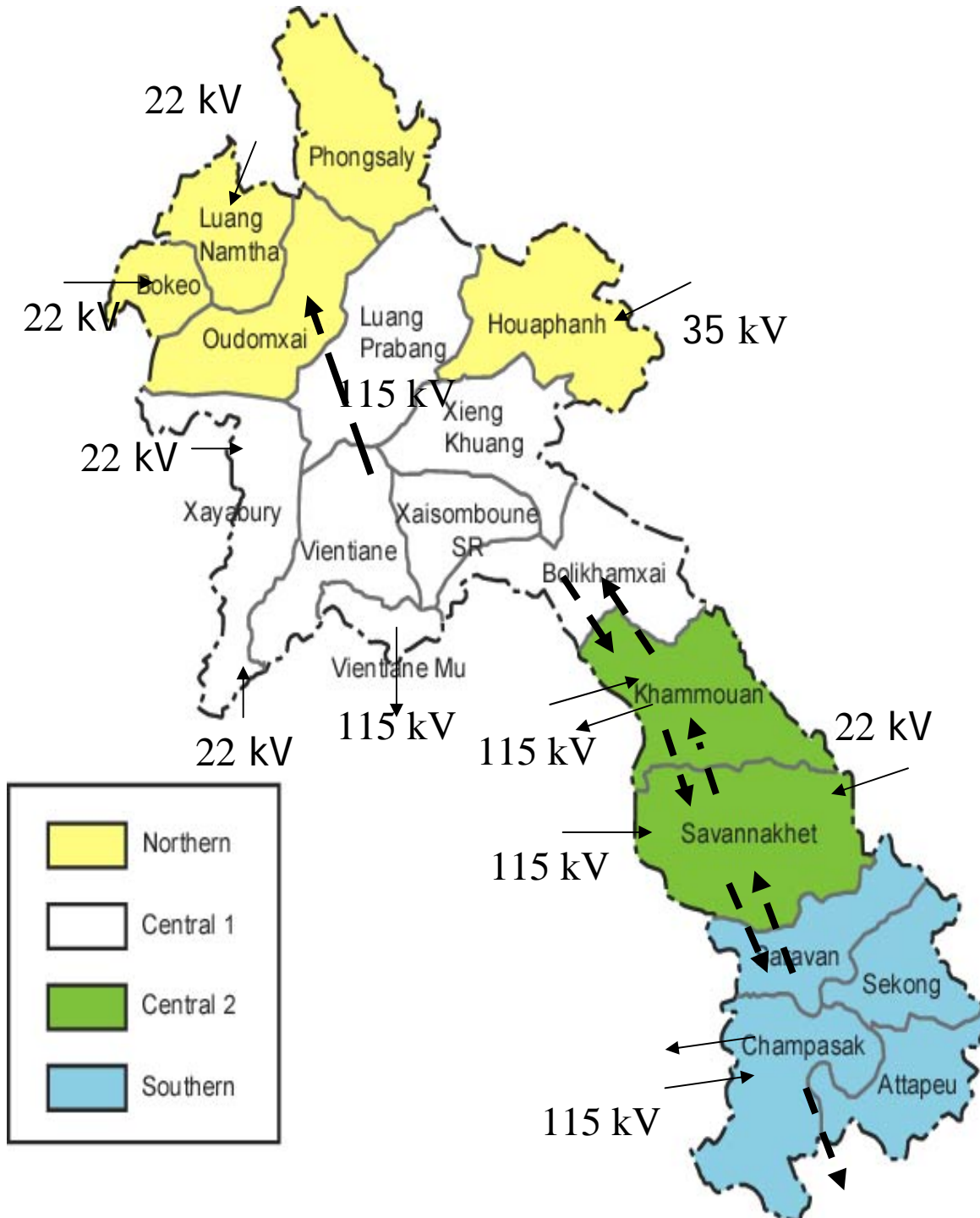
PWG - 5
and FG – 6

Vientiane, 17-18 June 2008

Contents

- 1. Present Status
- 2. Electricity Demand and Energy Requirement
- 3. Power Development Plan
- 4. Transmission System Network
- 5. Cross border Trading





Present Status

**Household
Electrification 52%**

**-4 Areas are not yet
interconnected**

**-Central 1 & Northern
area will be connected
2009**

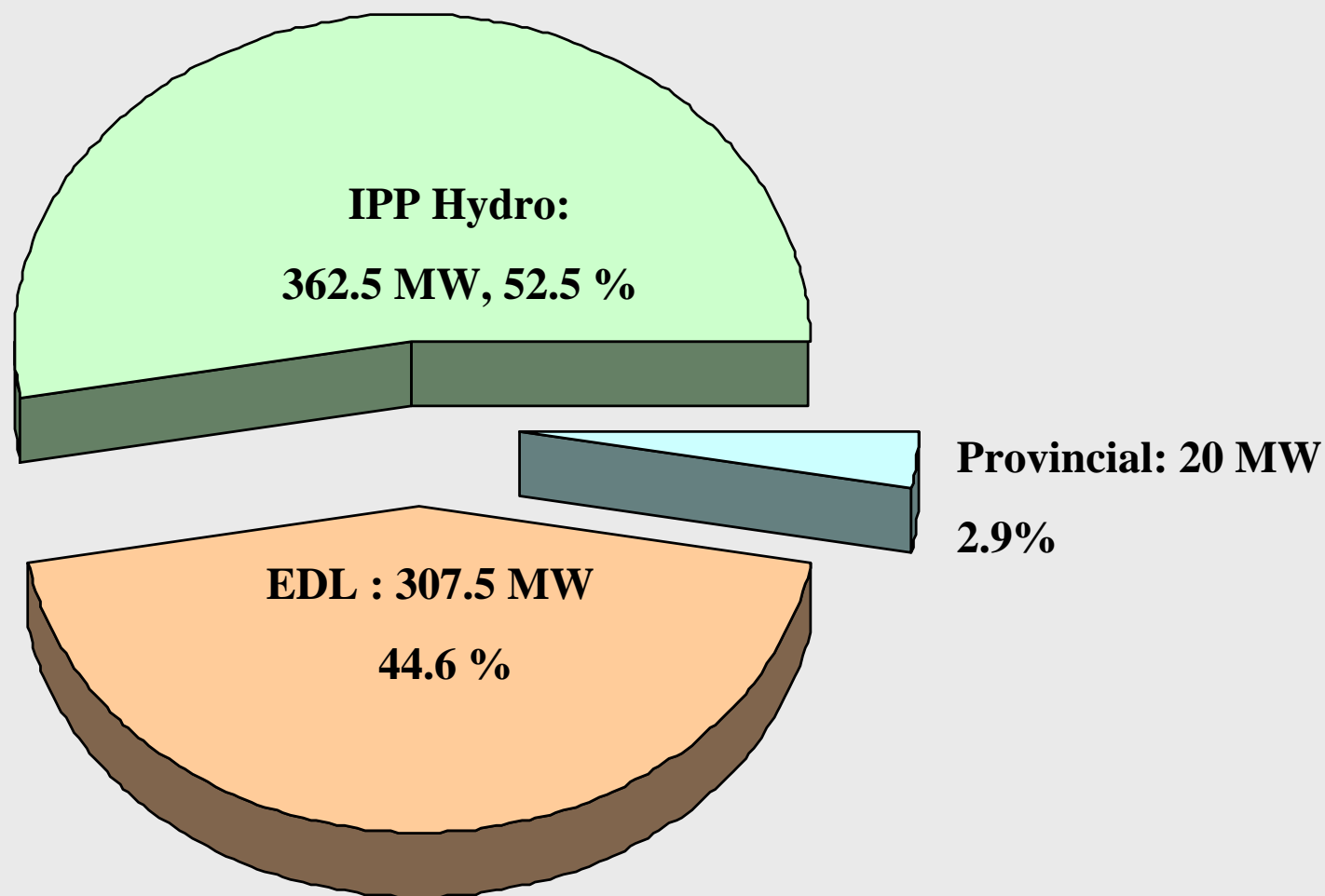
**-Central 1 & Central 2
will be connected 2010**

**-Central 2 & Southern
area will connect 2012**

POWER GENERATION

- **Installed Capacity:** By the end of year 2007,
- the total installed capacity is 690 MW, of which hydropower is 97.5% and 2.5% is diesel-fired and solar power.
- Installed capacity for domestic supply is 328MW.
- Installed capacity (IPP) for export is 360MW.
- Existing power plants mainly locate in Central region(69%) and Southern region(29%).

Installed Capacity-2007



Demand Forecast

	2007	2010	2015	2020
Energy Demand, GWh	1711.4	3034	6358	7770
System losses, Gwh	365	458	651	778
%	18%	13%	9%	9%
Energy demand (incl. system losses, GWh)	2076	3493	7009	8549
Peak load, MW	415.6	648	1216	1476

Power Development Plan

Project under Construction

- Export to Thailand:
 - Nam Theun2 1088MW, comp. end 2009
 - Nam Ngum2 615 MW, comp. end 2010
- Export to Vietnam:
 - Xe kaman3 250 MW, comp. 2009
 - Xe Kaman1 290 MW, comp. 2011
- Domestic use:
 - Xe Set 2 76 MW, comp. 2009
 - Nam Lik1/2 100 MW, comp. 2010
 - Nam Ngum 5 120 MW, comp. 2011
 - Xe kaman-sanxay 32 MW, comp. 2011

Project in Advanced Stage

- Domestic use :
 - Nam Sim 8MW, com. 2011
 - Nam Ham2 5MW, com. 2012
 - Theun-Hinboun Exp.(NG8) 60MW, com. 2012
 - Nam Gnone 2.4MW, com. 2011
 - Xe Pon3 100MW, com. 2012
 - Off take from Hongsa 100MW, com. 2013
 - Nam Tha 1 158 MW, com. 2013
 - Nam Ou 2 90 MW, com. 2014

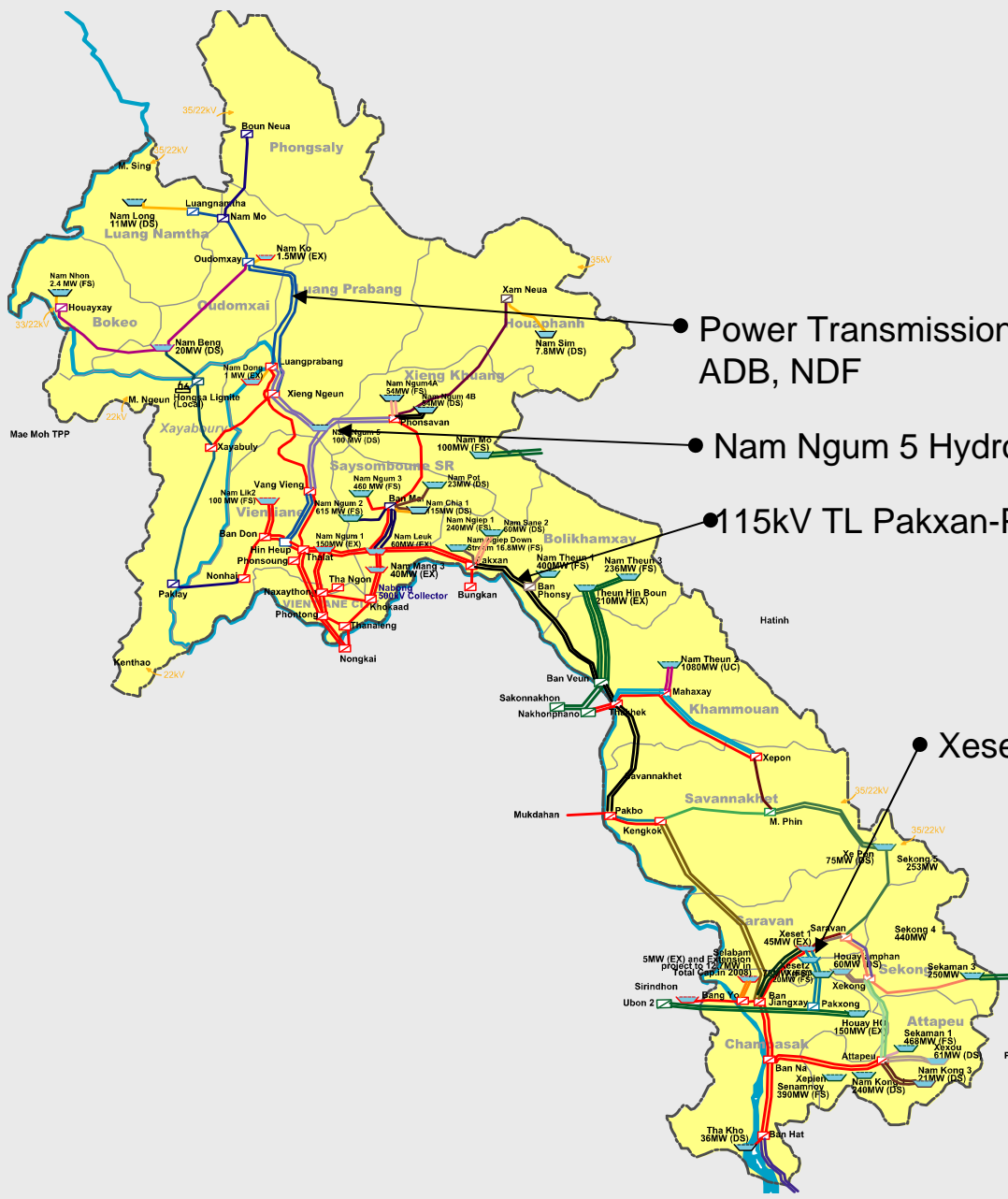
Project in Advanced Stage

- Export to Thailand:
 - Theun-Hinboun Exp. 210MW, com. 2012
 - Hongsa Coal-fire 1800MW, com. 2013
 - Nam Ngum3 460MW, com. 2014
 - Nam Theun1 523MW, com. 2014
 - Nam Ngiep1 260MW, com. 2015
 - Don sahong 360MW, com. 2013
 - Xepian- Xenamnoy 390MW, com. 2014
 - Nam Ou 1,3,4,5,6,7 1200 MW, com. 2013-2016

Projects in the Main stream under MOU

- Pak Beng 1320 MW, FS on going
- Luangprabang 1410 MW, FS on going
- Sayabury 1260 MW, FS on going
- Paklay 1320 MW, FS on going
- Sanakham 1000 MW, FS on going
- Ban Khum 2330 MW, FS on going
(located on the border Laos-Thailand)

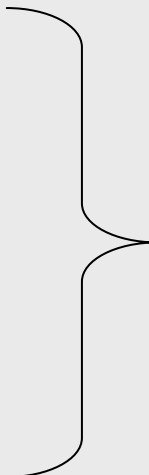
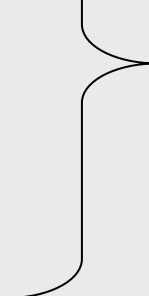
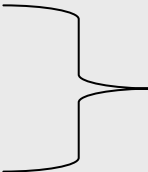
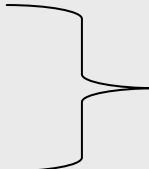
Domestic Transmission System Network



