

Summary of Discussions
Planning Working Group (PWG)/ Focal Group (FG) Meetings
Ninth Meeting of the Regional Power Trade Coordination Committee (RPTCC-9)
Fourth Meeting of the Subregional Energy Forum (SEF-4)
Shenzhen, Peoples' Republic of China (PRC), 26-27 October 2010

Objectives

1. The PWG/FG/RPTCC-9 meeting: (i) took stock of the final reports and recommendations of regional technical assistance project (RETA) 6440 (Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the GMS), (ii) discussed successor RETA on support for sustainable GMS power trade development and its implementation arrangements, (iii) reviewed the country progress reports on power development plans, and (iv) considered various institutional options for developing power trade.
2. The SEF-4 meeting discussed the following: (i) country developments in the energy sector, and national strategies for CC/greenhouse gas reduction targets; (ii) progress in the GMS Road Map for Expanded Energy Cooperation; and (iii) implementation plan for RETA on Promoting Renewable Energy (RE), Clean Fuels (CF) and Energy Efficiency (EE) in the GMS. Knowledge sharing session focused on (i) Viet Nam's experience in rural electrification; and (ii) Carbon Capture and Storage (CCS) as climate change (CC) mitigation approach.
3. The PWG/FG/RPTCC-9 and SEF-4 meetings were held in Shenzhen, PRC on 26-27 October 2010 and co-organized by the National Energy Board (NEB) and China Southern Power Grid Company (CSG) of PRC and the Asian Development Bank (ADB). It was attended by RPTCC/SEF nominees of four (out of the six) GMS member countries, as well as by representatives of ADB, Agence Francaise de Developpement (AFD), Environment Operations Center (EOC), Swedish International Development Cooperation Agency (Sida), World Bank (WB), and RTE International/ Center for Energy Environment Resources Development (CEERD). Attached is the agenda and program of the meetings (Annex 1) and the list of PWG/FG-RPTCC-9 and SEF-4 participants (Annex 2).
4. The PWG/FG/RPTCC-9 meeting was co-chaired by Mr. Xu Jilin, Division Chief, National Energy Bureau (NEB), PRC and Anthony Jude, Director, Energy and Water Division (SEEW), Southeast Asia Department (SERD), ADB. The SEF-4 meeting was also co-chaired by Mr. Xu Jilin, Division Chief, NEB, PRC and Mr. Anthony Jude, SEEW, ADB.

PWG/FG/RPTCC-9 Meeting (Day 1)

Opening Session

5. Mr. Xu Jilin, Division Chief, NEB, PRC, welcomed everybody to the meeting and thanked the GMS delegates and ADB for the active support for the RPTCC. He noted that Shenzhen is the first special economic zone of China and its 30-year history of success ushered in the country's opening up policy and eventual economic modernization. This has propelled China, particularly its energy companies, to a leading global role in terms of energy production and consumption, and in the development and utilization of renewable resources such as hydropower, solar, wind and clean energy processes such as carbon capture and storage (CCS). He looked to today's meeting as an opportunity to share information and strengthen

coordination and GMS relationships, pushing GMS cooperation to a new level. He wished everyone a productive meeting and good outcomes.

6. Mr. Anthony Jude, Director, SEEW, ADB, welcomed the participants and thanked the host, the NEB and CSG for the gracious hospitality and excellent meeting arrangements. He informed that henceforth PWG and FG meetings will be referenced to concurrent RPTCC meetings and no longer numbered separately. He explained the plan for the meeting, which will include discussing: (i) results and recommendations of RETA 6440, (ii) implementation plan for successor RETA to ensure sustainable regional power development, and (iii) regional institutional arrangements to develop GMS power trade. He added that brainstorming on these areas during plenary discussions would provide guidance to the countries on needed institutional mechanisms to graduate to more advanced stages of power trading and on measures to ensure better environmental and social sensitivity to GMS power development. Moreover the plenary would take up the next steps following RETA 6440, which cover updating of the master plan updating, improving database usage, and building environmental management planning (EMP) capacities. He stressed that identified priority issues to be addressed by the new GMS Strategic Framework, e.g., food security, energy sufficiency and efficiency and climate change (CC), are in step with the RPTCC's focus on ensuring environmentally sustainable GMS power development.