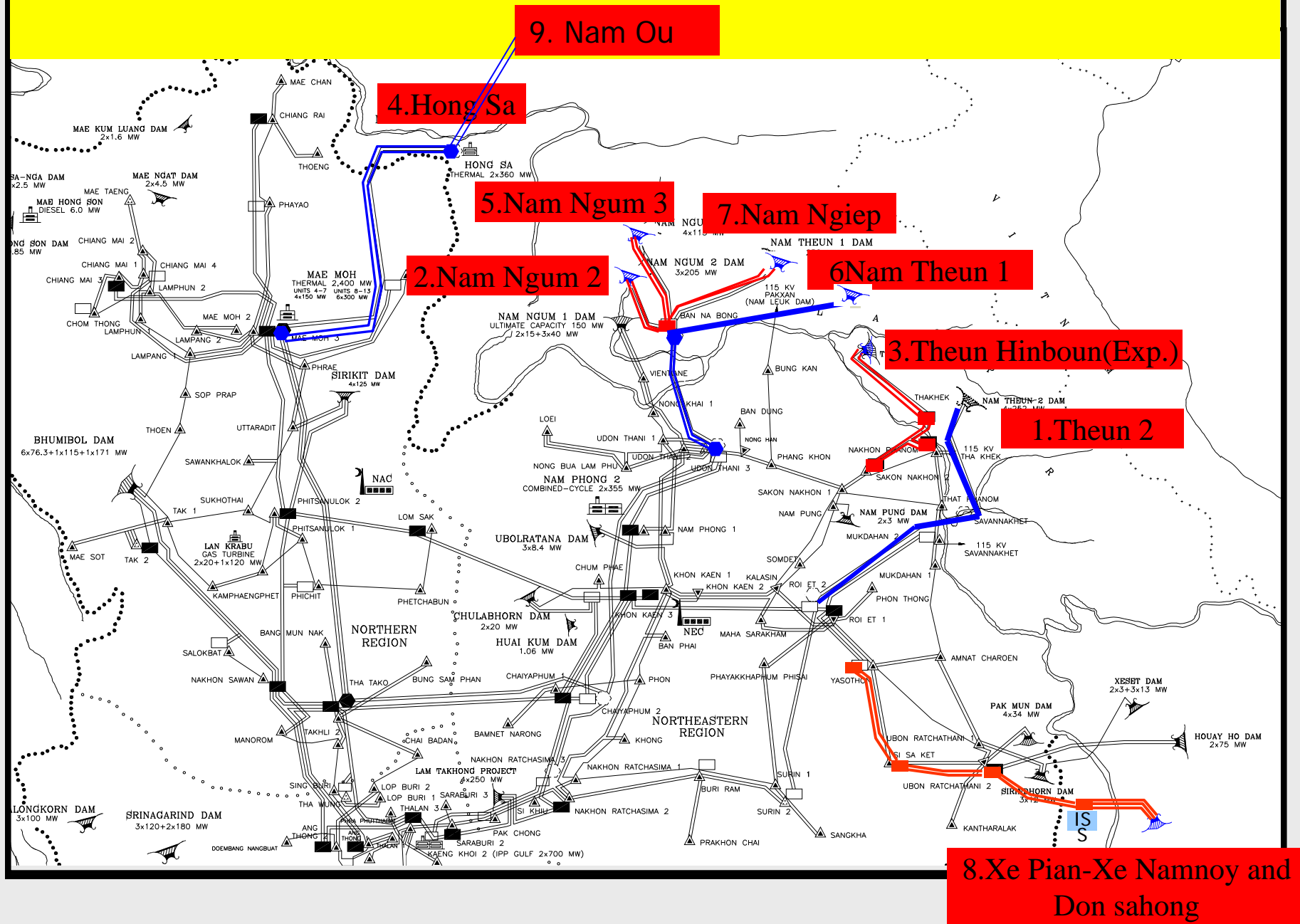
- Power Transmission and Distribution, Phase 2 (PTD2), ADB, NDF
- Nam Ngum 5 Hydropower Project (Sinohydro)
- 15kV TL Pakxan-Pakbo, JBIC (Japan)
- Xeset 2 Hydropower Project (Sinohydro)

Cross Border Trading

3) Export from Private Sectors to Thailand

-Nam Theun 2	1080 MW, 2009		500 kV Nam theun2- Roi Et	
-Nam Ngum 2	615 MW, 2009			500 kV Nabong- Udon Thani
- Nam Bak 1	80 MW, 2013			
- Nam Ngum 3	460 MW, 2014			
- Nam Theun 1	523 MW, 2014			
- Nam Ngiep 1	260 MW, 2015			
- Don sahong 360 MW,2013			230 or 500 kV Ban Sock-Ubon	
-Xepian-xenamnoy 390MW, 2014				
-Hong sa	1800 MW, 2013		500 kV Hongsa- Maemoh	
-Nam Ou basin	1053 MW, 2016			

Power Export from IPP in Lao PDR to Thailand.



3) Export from Private Sectors to Vietnam

– Xekaman3	250 MW, 2009	
– Xekaman1	290 MW, 2011	}
– Xekong4	400 MW, 2012	
– Nam Kong 1	75 MW, 2012	
– Xekong5	250 MW, 2013	
– Xekaman 4	240MW, MOU	
– Xekaman2	180 MW	}
– Nam Mo	105 MW	
– Nam Kan	66 MW	

500 kV BAN SOCK-
PLEKU

**Thank You For
Your Attention**



**Greater Mekong Subregion
Regional Power Trade Coordination Committee (RPTCC)
Fifth Meeting of Planning Working Group (PWG-5)**

**Country Report
on
Progress of Power Development Plans and
Transmission Interconnection Projects**

MYANMAR

17th June 2008

Vientiane, Lao PDR

The Objective of New Structural Changes

In order to effectively carry out to fulfill the electricity requirement for the economic development, nation-building and multi-sector development tasks, the Ministry of Electric Power has been reorganized as two Ministries viz Ministry of Electric Power No.1 and Ministry of Electric Power No.2 on 15 May, 2006.

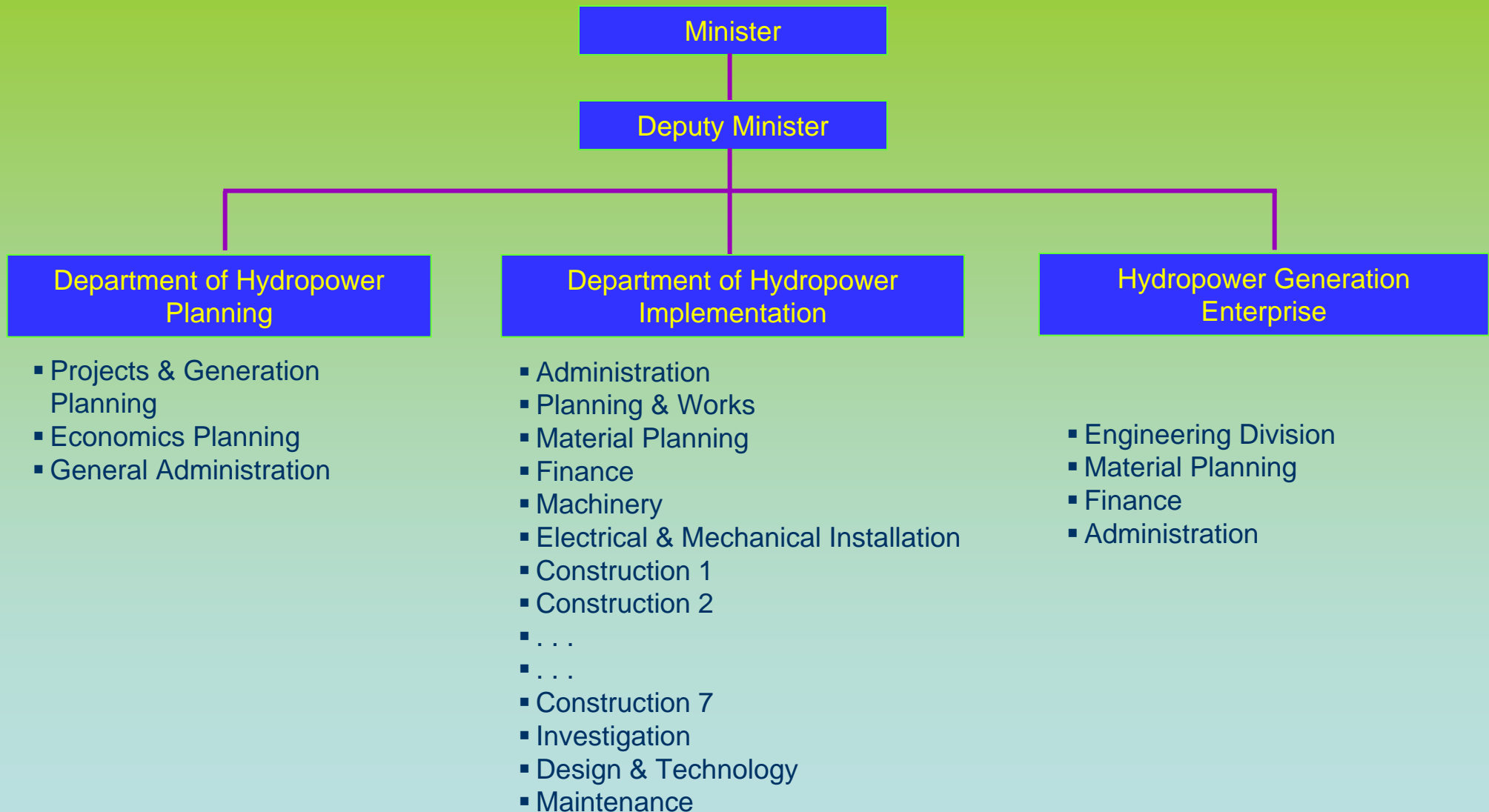
Ministry of Electric Power No.1

- Development of new hydroelectric power projects.**
- Operation and maintenance of (12) existing hydroelectric power stations and (1) coal fired thermal power station.**
- Selling electricity to Ministry of Electric Power No.2**

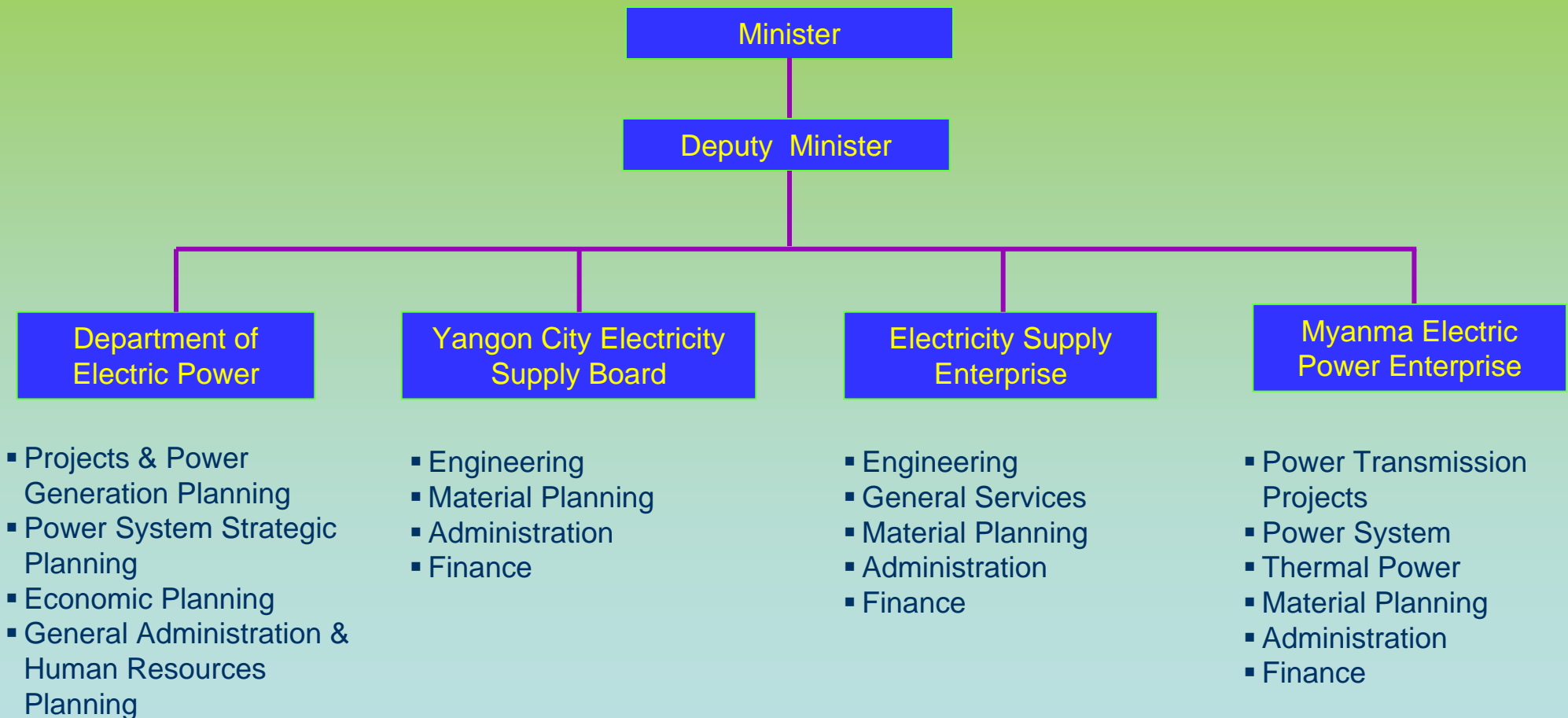
Ministry of Electric Power No.2

- Planning and implementation of transmission lines compliance with the generation plan of both ministries**
- Operation and maintenance of (10) gas turbine, combined cycle and thermal power stations.**
- Purchasing electricity from Ministry of Electric Power No.1**
- Planning and implementation of distribution system and selling electricity to end users**

Organization Chart for Ministry of Electric Power No. (1)

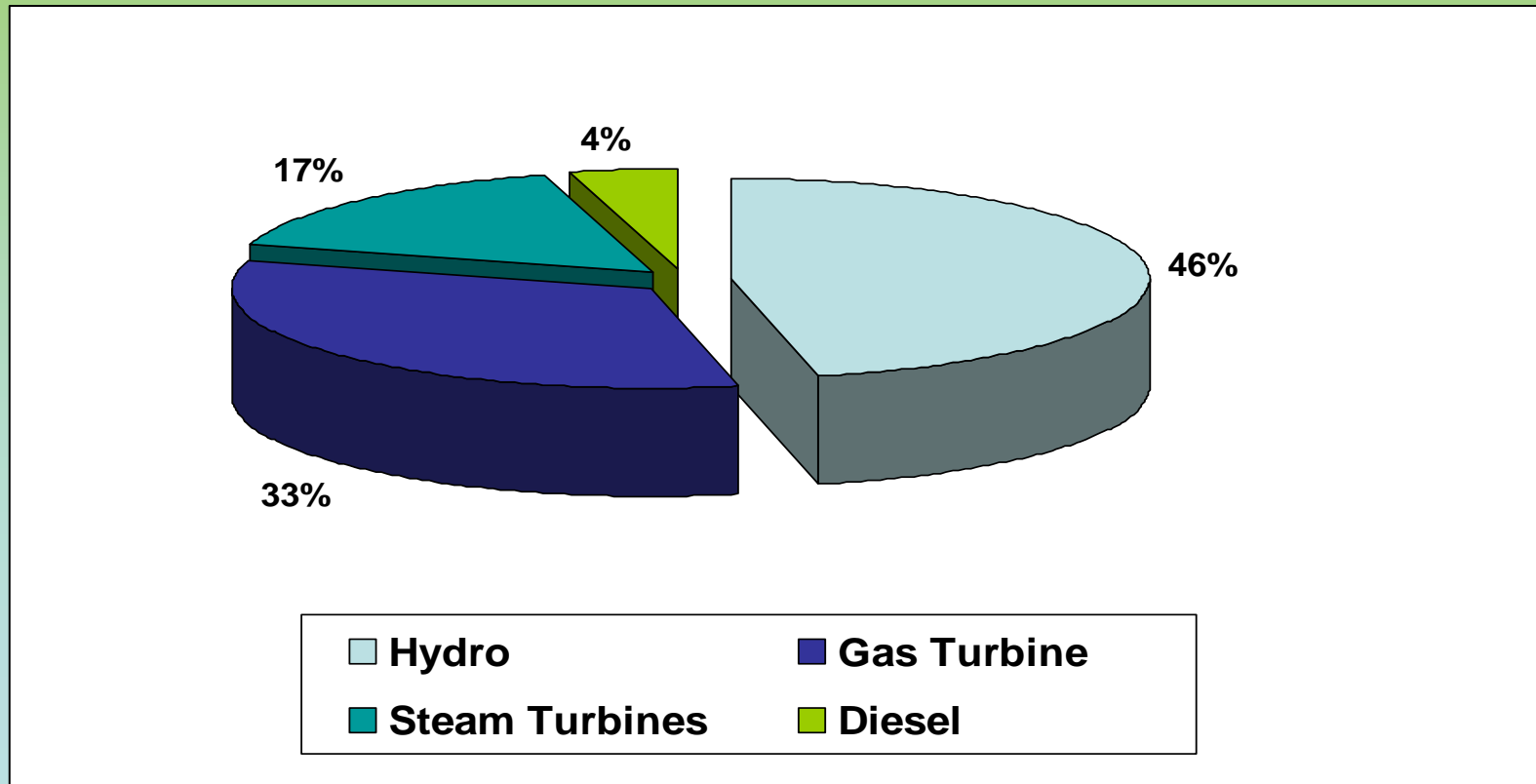


Organization Chart for Ministry of Electric Power No. (2)



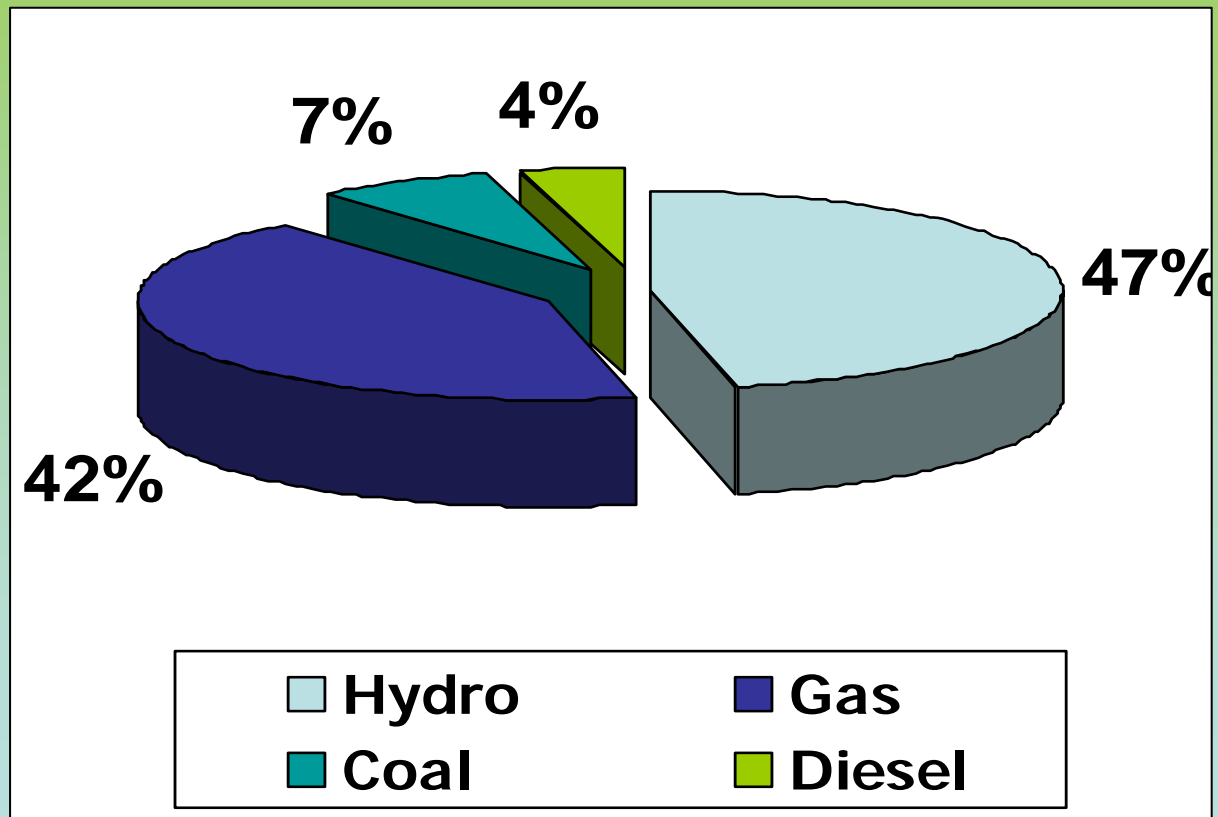
Installed Capacity (MW) as of May 2008

	<u>Grid System</u>	<u>Isolated</u>	<u>Total</u>	<u>Percentage</u>
Installed Capacity	1601.90	116.42	1718.32	100.00%
Hydroelectric	767.00	35.73	802.73	46.72%
Gas Turbine	549.90	10.90	560.80	32.64%
Steam Turbines	285.00	-	285.00	16.58%
Diesel	-	69.79	69.79	4.06%



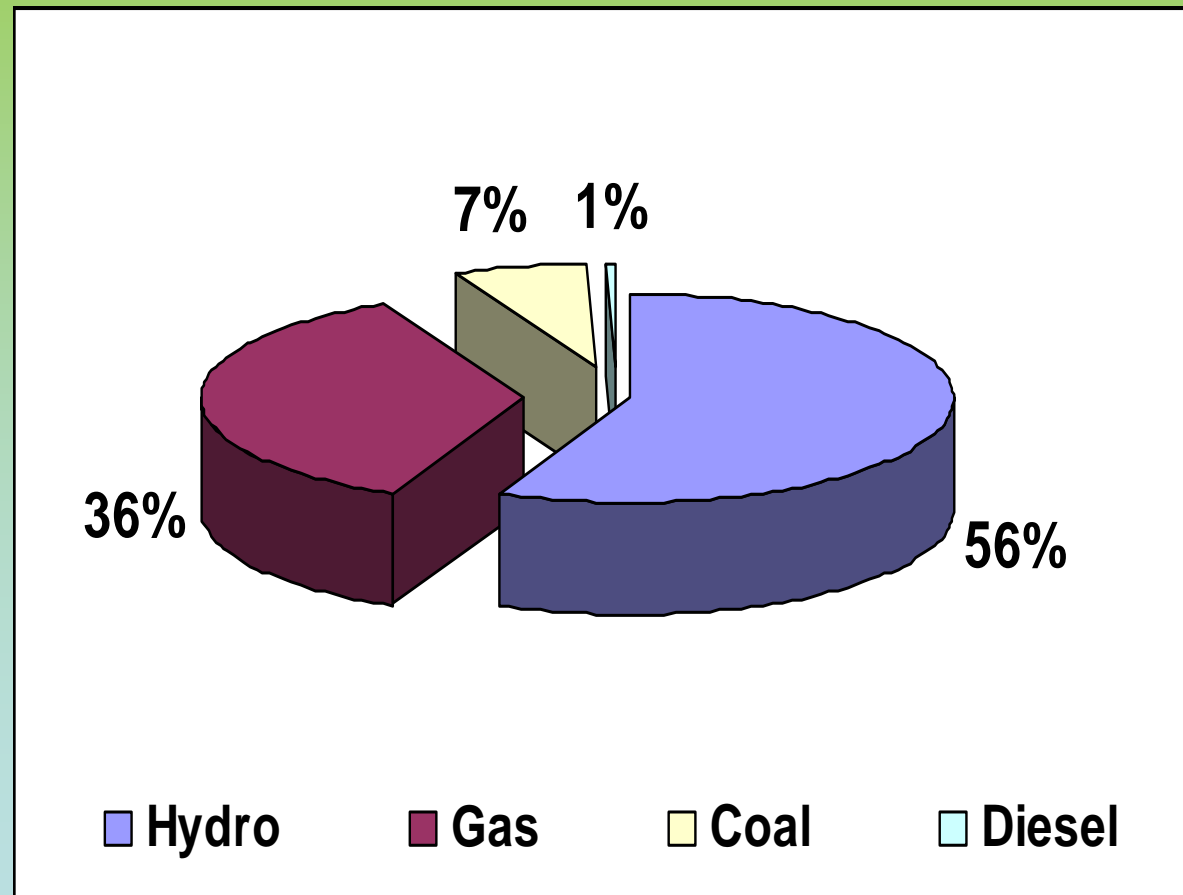
FUEL MIXED

Installed Capacity (MW)	
Hydro	802.73
Gas	725.80
Coal	120.00
Diesel	69.79
Total	1718.32



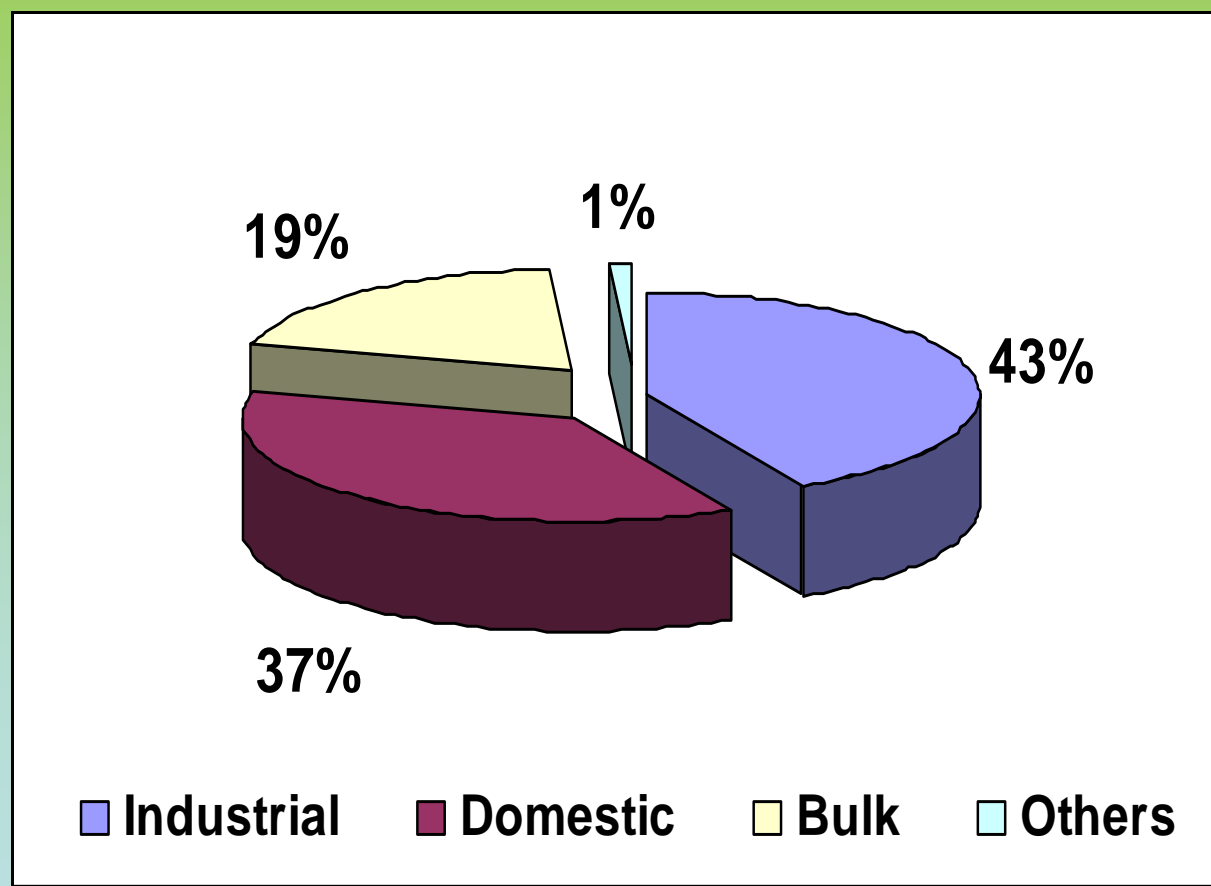
Total Units Generated for the Year 2007-2008

Units Generated (GWh)	
Hydro	3618.50
Gas	2309.57
Coal	436.36
Diesel	33.59
Total	6398.02

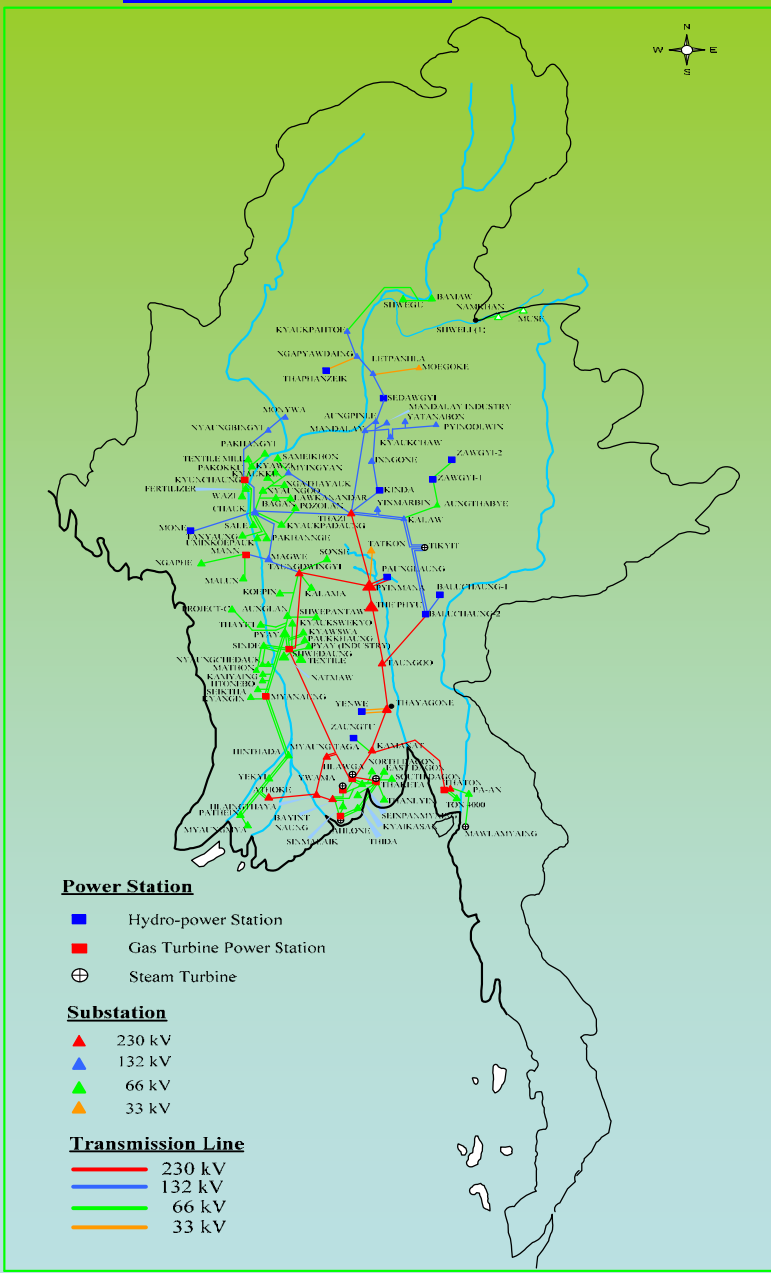


Total Units Sold for the Year 2007-2008

Units Sold (GWh)	
Industry	1865.025
Domestic	1641.392
Bulk	861.85
Others	55.14
Total	4423.407



**MYANMA ELECTRIC POWER ENTERPRISE
NATIONAL GRID SYSTEM**



Hydro Power Stations

1. BHP(2)(2) 168 MW
2. BHP(1) 28 MW
3. Kinda 56 MW
4. Sedawgyi 25 MW
5. Zawgyi(1) 18 MW
6. Zawgyi(2) 12 MW
7. Zaungtu 20 MW
8. Thaphanseik 30 MW
9. Paunglaung 280 MW
10. Mone 75 MW
11. Ye`nwe 25 MW
12. Khabaung 30 MW

Gas Turbine Power Stations

12. Kyunchaung 54.3 MW
13. Mann 36.9 MW
14. Myanaung 34.7 MW
15. Shwedaung 55.35 MW
16. Ywama 60.9 MW
17. Thaketa 57 MW
18. Ahlone 99.9 MW
19. Hlawga 99.9 MW
20. Thaton 50.95 MW

Steam Turbine Power Station

21. Thaketa 34.90 MW
22. Hlawga 54.30 MW
23. Ahlone 54.30 MW
24. Mawlamyaing 12.00 MW
25. Ywama 9.40 MW
26. Tigyit 120 MW

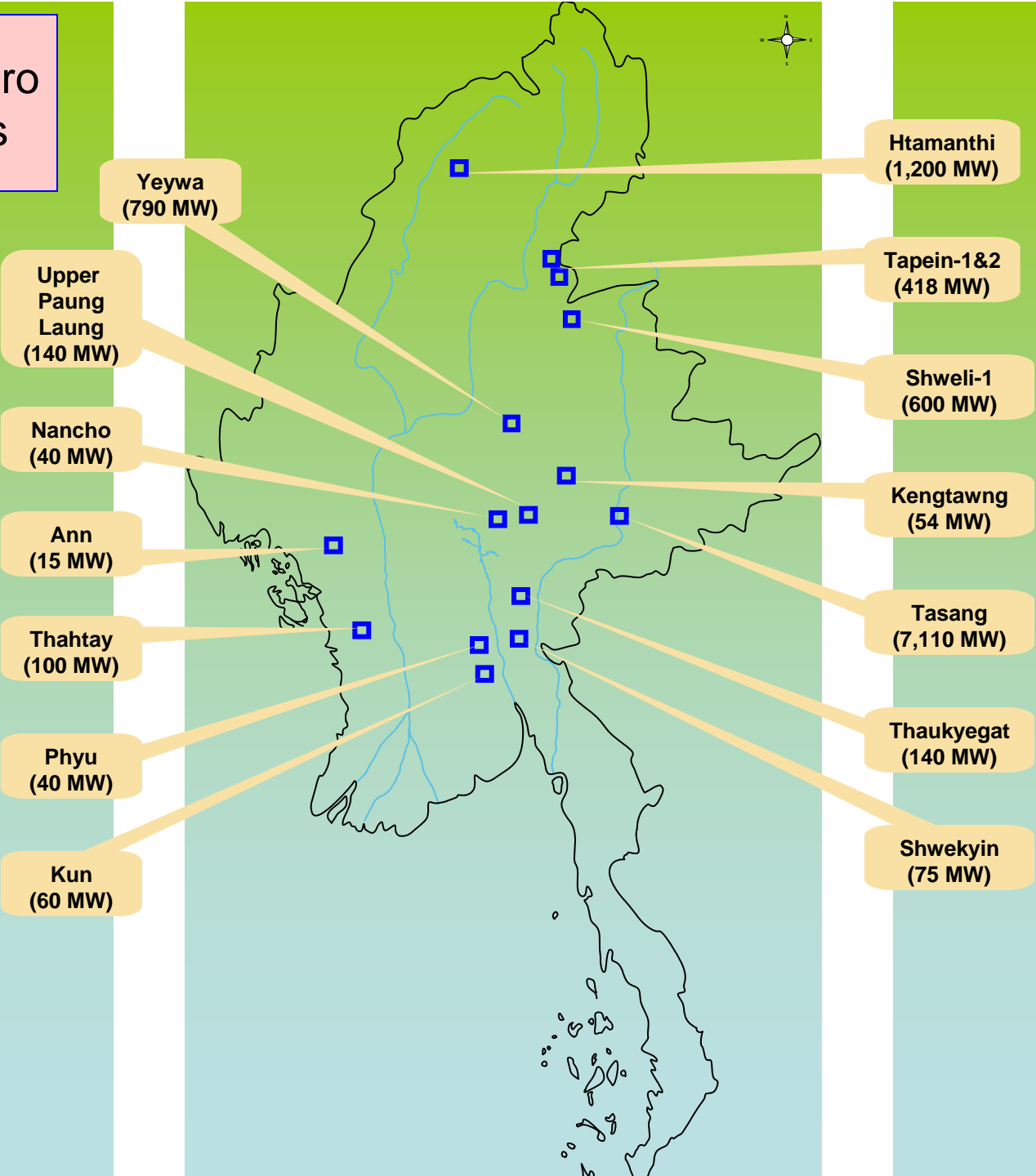
Generation Facilities

- In order to overcome the present insufficient power supply situation and to meet the electricity demand throughout the country, the Government laid down the energy policy to exploit and utilize enormous hydropower potentials of the country.
- At present, **(14) hydropower projects are under implementation** by the Department of Hydropower Implementation (DHPI), the Ministry of Electric Power No.(1) and the Irrigation Department (ID), the Ministry of Agriculture and Irrigation.