RETA 6440: Key Results, Conclusions and Recommendations

7. **Presentation on Component 1** (Annex 3). Mr. Michel Caubet, Project Team Leader, RTE International, reviewed the objectives and implemented activities of RETA 6440's components 1 and 2. He presented the results and conclusions of component 1 modules such as regional interconnection master plan, methodology for benefits assessment, power transmission studies, GMS regulatory framework, and update of the regional database structure. He presented on the update of the RPTCC Road Map and showed the activities and timelines according to the various milestones specified under the MOU-2 signed in Lao PDR in March 2008 to fully achieve stage 1 of power trade. He discussed the progress in the various activities and their corresponding deliverables achieved under the RETA.

8. **Presentation on Component 2** (Annex 4). Mr. Thierry Lefevre, Project Deputy Team Leader, CEERD, reviewed the organization of the RETA and noted that components 2 is composed of two modules, strategic environmental assessment (SEA) and environmental impact assessment (EIA). He noted that a project office was set up in Bangkok, and gave the structure of the project website which was launched in January 2009. He discussed the specific objectives, methodology, implemented activities and technical reports/outputs of component 2. He elaborated on the cooperative activities undertaken with component 1 team and GMS partners such as EOC and MRC, such as training/ workshops/ field trips, researches, and good practice dissemination. He presented the conclusions and recommendations from component 2, in terms of achieving sustainable development of GMS energy resources. He also recommended that future RPTCC meetings include representatives from GMS countries' environmental agencies, as well as favouring environmental and social trainings of trainers (universities, academia, etc.) to ensure sustainability, replicability and increased impacts of these activities.

9. Mr. Caubet then provided an update of the RPTCC Road Map, specifying the various activities and timelines needed to achieve the Road Map's key milestones. He proceeded to present the outline for the proposed regional organization, and gave the rationale, governance structure and main elements of the GMS Coordination Centre. Finally, he enumerated the way

forward for the GMS, focusing on the establishment of the regional electricity market (REM) organization through an inter-utility memorandum of understanding (MOU).

10. **Discussions.** The GMS countries raised the following issues/ points on the presented results/ recommendations of RETA 6440:

- a. Myanmar asked whether wheeling charges/ transit fees/ right-of-way were considered in the master plan study. RTE clarified that the study did not go through this detail but would be considered in later feasibility studies.
- b. PRC asked whether a formal regional regulatory body is being proposed for the future REM. RTE noted that it did not go into the details of the REM regulatory body, but stressed there is a need to start thinking about the framework for regulatory functions at the regional level.
- c. Lao PDR noted the need to strengthen coordination in integrating environmental considerations in power development planning.
- d. Viet Nam inquired about the suggested capacities of transmission lines involving Viet Nam and its GMS neighbors. RTE said such information is in the master plan final report which also reflects the countries' comments.
- e. Viet Nam noted the importance of benefits sharing assessment for hydropower/ transmission projects being developed. He supported the idea of establishing the REM coordination center but stressed the need to develop the detailed concept note for this center.
- f. ADB proposed another RPTCC meeting in December 2010 to firm up the configuration of priority GMS generation and transmission projects under the master plan and to consider key elements of the proposed REM center in the concept note.

Ensuring Sustainability of GMS Regional Power Development- Application of Strategic Environmental Impact Assessment (SEA) and Risk Analysis (Annex 5)

11. Ms. Isabelle Vincent, Project Manager, Environment and Infrastructure, AFD, provided a background of AFD's development work (objectives, financial tools and commitments) with strong focus on energy/climate agenda. She said the new RETA fits AFD's clean energy strategy and meets the need for stronger social/ environmental consideration in energy planning. She noted that GMS development challenges would benefit from solutions adapted to global concerns, leading toward long term sustainability and energy security.