Hydropower Projects Under Implementation

Sr.	Name	Installed Capacity (MW)	Annual Energy (GWh)	Year to be commissioned	Implementing Agency
1	Kengtawn	54	472	2008	DHPI
2	Shweli (1)	600	4022	2008	DHPI + YUPD
3	Kun	60	190	2010	DHPI
4	Phyu	40	120	2010	ID + DHPI
5	Shwekyin	75	262	2010	DHPI
6	Yeywa	790	3550	2010	DHPI
7	Thahtay	100	394	2010	DHPI
8	Upper Paunglaung	140	434	2010	DHPI
9	Nancho	40	128	2010	DHPI
10	Thaukyegat	140	670	2011	DHPI
11	Ann	15	65	2011	DHPI
12	Tapein (1) (2)	418	1081	-	DHPI + Private
13	Tamanhti	1200	6685	-	DHPI
14	Tasang	7100	35446	2020	DHPI + MDX

Under Construction Hydro Power Station Projects



Hydropower Projects to be implemented in Near Future

Sr.	Name	Installed Capacity (MW)
1	Shweli (2)	460
2	Shweli (3)	360
3	Upper Thanlwin	2400
4	Upper Sedawgyi	60
5	Upper Kengtaung	60
6	Shwesarye	660
7	Mawlaik	515
8	Hutgyi	1200
9	Maykha River Basin	13600
10	Tanintharyi	600
11	Bu-ywa	150
12	Manipura	380
13	Pyangsho	300

Transmission Facilities

In order to reinforce the present National Grid System and to facilitate power transmission from new generating stations to National Grid System, Ministry of Electric Power No.(2) carry out 23 transmission line and 15 substation projects at present and plan 35 transmission line and 28 substation projects to be implemented in the near future

Summary of Existing Transmission lines and Substations

Voltage Level	Transmission Line		Substation	
	Number of lines	Line Length (mile)	Number of Primary Substations	Capacity (MVA)
230 kV	16	918.06	16	2150
132 kV	23	1170.06	22	1512.6
66 kV	66	1454.76	52	1816.7
Total	105	3542.88	90	5479.3

Summary of Existing Distribution lines

<i>Voltage Level</i>	<i>33 kV</i>	<i>11 kV</i>	<i>6.6 kV</i>	<i>0.4 kV</i>	<i>Total</i>
<i>Line Length (mile)</i>	2573.4	5632.7	804.8	8343.2	17354.1

Transmission Lines and Primary Substations Projects (Under Construction)

Transmission Lines

Voltage Level	No. of lines (lines)	Line Length (miles)
230 kV	20	995.5
132 kV	3	207
Total	23	1202.5

Primary Substations

Voltage Level	No. of Substations	Capacity (MVA)
230 kV	12	1170
132 kV	3	225
Total	15	1395

Transmission Lines and Primary Substations Projects (Future Plan)

Transmission Lines

Voltage Level	No. of lines (lines)	Line Length (miles)
<i>500 kV</i>	5	1795
<i>230 kV</i>	28	3265
<i>132 kV</i>	2	121
<i>Total</i>	35	5181

Primary Substations

Voltage Level	No. of Substations	Capacity (MVA)
<i>500 kV</i>	6	3000
<i>230 kV</i>	21	2100
<i>132 kV</i>	1	2x160
<i>Total</i>	28	5420

Summary

Existing

Power Stations	26 nos	1601.90 MW
Transmission Lines	105 Lines	3542.88 miles
Primary Substations	90 nos	5479.30 MVA

Under construction Projects

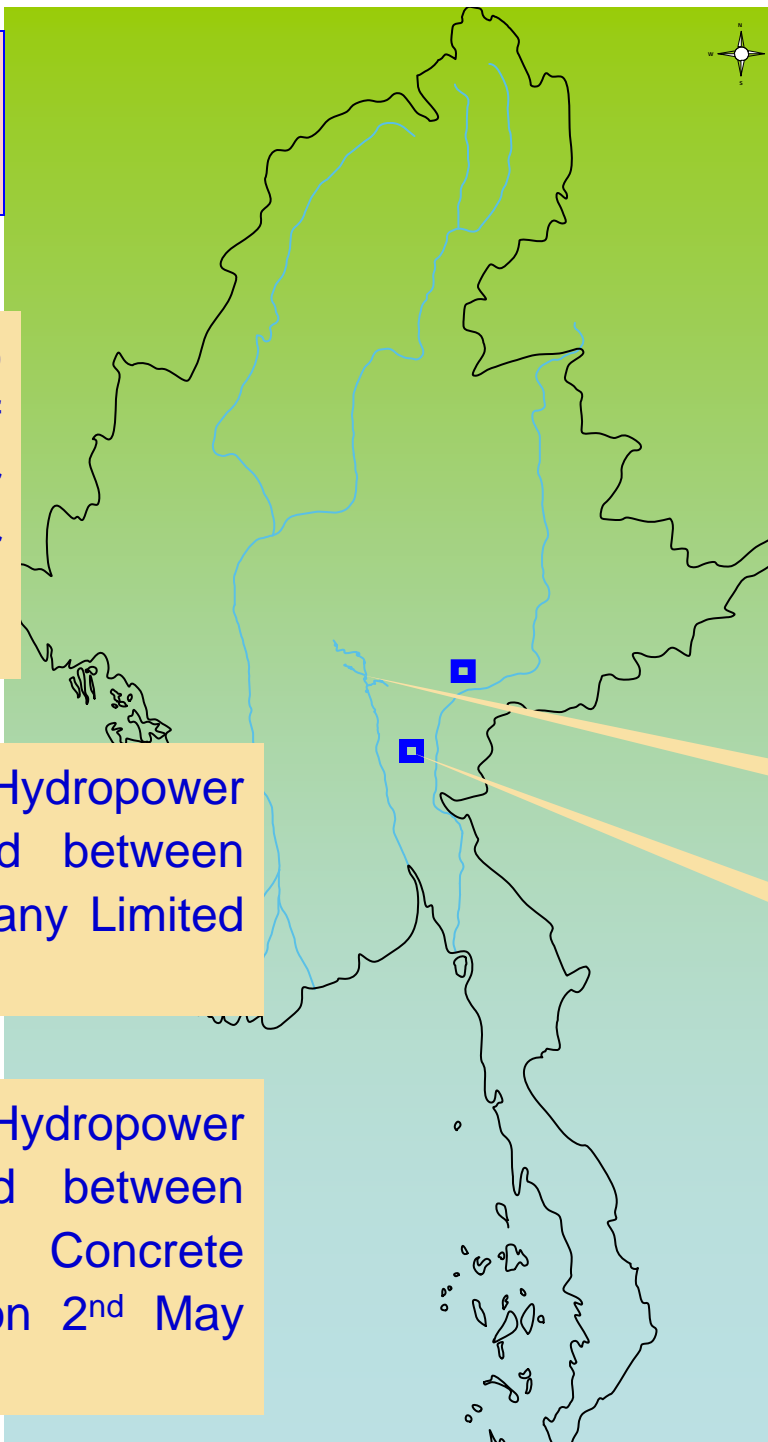
Power Station	14 nos	10772 MW
Transmission Lines	23 Lines	1202.5 miles
Primary Substations	15 nos	1395 MVA

Future Projects

Power Station	13 nos	23645 MW
Transmission Lines	35 Lines	5181 miles
Primary Substations	28 nos	5420 MVA

Private Sector Investment In Power Generation Sector

- Local investors are allowed to participate in the scheme of Independent Power Producer (IPP) for medium hydropower projects
- ✓ The MOU on **Thaukyegat(2)** Hydropower Project (120 MW) was signed between MOEP(1) and Asia World Company Limited on 2nd May 2008.
- ✓ The MOU on **Baluchaung(3)** Hydropower Project (48 MW) was signed between MOEP(1) and High Tech Concrete Technology Company Limited on 2nd May 2008.



Baluchaung-3
(48 MW)

Thaukyegat-2
(120 MW)

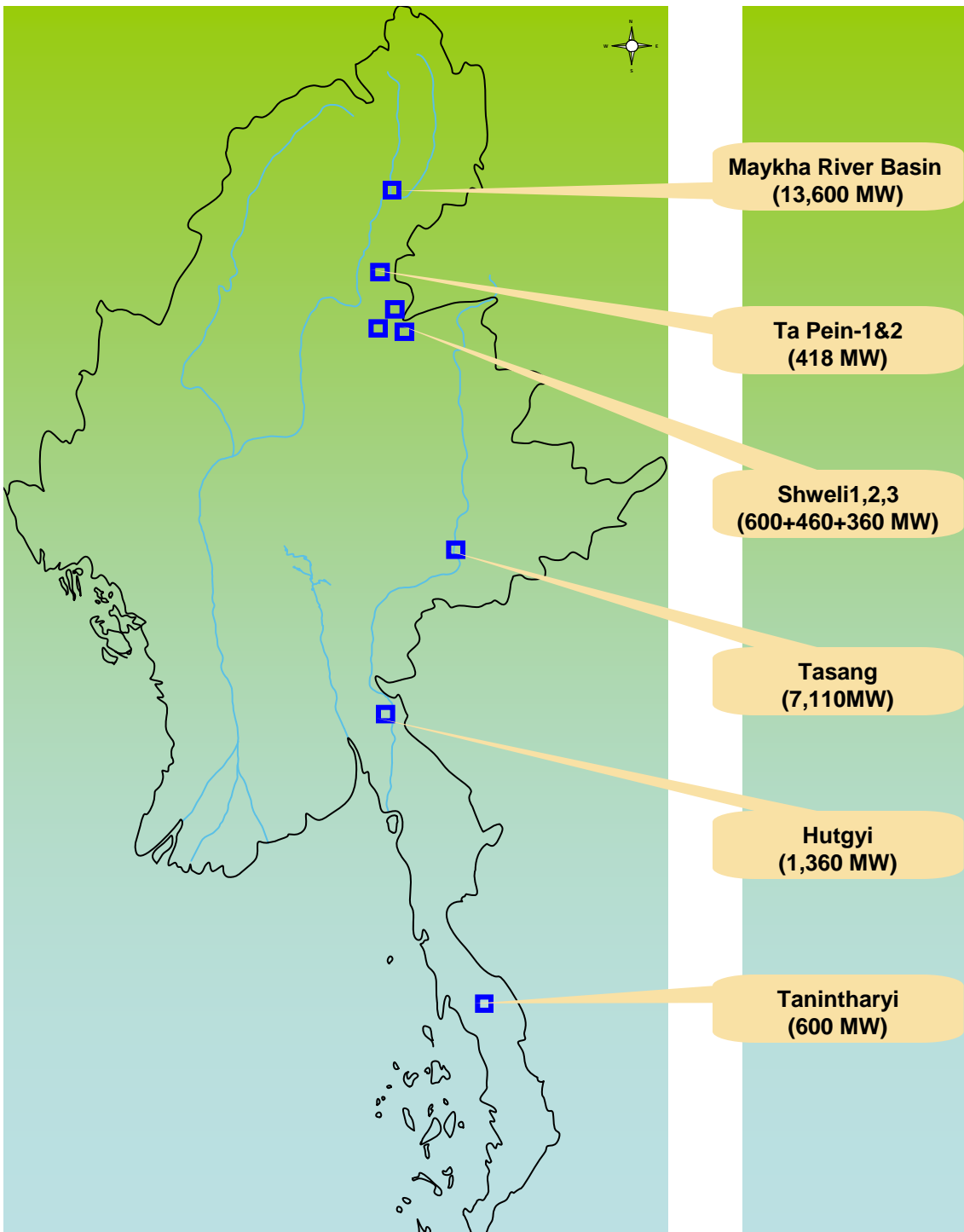
Foreign Investment in Power Generation Sector

- Foreign investment in the power generation sector is invited by the government.
- **Shweli-1** Hydropower project (600 MW) is being developed by Joint - Venture basis with YUPD, China and MOEP 1.
- The MOU was signed between MOEP(1)and Yunnan United Power Development Co. Ltd.(YUPD) to develop the **Shweli-2 HPP(460MW)** & **Shweli-3 HPP (360 MW)** on 12 May 2008
- **Tasang Hydropower project** (7110 MW) will be developed by Joint-Venture basis with MDX group Co., Ltd, Thailand and MOEP 1. The agreement was signed on 10.3.2006.
- MOEP 1 and CPI, China have signed on MOU to develop six hydropower projects on **Mekha river basin** (approximately 13600 MW).
- MOEP 1 and EGAT, Thailand signed on MOA to develop the **Hutgyi hydropower project** (1200 MW) and **Tanintharyi hydropower project** (600 MW) on Joint- Venture basis. The feasibility study is jointly done by both parties

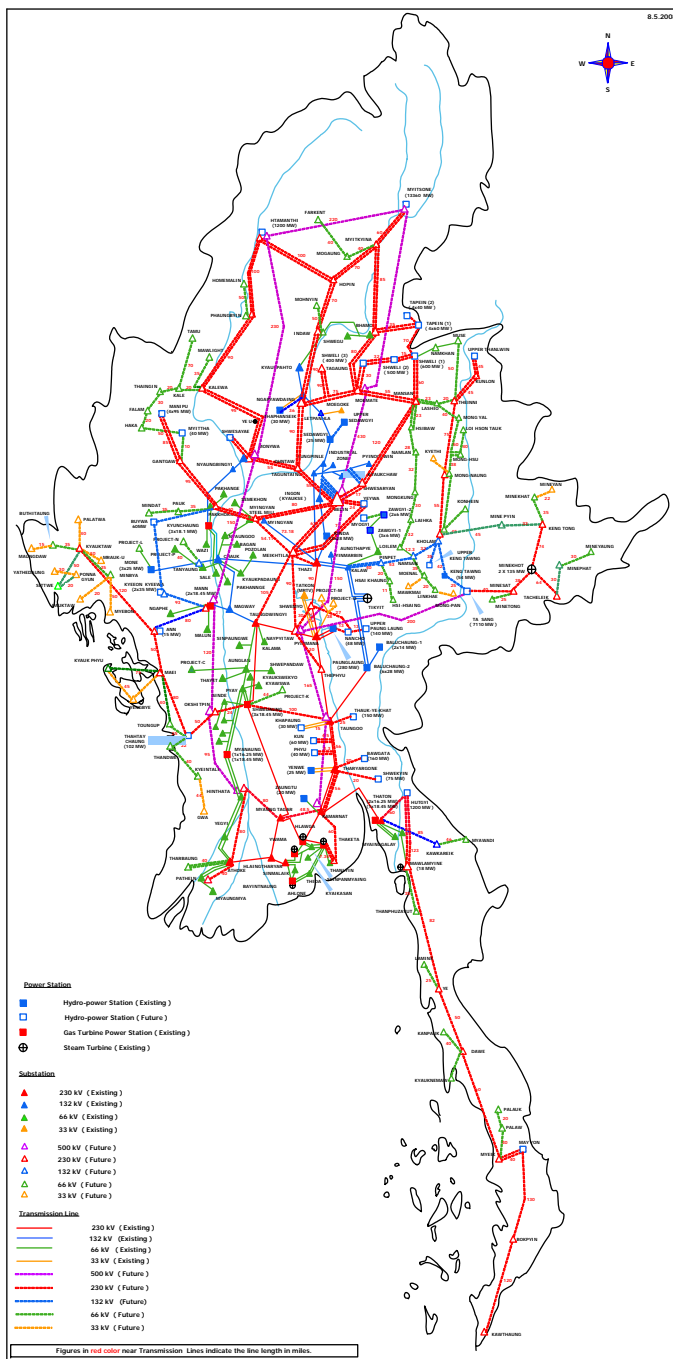
List of Hydropower Projects for power export