12. Mr. Carl Bernadac, Energy and Climate Expert, AFD, reflected on the results/ conclusions of RETA 6440 and stressed the huge benefits from integration of the GMS power market. He outlined the additional development issues to be addressed by the new RETA and the need to factor environmental externalities and scarcity in power master planning, re-assessing supply-demand scenarios, and undertaking risk analysis. He showed the different elements involved in integrating social and environmental factors in energy planning, and how to factor in energy security considerations (price volatility, financial crisis, depletion/ supply disruptions). He discussed the components of sensitivity analysis and capacity building under the RETA.

13. **Discussions.** Ms. Isabelle updated on the status of RETA preparation and financing and showed the implementation steps and schedule for Phase I (SEA, scenario analysis) and Phase 2 (capacity building and pilot national PDP). Mr. Bui clarified that the RETA is ready for approval and is waiting for the final round of comments from the countries. Mr. Haag (Sida) asked whether a broader range of stakeholders (e.g., academia) would be involved in the RETA

implementation especially SEA capacity building. Mr. Sumit Pokhel (EOC) noted that the SEA is a continuing process and that we need to learn from various SEA experiences and build on these. AFD stressed that further refinements in the RETA's design and implementation plan will be made to better respond to the countries' needs. Mr. Jude stressed the need for tighter links between energy and environment agencies to ensure social/environmental impacts are properly considered in developing energy projects.

Regional Institutional Arrangements to Develop GMS Power Trade- Lessons Learnt from ESMAP Studies (Annex 6)

14. Mr. Jie Tang, Senior Energy Specialist presented the background and general principles for regional power trade institutions, which provide the means and forums for involvement of all countries, and should be harmonized to the phased evolution of power trade. He showed the institution's functions at different stages: preliminary stage, multi-country/grid integration stage, and power market stage. He discussed the various challenges of GMS power trade (political, economic, technical and institutional). He summarized the similarities/differences in, and assessment of, international experiences in regional power trade institutions. He described the characteristics of four power pools: Southern African Power Pool (SAPP), West African Power Pools (WAPP), Central America Power Market/ SIEPAC Transmission Project, and the South East Europe (SEE) institutions. He discussed the various lessons learned and recommendations from these experiences and asked for countries' comments/feedback on the full report in regional power sector integration.

15. **Discussions.** Mr. Jude informed that the heads of GMS delegations agreed earlier on the need for the regional institution and the WB presentation provided the steps by which the institution could be established. The countries' comments included the following:

- a. PRC noted that national regulators could be involved in the regional institution, and could contribute to the rules to be agreed upon through say, a regulatory forum.
- b. Mr. Tang said that national regulators indeed have a key role in setting of rules for the regional market.
- c. Per Viet Nam's request, Mr. Caubet elaborated on the governance structure and organization of the SAPP.
- d. Mr. Bernadac and Mr. Caubet explained how the institutions evolved following establishment of transmission interconnections among WAPP states.
- e. Mr. Dejan R. Ostojic, Sector Leader, WB stressed the importance of a clear mandate and legal charter as well as funding support for the regional institution and elaborated on the evolution of the SEE institution with the strong backing of the European Economic Community (EEC).

Country Progress Reports on Power Development Plans and Transmission Interconnection Projects (Demand Projections, Planned Generation/ Transmission Projects, and Planned Interconnections with GMS Countries) (Annex 7)

16. **PRC.** Mr. Hu Feixiong, Division of Strategic Planning, Planning and Development Department, CSG gave the status and coverage of CSG in 2009: capacity, generation, consumption, internal power exchange, GMS countries' exchanges, and major projects. He showed CSG's 12th five-year plan (2010-2015) composed of generation and transmission expansion projects based on demand projections to 2015. He focused on various cooperation

projects of PRC with Myanmar, Viet Nam, Lao PDR, Cambodia and Thailand (suspended in the meantime for the latter two countries).

17. **Comments.** Mr. Bui (ADB) asked whether CSG's future GMS transmission links correspond to the recommended lines in the GMS master plan. PRC replied that consistency of the CSG plans with the GMS master plan would be discussed shortly with RTE.

18. **Lao PDR.** Mr. Vilaporn Visounnalath, Electricite du Laos (EdL), provided introduction to the power sector's role to Lao PDR's economic goals, and gave the status of existing generation facilities and transmission line and substation facilities. He discussed Lao PDR's energy consumption record, past peak load record and gross power generation and power export-import for the 2001-2009. He gave the electrification record as of 2009, which hit 95.1% of all districts, and explained the electricity demand forecasts. He discussed the Power Development Program (PDP) 2010-2020, which consisted of the generation expansion plan for domestic supply, generation expansion plan, and demand supply balance, among others. He showed the expected configuration of the country's transmission system network in 2015 and 2020.

19. **Comments.** WB informed that it will fund the construction of 230 kV transmission line from Ban Hat (Lao PDR) to Stung Treng (Cambodia) to evacuate 400 MW of electricity. The project will be commissioned by 2014. WB clarified that the capacity (planned for 400 MW, double circuit) of transmission lines it is financing in southern Lao PDR would be phased according to the growth in power demand in the area.

20. **Myanmar.** Ms. Mi Mi Khaing, Director, Department of Electric Power, Ministry of Electric Power No. (2), showed the demand forecast from 2001 to 2030 and the total installed capacity in the country from various sources in 2010. She presented the future generation plan consisting of hydropower and coal-fired thermal projects. She listed the existing and future transmission facilities and showed their configuration in the map of Myanmar. She discussed the country's interconnection plan that would link with the major hydropower projects for future development, with most power for export going to PRC. She noted the progress in developing cross-border power trade between Myanmar and PRC.

21. **Comments.** There were queries on the destination of Myanmar's power exports, and it was clarified that most of Myanmar's power exports would go to PRC and some to Thailand and India. Myanmar clarified that it would explore joint ownership of the transmission lines that would evacuate power from its hydropower source.

22. **Viet Nam.** Mr. Nguyen Anh Tuan, Deputy Director, Institute of Energy, showed the current situation of the Viet Nam power system (market share and fuel mix of generation). He showed the installed capacity versus peak demand, power generation and load curves for various periods. He showed the power demand forecast from 2011-2020, showing doubling of demand midway, the power plant development by fuel types and the resulting generation mix in 2010, 2015 and 2020. He projected the situation by 2020 of the 500 kV grid of the northern and north-central regions, and the central and south regions. He discussed the plans for power interconnection and trade with GMS neighbors and the various issues in promoting power trade among PRC, Cambodia, Lao PDR, and Viet Nam.

23. **Comments.** Lao PDR updated on the status of the LAO-VIE interconnection line to tap the power to be generated by hydropower projects in southern Lao PDR.

Discussion on Key Priority Plans and Projects

24. Lao PDR requested guidance on how to proceed with financing of the LAO-VIE transmission link. Mr. Jude raised possible options for financing of this line, and suggested Viet Nam, as developer of the hydro projects in southern Lao, to also finance the transmission line and help build Lao capacity for operating high voltage lines.

25. Mr. Jude noted that Myanmar presented many interesting power export projects to PRC, India and Thailand. He stressed the need for the countries to share information to come up with informed decisions on the viability of cooperation projects.

26. Mr. Tang said that data sharing is a critical issue in making decisions on power investments, and it would be useful to work on building trust between countries and utilities. Mr. Jude stressed at this point the necessity for the regional center to further build trust and enhance information sharing.

Concept Note on Developing GMS Regional Coordination Center (Annex 8)

27. Mr. Duy Thanh Bui, Senior Energy Economist, ADB, reviewed the current status of GMS regional power trade and looked ahead in terms of the regional agreements on power trade. He explained the challenges of power trade development and the need for permanent GMS institution to move forward. In meeting this need he said ADB is willing to facilitate the setting up of this institution and donors are willing to support with GMS countries defining the modality, roles, responsibilities and functions of the regional coordination center (RCC). He requested for ideas to prepare the RETA to establish this institution. The RETA's outputs would include the MOU signed by GMS Ministers to establish the RCC and the pilot running of the RCC (2 years).