No.	Project	River	Dam Height (m)	Dam Type	Installed Capacity (MW)	Export to	Expected Year of Completion
1.	Ta Sang Low Head Dam	Thanlwin	78	RCC	200	Thailand	2010
2.	Ta Sang Main Dam 1 st Stage	Thanlwin	227.5	RCC	2133	Thailand	2016
3.	Ta Sang Main Dam 2 nd Stage	Thanlwin	227.5	RCC	4977	Thailand + China	2022
4.	Hutgyi	Thanlwin	33	RCC	1200	Thailand	2012
5.	Ta Pein (1)	Taping	83.5	CFRD	240	China	2010
6.	Shweli (2)	Shweli	-	-	460	China	Under F/S
7.	Shweli (3)	Shweli	-	-	360	China	Under F/S
Total					9570		

Foreign Investment
In Power Generation
Sector



THANK YOU



Future National Grid System In Myanmar



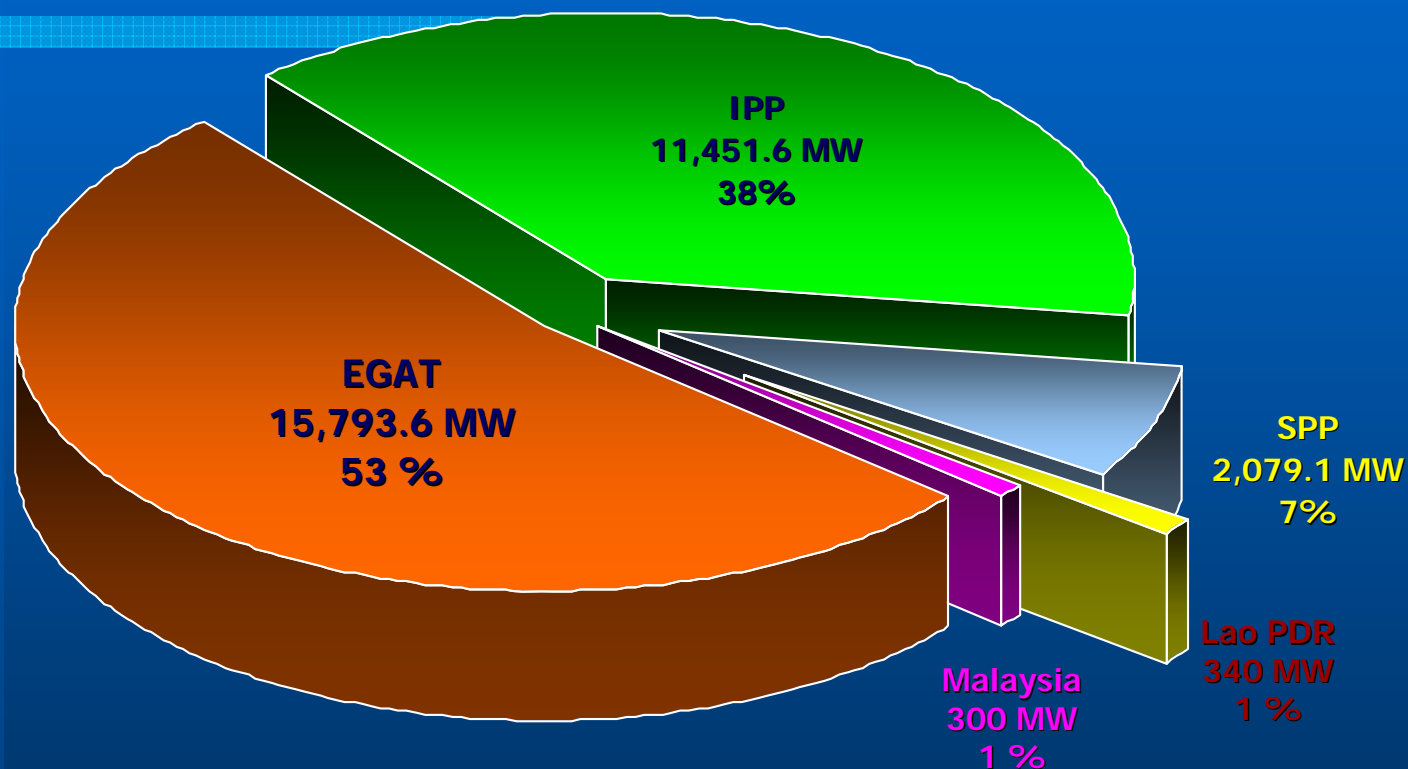
Updated Status of Thailand Power System

The 5th GMS Planning Working Group (PWG) Meeting
Lao PDR., 17th June 2008

Present Status

Total Installed Capacity (by Power Producers)

(As of April 2008)

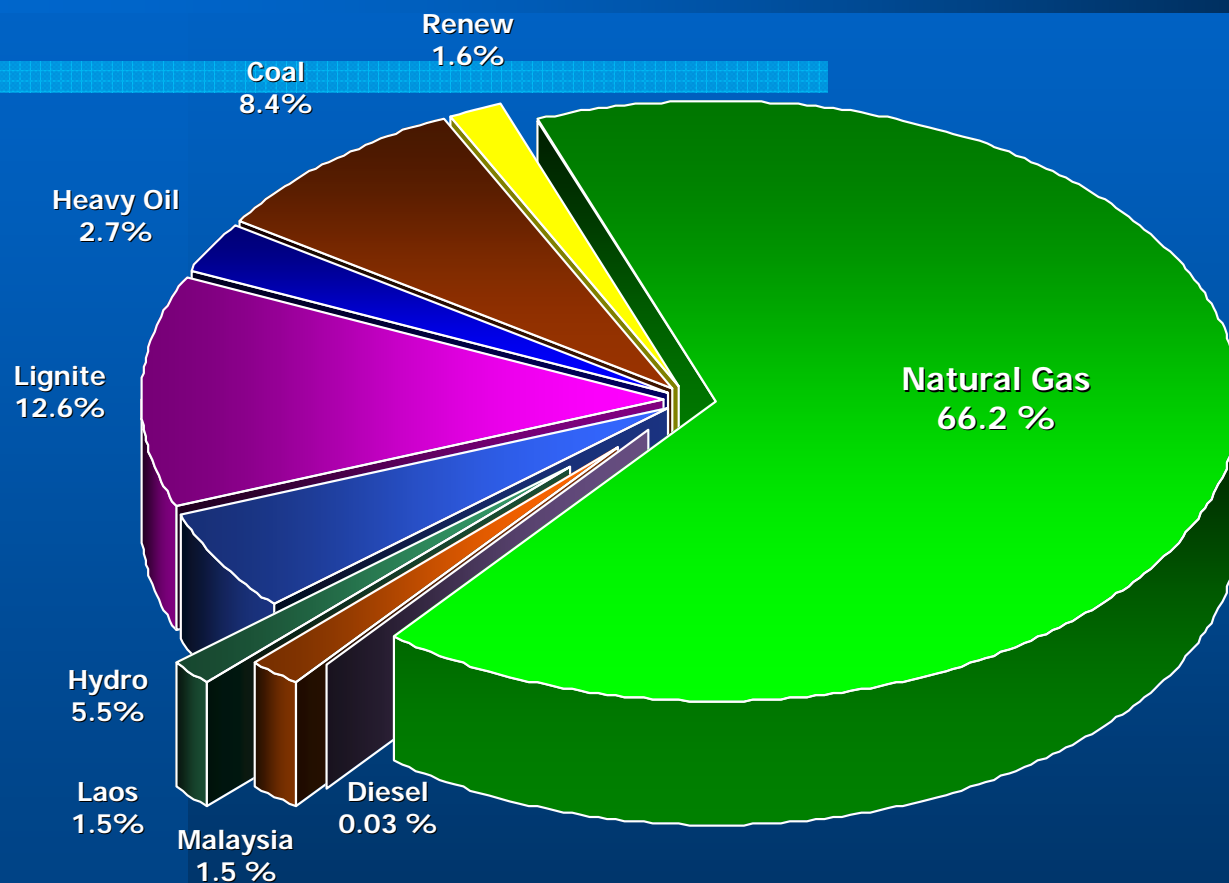


Total Install Capacity as of April 2008 29,964.3 MW

Peak Demand on 21 April 2008 22,568.2 MW

3

Thailand Fuel Mix for Power Generation in 2007

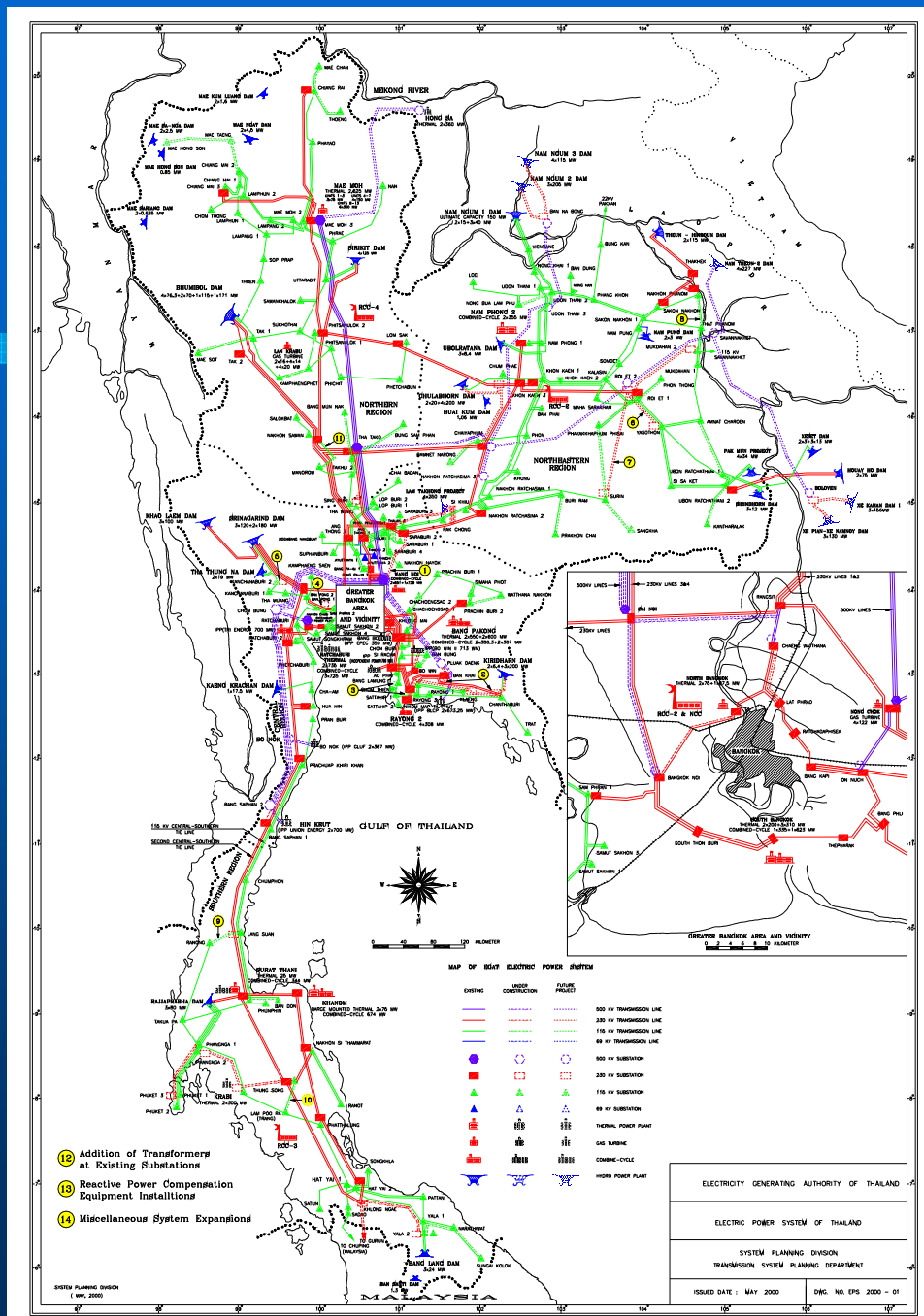


Total Energy Generation
(Included Power Purchased)

=

146,925 GWh

4



Thailand Transmission Network

EGAT's Transmission System

(As of April 2008)

Voltage	Substation		Transmission (Circuit-km)
	Number	MVA	
500 kV	9	13,050	3,433
230 kV	69	41,160	13,304
132 kV	-	133	9
115 kV	130	14,916	13,765
69 kV	1	33	46
300 kV HVDC	-	388	23
Total	209	69,680	30,580

Source: EGAT's Control Division

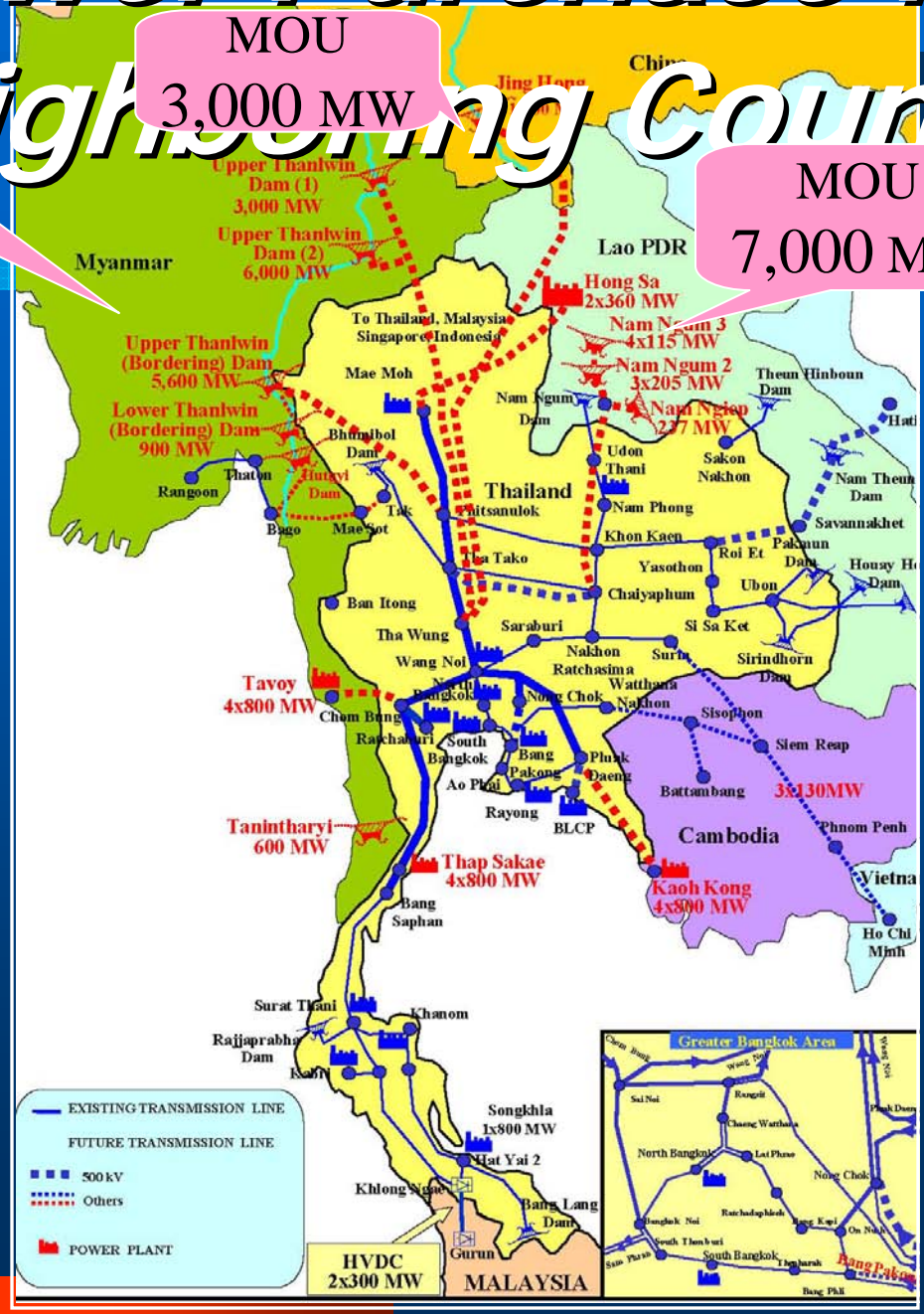
Power Purchase from Neighboring Countries

Power Purchase from Neighboring Countries

MOU
1,500 MW

MOU
3,000 MW

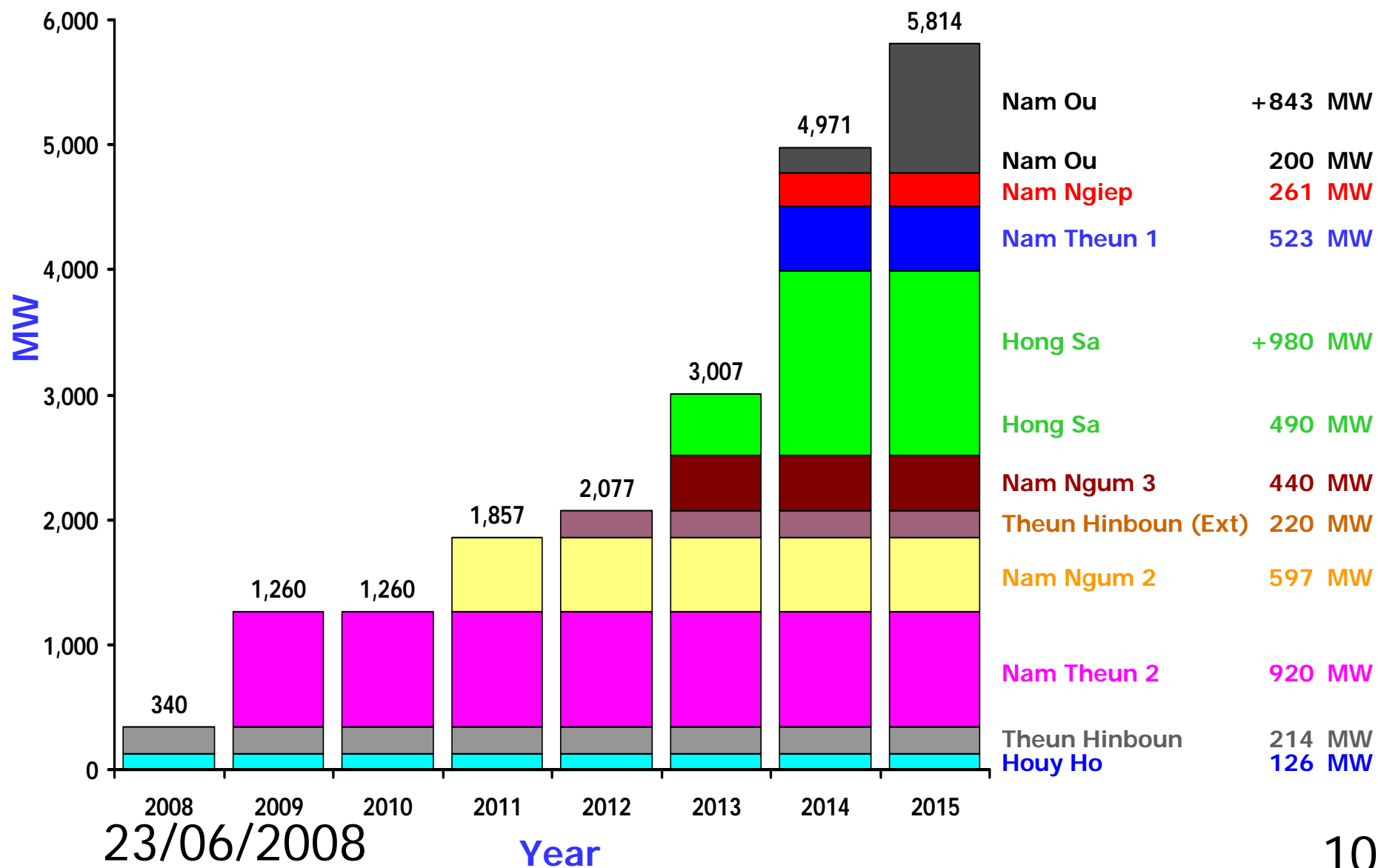
MOU
7,000 MW



Power Purchase from Lao PDR.



Power Purchase from Lao PDR



On-going Projects

- **Nam Theun 2 Project 920 MW :**
 - PPA November 2003
 - Project will be completed in November 2009

- **Nam Ngum 2 Project 615 MW :**
 - PPA May 2006
 - Project will be completed in December 2010

On-going Projects (Continued)

– **Theun Hinboun (Expansion) Project 220 MW :**

–PPA December 2007

–Project will be completed in March 2012

Future Projects

- **Nam Ngum 3 Project 440 MW :**
 - Tariff MOU December 2006
 - Expected COD in Jan. 2013

Future Projects (Continued)

– **Nam Theun 1** Project 510 MW :

–Tariff MOU December 2006

–Expected COD in Jan. 2014

– **Nam Ngiep** Project 261 MW :

–Tariff MOU June 2007

–Expected COD in Jan. 2014

Future Projects (Continued)

– **Nam Ou Project** 1,153 MW :

–Tariff MOU November 2007

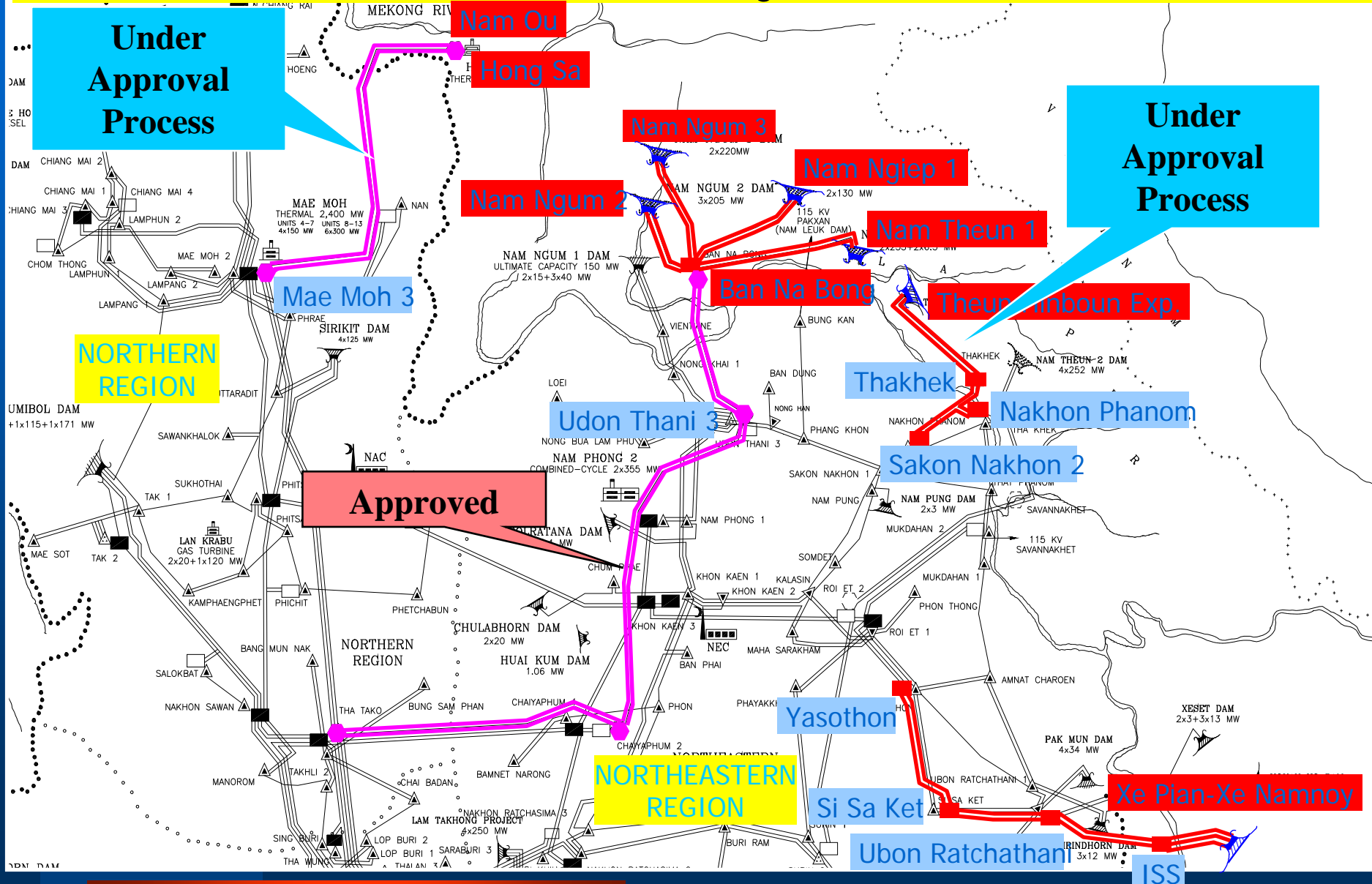
–Expecteded COD in 2013-2015

– **Hong Sa (Lignite-Fired Thermal Plant)** 1,473 MW

–Tariff MOU December 2007

–Expected COD in 2013-2014

Power Import from Private Developer in Lao PDR. (Future Project)



Under Approval Process

Under Approval Process

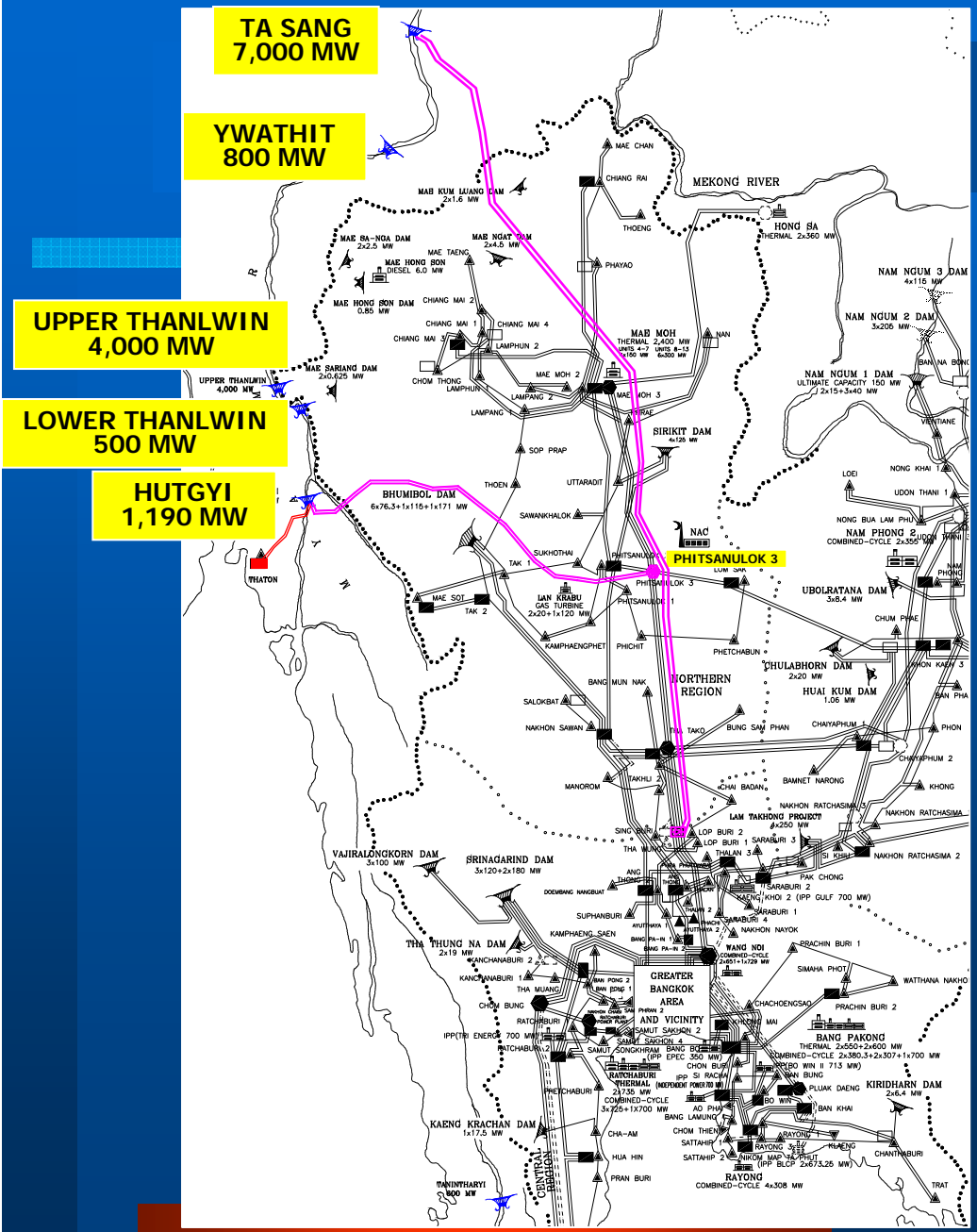
NORTHERN REGION

NORTHEASTERN REGION

Approved

Power Purchase from Myanmar

Power Projects Myanmar (Thanlwin Basin)



1. Ta Sang 7,000 MW
2. Hutgyi 1,190 MW
3. Upper Thanlwin (Bordering) 4,000 MW
4. Lower Thanlwin (Bordering) 500 MW
5. Ywathit 800 MW

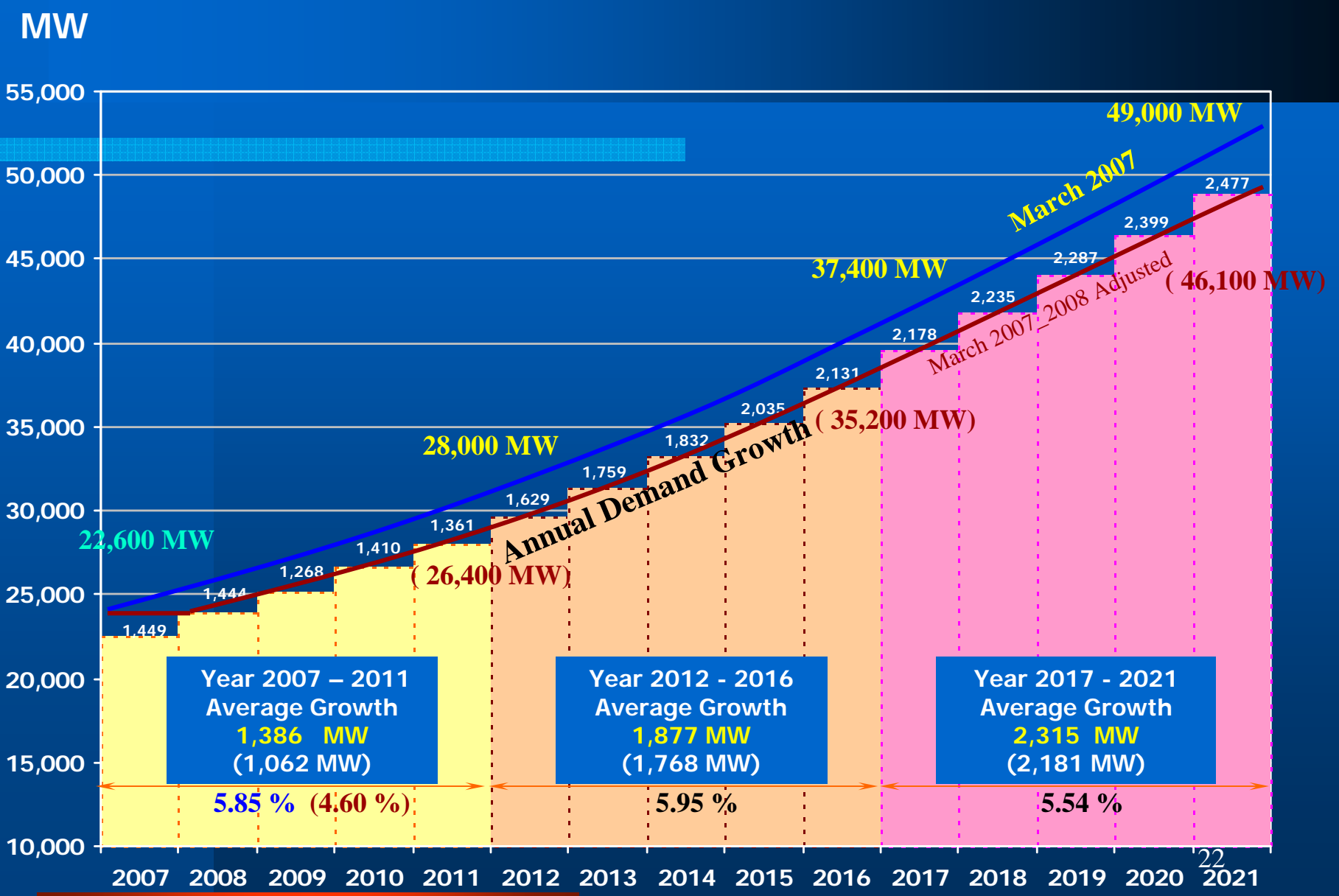
Power Purchase from Cambodia



Updated Future Aspects



Power Demand Projection (March 07 Forecast)