28. Mr. Goran Haag, Senior Program Manager, Sida, noted that a momentum for RPT has been created and understands that GMS countries are committed to the RPTCC and in principle agree to the RCC. However he stressed the importance of the GMS countries taking ownership of the RPT program. Without such ownership there is a clear risk to lose the momentum that is built. He stressed the importance of acknowledging the realities in the GMS region (e.g., development levels, power system size), and being aware of the risks (e.g., lack of commitment and resources). He said it is important to Sida in the assessment of a support to prepare for and initiate a coordination center, that the RPTCC/ power utilities are committed to the road ahead, that the countries are actively involved in the design of the proposed RETA, that poverty environment and social issues are considered, and that links should continue with the ASEAN, MRC, EOC and the new AFD RETA..

29. Mr. Jude said the countries agreed that the RCC would take over the work of the RPTCC. The head of the RCC would be appointed on rotation basis for a three-year term. The RCC location would be further discussed, depending on the interest and terms of offer of prospective host. The MOU to establish the center would be signed in a GMS Ministerial Meeting. He is looking at a time frame of one year to prepare the MOU, define the structure, functions, financing and operation of the RCC, and obtain internal clearances for MOU signing. He proposed an RPTCC meeting on 14-15 December 2010 in Bangkok to further flesh out the RETA's scope and the implementation plan for the RCC.

30. **Discussions (Key Issues).** Below are the participants' views on the proposed RCC:

- a. PRC asked whether some of the proposed RCC functions could be performed by the RPTCC at this time, and what would be the relationship of the RCC with the RPTCC,

- bearing in mind the need to avoid duplication of work. She also asked about the funding issue of the RCC, and how to ensure the financial sustainability of the RCC's operations. She also asked for clarification of ADB's role under the RCC, relative to the RPTCC.
- b. ADB clarified that it would remain a GMS Secretariat for various sectors of GMS cooperation until it is needed. ADB however would expect stronger GMS ownership and leadership of power trade activities when this is taken over by the RCC, with ADB and development partners in a supporting role.
 - c. PRC stressed the need for more discussions on this issue, and ADB agreed that the Bangkok meeting (December 2010) would provide the avenue for this.
 - d. WB noted the importance of having the mandate for the RCC, and the need to elevate the discussions at the Ministerial level to seal legal commitments to the RCC.
 - e. PRC requested for more information on the structure and operations of the regional power markets to serve as brief for GMS delegates in preparation for discussions at the December 2010 meeting.
 - f. AFD shared that RETA funds could be used to initially support RCC operations, in some cases up to 100% of operating costs but with a clear phase-out plan.
 - g. WB agreed that the GMS countries would be best placed to decide on the form of the regional institution. Donor funding could be used to support the initial operations of the institution.
 - h. ADB clarified that RPTCC is focused more on policy coordination, while the RCC could focus on operations and report to the RPTCC. He asked the GMS members to input their experiences with the ASEAN bodies in deciding on the RCC.
 - i. Viet Nam supported the proposed RCC, appreciated the comments from PRC and stressed the need to specify the relationship between the RCC, RPTCC and ADB.
 - j. Myanmar agrees in principle to the proposed RCC but would look forward to a review of its details (structure, functions, funding, etc.) and possible eventual integration for the whole energy sector, as the RPTCC is part and parcel of the SEF.
 - k. Lao PDR supports creation of the RCC, which is expected to push forward key interconnection projects in the GMS.

Plenary Discussion: Implementation Aspects of RETA: Ensuring Sustainability of GMS Regional Power Development

31. Mr. Bui informed that the proposed RETA paper would be submitted for approval in ADB shortly. He asked the GMS delegates to submit their comments on the RETA paper on or before Friday, 5 November 2010. GMS countries' no-objection to the RETA in writing would also be needed after RETA approval (prior to RETA implementation).

Closing Session

32. **Synthesis of Discussions.** ADB (Mr. Jude) gave a recap of the key items discussed during the meeting, which covered the overview of RETA 6440 outputs, the proposed new AFD RETA, the proposed RCC to oversee power trade development, and the various country presentations on progress of power development programs to meet the rapid growth of demand in the GMS region. He noted the usefulness of the information shared during the country presentations, notably the various power export projects in Myanmar, Viet Nam's generation expansion plans for meeting its power needs, and Lao PDR's need for financing support for developing its transmission links to export to Viet Nam. He noted the useful discussions on the concept for the RCC and the need to move forward on this through the Bangkok RPTCC meeting on 14-15 December 2010, especially to discuss the financing structure and other GMS-

suitable RCC elements based on the power pool experiences elsewhere. He said a draft RETA paper for establishment of the RCC earlier prepared by ADB, would be refined and circulated as reference for the December 2010 meeting.

33. **Consideration and Adoption of Proceedings.** Mr. Jude announced the distribution of the draft summary of proceedings for review by the participants. After the RPTCC members reviewed the draft summary of proceedings, and after incorporation of suggested changes, the body therefore approved the minutes of the PWG/FG/ RPTCC-9 meetings *ad referendum*.

34. **Closing Remarks.** Mr. Jude thanked the participants and appreciated the substantive contributions of the GMS participants and development partner representatives during the discussions to advance power trade development through establishment of a more formal regional institution. The development partners present (AFD, Sida, and WB) all expressed appreciation to the commitment of the GMS countries to the regional power institution and looked forward to further discussions on this matter.

SEF-4 (Day 2)

Opening Session

35. Mr. Anthony Jude, Director, SEEW, ADB, welcomed the participants and noted that PRC is a fitting venue for following up the progress of the GMS Energy Road Map given (i) PRC's strong interest in leading its implementation and (ii) PRC's global leadership in such key Road Map activities as renewable energy (RE) equipment manufacture, energy service companies' deployment, clean coal technology application and promotion of RE and energy efficiency (EE). He recalled that the last SEF meeting in Cambodia considered the best ways to achieve the Road Map's objectives and help propel the energy sector at the forefront of the GMS region's CC response. The SEF-4 meeting therefore would take up a key Road Map component, the ADB's new RETA to promote RE, clean fuels (CF) and EE involving developing business models for propagating suitable RE, CF and EE technologies, and strengthening the SEF for capacity building and knowledge dissemination. He informed that the RETA would be implemented starting early 2011. He briefed on the knowledge sharing sessions dealing with Viet Nam's rural electrification experience, and carbon capture and storage as a CC mitigation approach and looked forward to future focus of such sessions on other priority Energy Road Map issues.

Country Presentations: Developments in Energy Sector and National Strategy for CC Issue/ Targets for Greenhouse Gas Reductions (Annex 9)

36. **Viet Nam.** Ms. Dao Minh Hien, Director of Planning and Supply Demand Monitoring Department, Electricity Regulatory Authority of Vietnam (ERAV) provided an overview of Viet Nam's energy resources and discussed the country's energy development strategy, consisting of overall energy targets, policies and mechanisms, power sector targets and plan to 2020, power strategies and measures, and power market development. She noted the potential impact of CC in Viet Nam and presented the national target program to respond to CC, its objectives and various activities. She then informed of the country CC adaptation activities such as the National Implementation Program for the National Strategy for Disaster Mitigation and the Action Plan Framework for Adaptation in CC in the Agriculture and Rural Development Sector (2010-2020).

37. **Comments.** In response to AFD's query, Ms. Hien provided additional information on efforts to establish a competitive generation market in Viet Nam, which will commence in 2011. She stressed that reliance on cleaner energy sources (RE and nuclear) will help offset increased emissions from coal plants to be tapped to meet power demand. She also elaborated on the EE law being prepared to manage the demand side, which includes pricing reforms. Mr. Tuan (Institute of Energy, Viet Nam) briefed on the RE law that would enable RE sources to compete in the generation market.

38. **Myanmar.** U Htin Aung, Deputy Director General, Energy Planning Department, Ministry of Energy (MOE), presented the institutional and policy framework for the energy sector in Myanmar, with the MOE as focal point for energy sector cooperation. He presented the energy sector status and forecasts (primary energy consumption and supply by type, energy resources available, and oil and gas bearing areas). He informed of current onshore and offshore activities, and natural gas development projects. He presented forecasts for the electricity and coal sectors. He discussed Myanmar's various clean energy efforts such as the RE program, rural electrification using mini hydropower, and cleaner fossil energy program. He then

discussed Myanmar's EE policy, goals and measures and its CC policy, targets and responses for GHG emissions reductions.