Year	PDP 2007 (Rev.1; jan 08)		Expected Revision
	Project Name	MW	
2008	EGAT's Jana CC#1	710	-
	IPP (Gulf #2)	734	
	IPP (Ratch #1-2)	2x700	
2009	EGAT's SB CC#3	715	-
	EGAT's BPK CC#5	719	
	PP (NamTheun 2)	920	
2010	SPP	225	-
	RPS	33	
	EGAT's NB CC#1	685	
2011	SPP	25	-
	PP (Nam Ngum 2)	596	
2012	SPP	245	-
	IPP Coal (Gheco)	660	
	IPP Gas (Siam Energy)	800	
	EGAT's WNO CC#4	700	
	PP (Theun Hin Boun)	220	

23/06/200

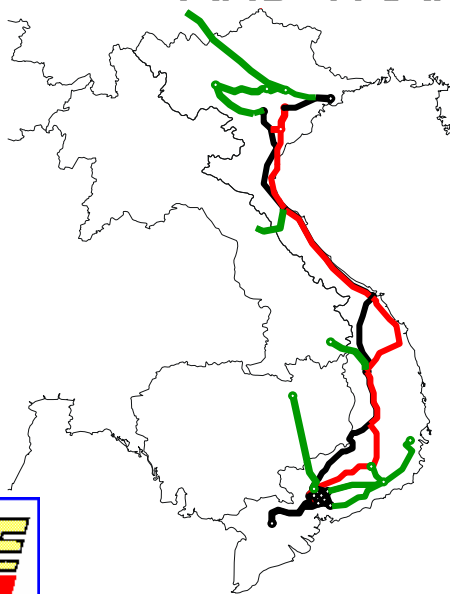
Year	PDP 2007 (Rev.1; jan 08)		Expected Revision
	Project Name	MW	
2013	SPP	200	<p>Tobe replaced with Jana CC#2 710MW (2018)</p>
	IPP Coal (NPS)	540	
	IPP Gas (Power Gen)	800	
	EGAT's BPK CC#6	700	
	PP (Hong Sa /1)	490 ?	
	PP (Nam Ngum 3)	440	
2014	SPP	200	<p>PP (Nam Ngum 3) 440 MW</p>
	PP (Hong Sa /2)	2x490 ?	
	PP (Nam Theun 1)	523	
	PP (Nam Ou /1)	200	
	PP (Nam Ngiep)	261	
	2015	SPP	
IPP Gas (J-Power)	2x800		
PP (Nam Ou /2)	843		
EGAT's Coal #1	700		
2016	SPP	200	<p>PP (Nam Ou /2) 843 MW</p>
	EGAT's Coal #2-3	2x700	

Thank You



Greater Mekong Subregion Fifth meeting of the Planning Working Group (PWG-5)

PROGRESS OF vietnam POWER DEVELOPMENT AND TRANSMISSION INTERCONNECTION PROJECTS



Vientiane, June 17-18th 2008



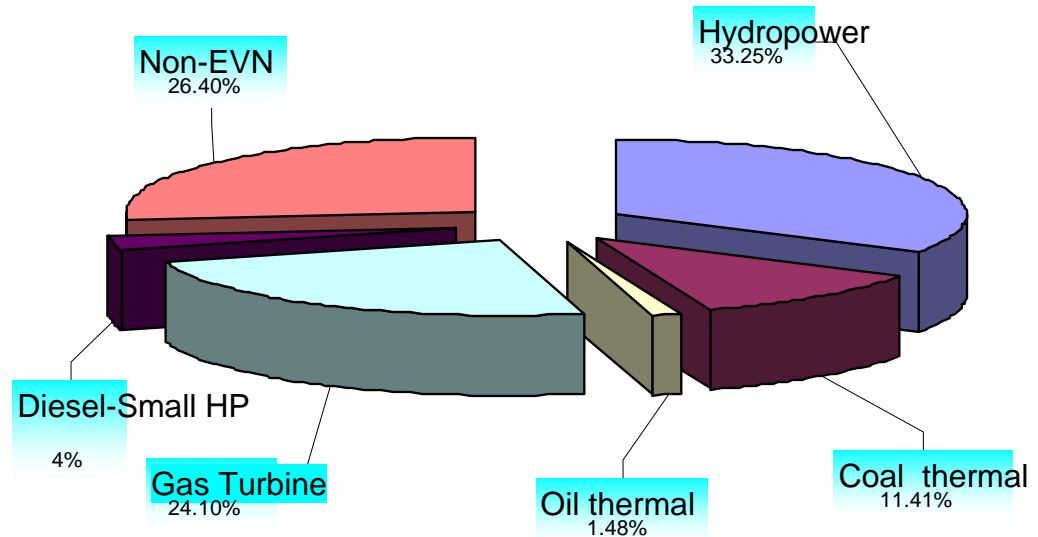
Progress of power development plan



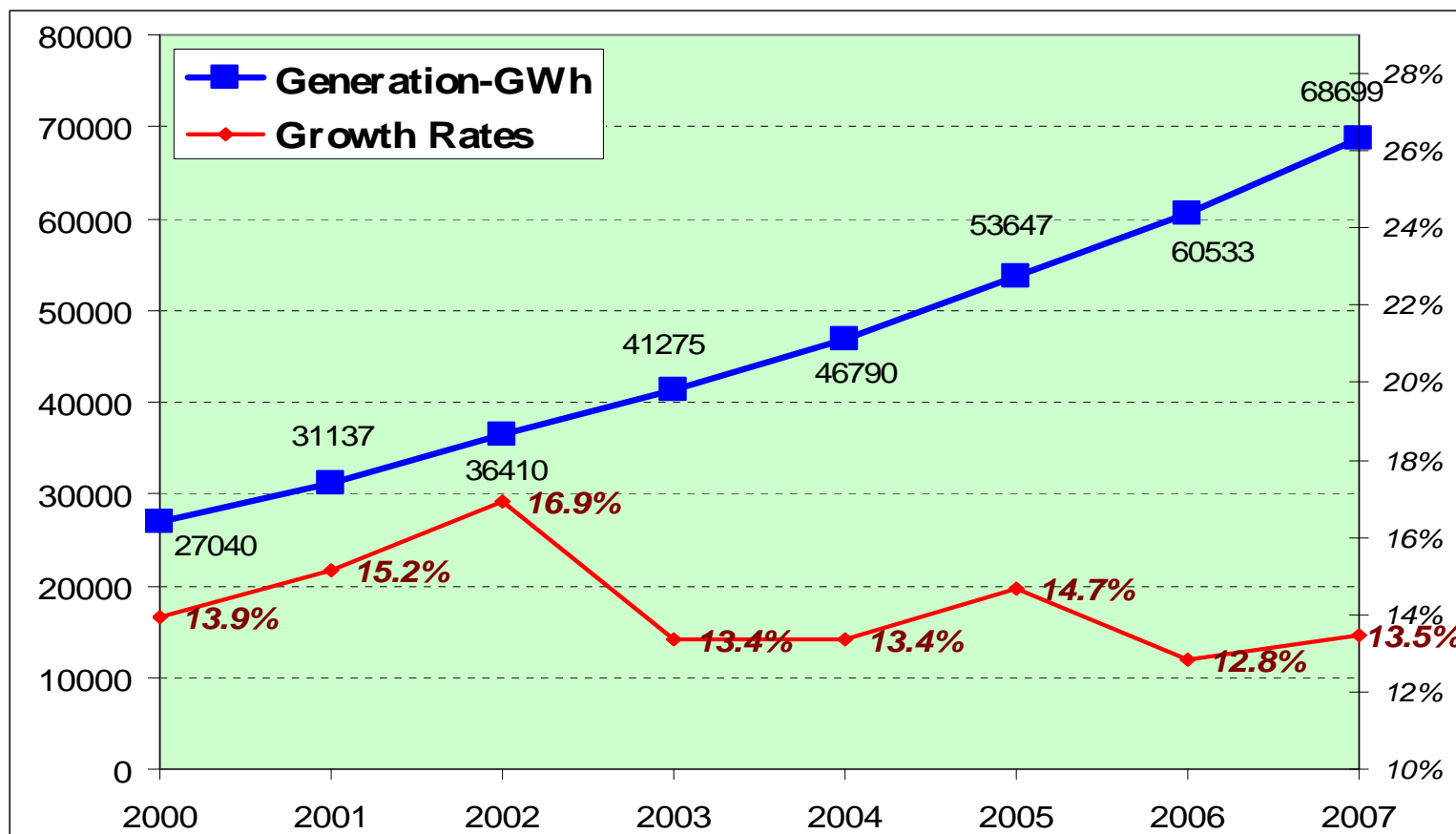
Installed Capacity & Generation structure in Vietnam

✓ install capacity:	13512 MW
✓ IPP:	2,967 MW
✓ Generation output 2007:	68,700 GWh
✓ Peak load 2007:	11,286 MW
✓ May 2008:	11,824 MW

*Structure of
power capacity
in 2007*



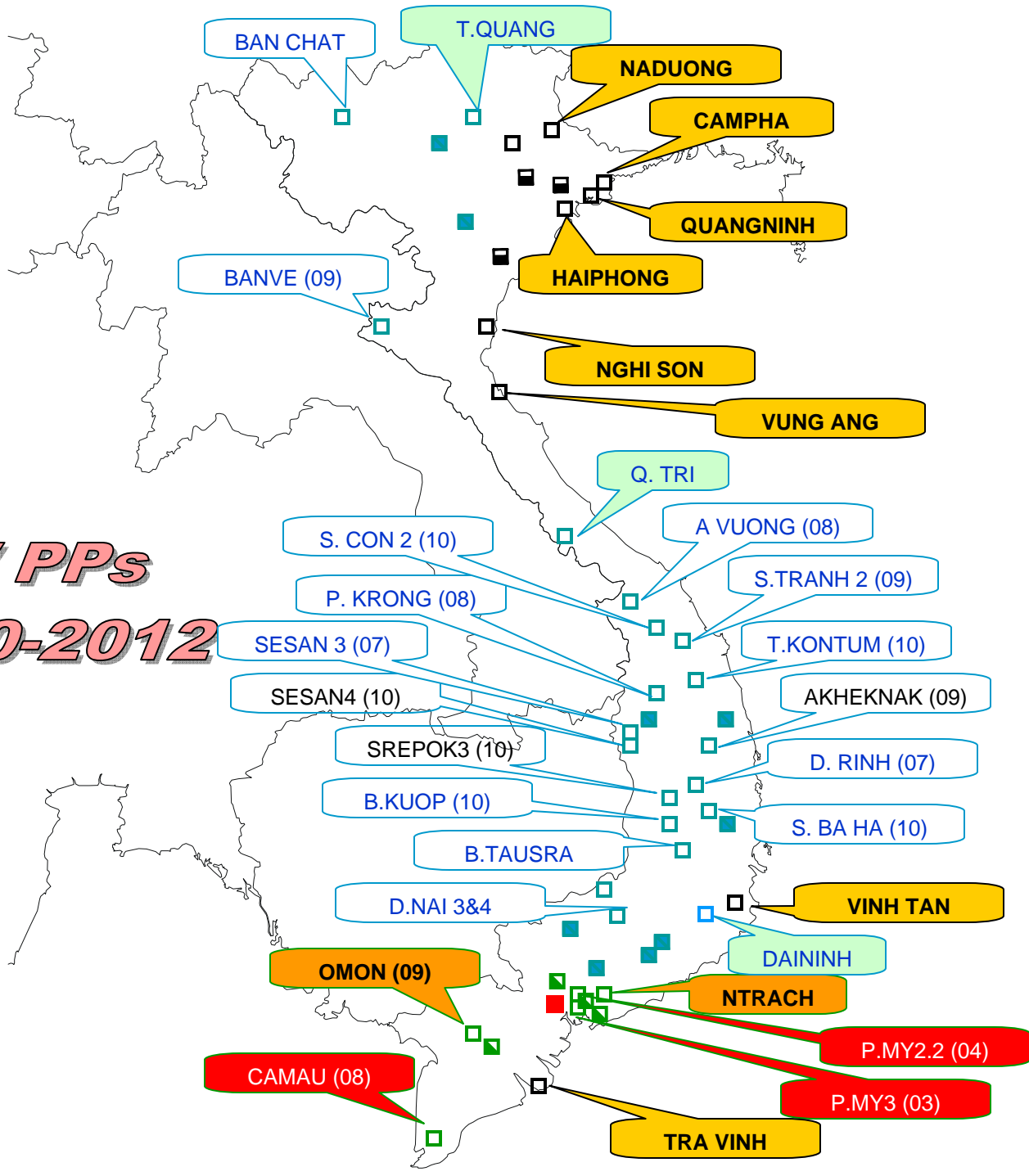
Power Generation in vietnam



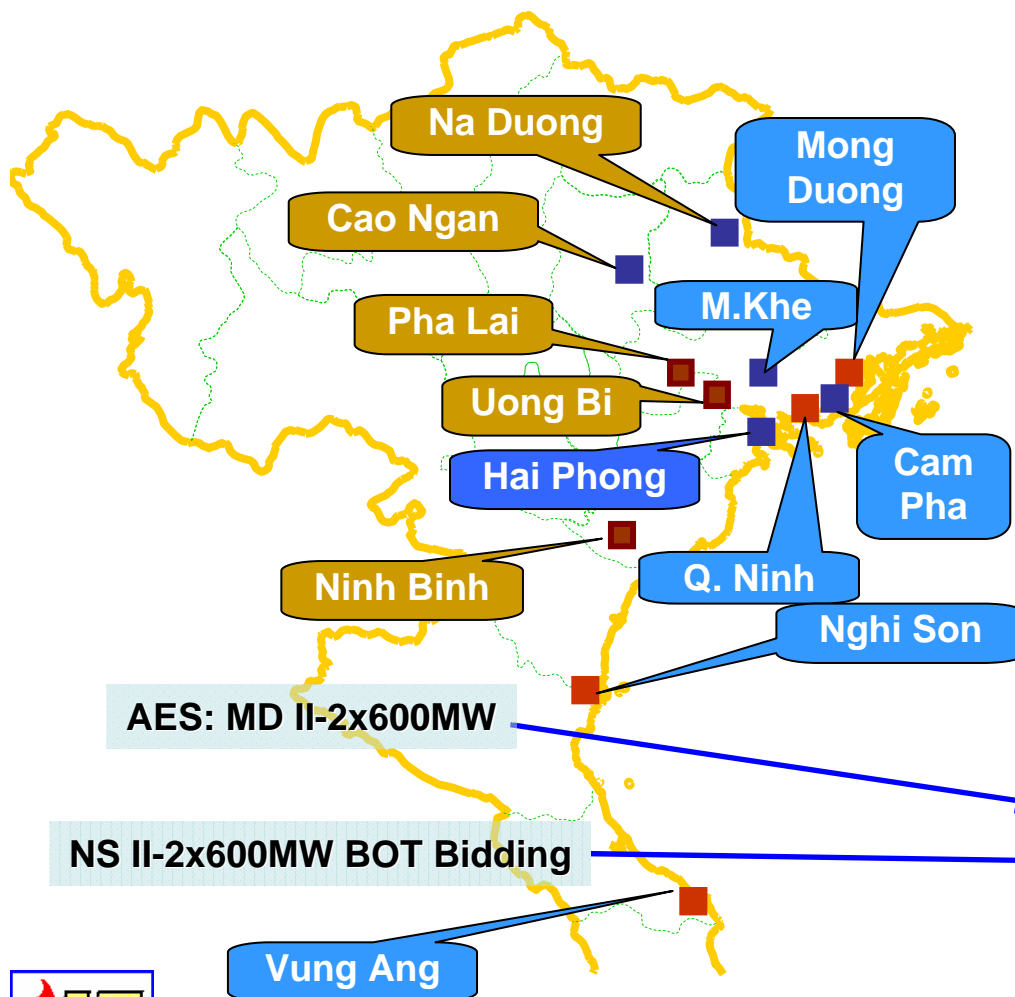
- From January to May of 2008: Power Demand grew by more than 16%
- Power Demand in 2010 will be about 100-110 TWh
- 25 power plants are under construction, up to 2010 total new capacity of 11000MW will be in operation



NEW PPs in 2010-2012



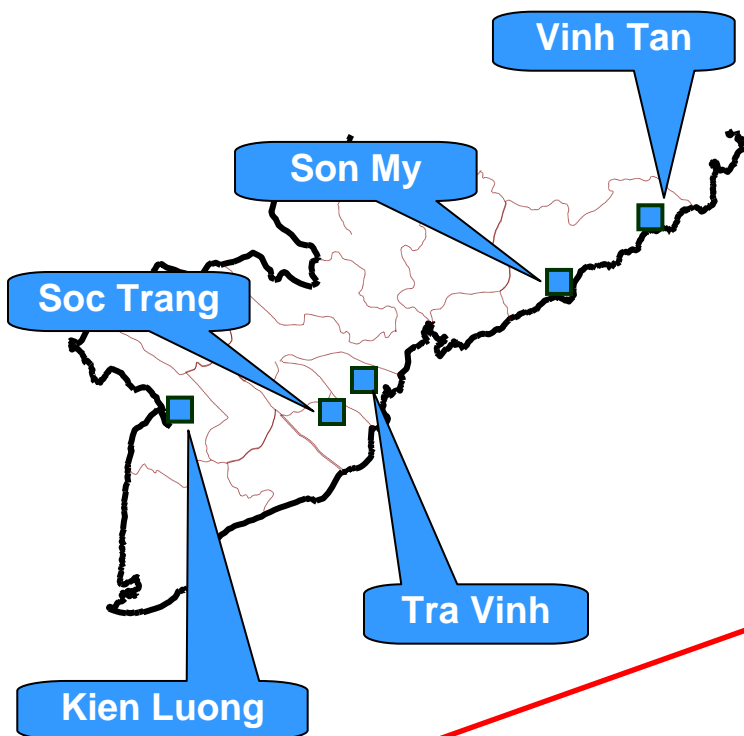
Coal-Fired Projects in the North



	P(MW)	SITUATION
UONG BI	405	OPERATION
NINH BINH	100	OPERATION
PHA LAI	1040	OPERATION
NA DUONG	110	OPERATION
CAO NGAN	100	OPERATION
SON DONG	220	2009
CAM PHA	600	2009-10
HAI PHONG	1,200	2009-2010
UONG BI (ext)	300	2012
MAO KHE	440	2010-2011
QUANG NINH	1,200	2009-2010
THAI BINH	300	2012
MONG DUONG	2,200	2012
NGHI SON	1,800	2012-2013
VUNG ANG	2,400	2012-2013
TOTAL	12,415	



Coal-Fired Projects in the South



	P(MW)	SITUATION
VINH TAN	4,400	2010-15
SON MY	2,400	2012-15
TRA VINH	4,400	2011-16
SOC TRANG	4,400	2013-17
KIEN LUONG	4,400	2013-18
TOTAL	20,000	

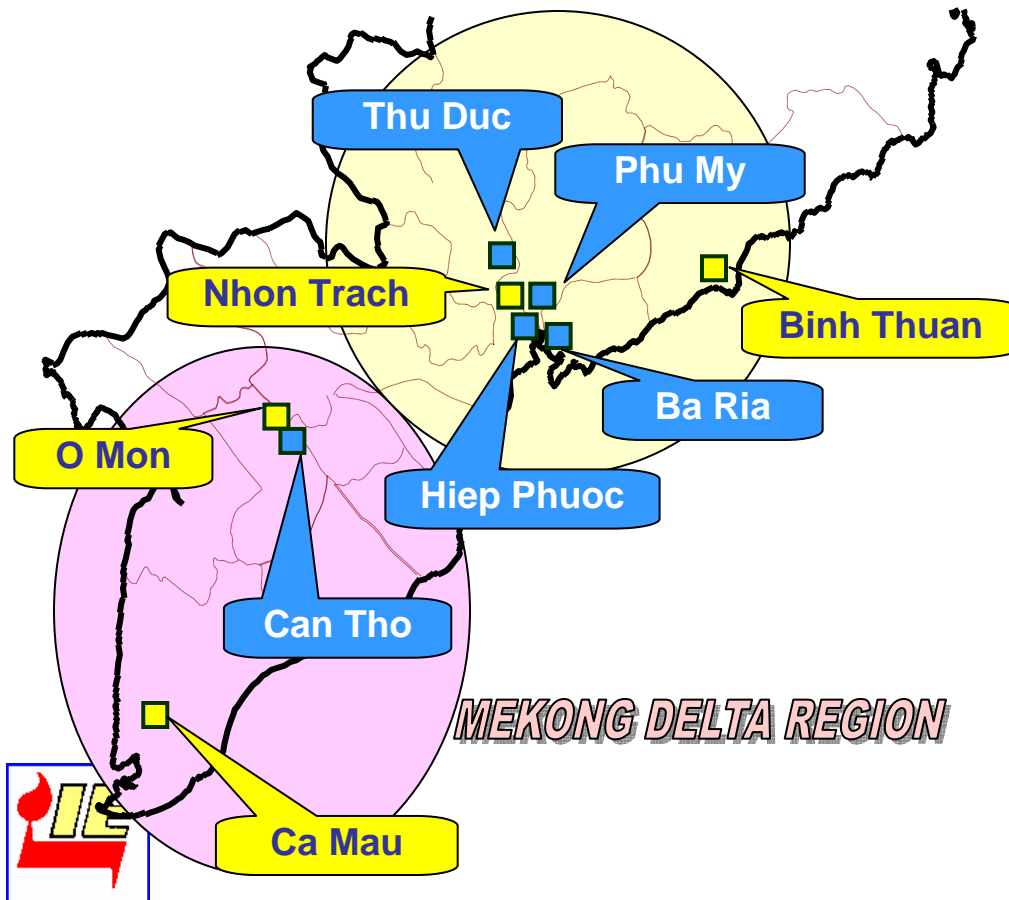
CSG:
VT I - 2x600MW

BOT/BOO



GAS & OIL FIRED PROJECTS

HCM-DN-BRVT INDUSTRIAL TRIANGLE



	P(MW)	SITUATION
THU DUC	291	OPERATION
CAN THO	183	OPERATION
BA RIA	387	OPERATION
HIEP PHUOC	375	OPERATION
PHU MY	3,900	OPERATION
CA MAU	1,500	2007-2008
O MON	2,800	2009-2015
NHON TRACH	1,200	2008-2010
TOTAL	10,636	

Transmission interconnection projects



Introduction of Hydropower Projects are being considered in Cambodia

	Name of Projects	Capac. MW	Comissioning	Developers	Remarks
1	SeSan 1	90	2013-2014	VN-Cambodia PJS	PreF/S on-going
2	Lower Sesan 3	180	To be dated	Na	Planning
3	Lower Sesan 2	420	2014-2015	VN-Cambodia PJS	PreF/S on-going
4	Prek Lieng 1&2	64+64	To be dated	Na	Planning
5	Lower Srepok 5,6,8 &9	~300	To be dated	Na	Planning
6	SamBor	467	To be dated	Na	Planning
	Total	1685			

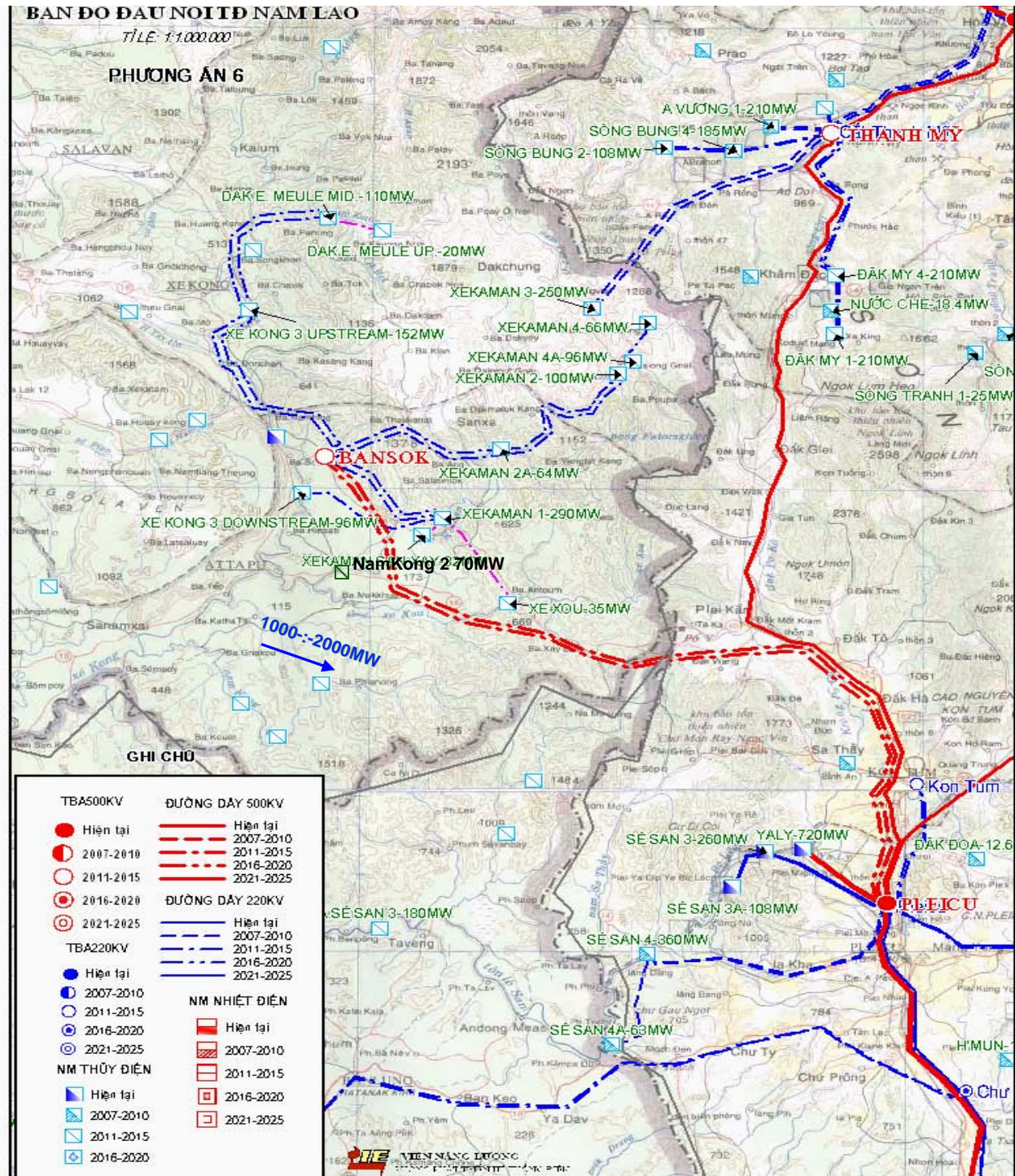


Introduction of Hydropower Projects are being considered in Lao PDR

	Name of Projects	Capac. MW	Comissioning	Developers	Remarks
1	Nam Et 1	140	2012-2013	EVN-Sovico	MOU-Planning
2	Nam Et 2	170	2012-2013	EVN-Sovico	MOU-Planning
3	Nam Et 3	110	2013-2014	EVN-Sovico	MOU-Planning
4	Nam Mo	105	2012	VN developer	PreF/S
5	Nam Kan	66	2012-2013	EVN-...	PreF/S on-going
6	Nam Kong 2	70	2014	EVN-Cavico	Planning
7	Xe Xou	60	2013	EVN-Cavico	Planning
8	Xe kaman 3	250	2009-2010	EDL-VietLao PJS	Under Contr.
9	Xe kaman 1	290	2011-2012	VietLao PJS	F/S
10	Xe kaman 2&2A	100+64	2015	VN developer	Planning
11	Xe kaman 4&4A	74+69	2013	Lao & VietLao PJS	MOU & PreF/S
12	Xe Kong 3 upper	152	2013-2014	VietLao PJS	PreF/S
13	Xe Kong 3 down	96	2014-2015	VietLao PJS	PreF/S
14	Dak E Meul Upper	23	2014-2015	Lao & VietLao PJS	PreF/S
15	Dak E Meul Mid	115	2014-2015	Lao & VietLao PJS	PreF/S
16	Xe kaman Xanxay	32	2011-2012	Lao & VietLao PJS	F/S
17	Luong PhaBang	1410	2015-2016	Lao-PVN-Song Da Co	PreF/S on-going
18	SeKong 4	420	<i>TBD</i>	Region Oil & Others	F/S on-going
19	SeKong 5	250	<i>TBD</i>	Region Oil & Others	F/S on-going
20	Nam Kong 1	100	<i>TBD</i>	Region Oil & Others	F/S on-going
21	HP Projects in Nam Xam river	~730	<i>TBD</i>	Saigon Invest & Others	Planning
	Total	4896			



Ban Sok-Pleiku 500kV line projects



promissing interconnection projects

with China

- Yunnan–Soc son: **500kV**; ~450km

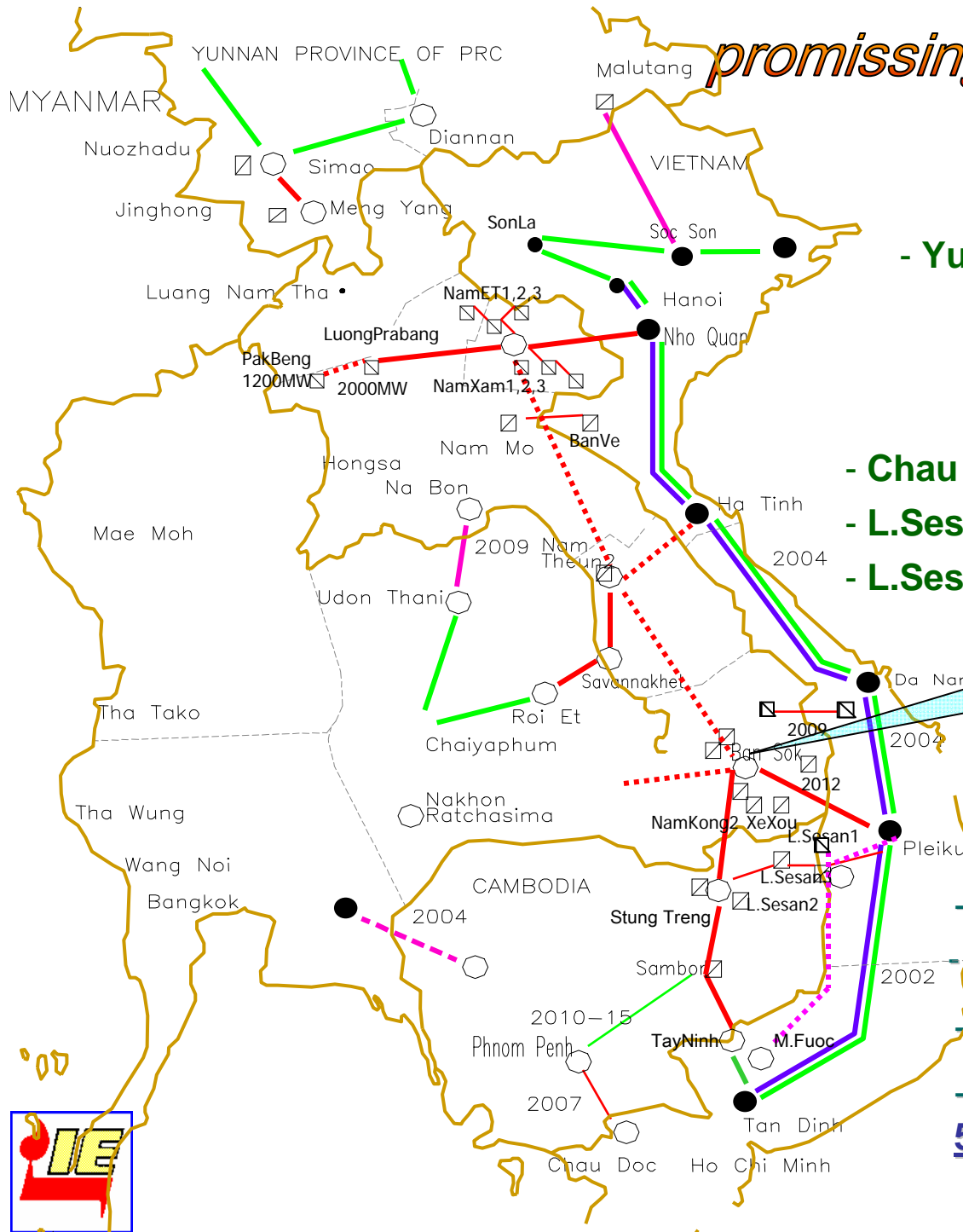
with cambodia

- Chau Doc–Phnom Penh: **230kV**; 90km; 2008
- L.Sesan 3- L.Sesan1: **230kV**
- L.Sesan2 – StungTreng - Tay Ninh: **500kV**

Xekaman1,2,2A,4,4A Xanxay,
U&L.Xekong3, DakEmeule U&M
X.Kong4 & 5

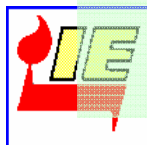
with LAO PDR

- Nam Mo – Ban ve: **230kV**; 85km; 2012
- Sekaman3 – Da Nang: **230kV**; 2009
- Pleiku–Ban Sok: **500kV**; 190km; 2012
- Luong Phabang-Samnua-NhoQuan: **500kV** 400km; 2015-2016



Key issues

- ✓ It is necessary to facilitate the proceed of consultant selection to study the **500kV line from China to Vietnam** (timing? AC or DC option?,...)
- ✓ 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
- ✓ There will/may be the 500kV lines:
 1. from **Ban Sok – Pleiku**
 2. from **Ban Sok - Stung Treng -Tay Ninh**
 3. from **Luongphabang – Xamnua – Nho Quan**
- ✓ The **economics options** of transmission lines should be proposed
- ✓ The **investor/owner, legal organization, operation & maintenance, wheeling charges?**
- ✓ A “**Master plan of Indochina’s power transmission system**” might be carried out
 1. *A budget’s sponsor?*
 2. *An International consultant?*



Thank you