39. **Comments.** U Htin Aung clarified in response to AFD's query, that hydros in the primary energy supply, by type, includes large and small scale hydro projects. He noted that while jatropa cultivation is no longer considered priority, the promotion of improved cooking stoves remains a priority. He expressed that there is scope for improving coordination of work among the different energy agencies. He elaborated on the status and challenges of developing the Myanmar-China oil and gas pipeline (which will cut back on transport time of imported crude from the Middle East to China).

40. **Lao PDR.** Mr. Vilaysone Sourigna, Chief, Department of Energy Promotion and Development, Ministry of Energy and Mines, provided the status of oil, gas and coal supply and consumption in Lao PDR. He briefed on the growth in the power sector and electrification coverage (74% in 2010), status of power export agreements with Thailand and Viet Nam, and ownership and development status of various hydropower projects. He noted that the government is drafting the RE strategy policy and targeting RE to comprise 30% of total energy by 2025. He discussed the country's strategy on CC and recent efforts to improve CC adaptation and mitigation, and identified five key priority sectors: agriculture/food security, forestry/land use change, water resources, industry, and energy/transport.

41. **Comments.** In response to ADB's query, Mr. Vilaysone clarified that there is no policy yet on the management of oil and gas supply and consumption.

42. **PRC.** Mr. Hu Feixiong, Division of Strategic Planning, Planning and Development Department, CSG, presented a video "China's Energy Path" which featured the evolution of China's energy industry and focused on the status of the coal, oil and gas sectors. It showed the progress of the country's power generation and transmission system which employed state-of-the-art equipment and technology. It also discussed the development of RE sources (biomass, nuclear, wind and solar) and the emphasis on managing energy consumption. It discussed the importance of international cooperation to attain common strategic energy objectives with its partners, such as improved energy security and efficiency and CC mitigation.

Implementation Plan for RETA: Promoting RE, CF and EE in the GMS (Annex 10)

43. Mr. Pradeep Tharakan, Climate Change (CC) Specialist, SEEW, ADB, briefed the group on the role of the SEF and the aims of the GMS Energy Road Map, and gave a background on the RE targets and efforts in GMS countries. He provided the key rationale for the Road Map, and stressed that many answers to the challenges faced by GMS countries could be found in the GMS region (Thailand and China). He then introduced the ADB RETA to promote RE, CF and EE, including its objective, status, budget, timeline, next steps and main features. He elaborated on the RETA's design and monitoring framework (DMF), focusing on the outputs, activities and milestones, which he linked to the Energy Road Map's priority activities. Mr. Tharakan provided details on RETA's implementation arrangements and listed the points for discussion, namely, the priority areas, the chair for SEF (2011-2013), GMS focal points and donor coordination. He also highlighted that the RETA is to be implemented through Environment Operations Center (EOC) in Bangkok to allow for greater integration with complementary activities being undertaken by the GMS working group on agriculture (WGA) and the GMS working group on environment (WGE).

44. **Discussions and Comments.** AFD stressed the synergies of this RETA with the AFD RETA and the usefulness of close coordination in their implementation. Mr. Tharakan noted that implementing the RETA through the EOC was designed to ensure better complementarity with the AFD RETA. Mr. Jude asked the countries to identify their focal persons by Friday, 5 November 2010, to facilitate the RETA's implementation and to help identify the areas where business models could be developed. The WB noted the need to coordinate also with a RE loan for Viet Nam which focuses on mini-hydro development. The meeting considered to offer the chairmanship of SEF to Thailand. Viet Nam suggested inclusion of demand side management (DSM) in the work under the EE side of the RETA.

45. Mr. Tharakan gave an overview of the ADB's CC adaptation work in Viet Nam, including two TAs. The first one is focused on evaluating climate risk and helping to develop adaptation plans focused on energy, transport and agriculture sectors in two provinces in the Viet Nam Mekong delta, namely: Cau Mau and Kieng Giang. .This TA will be initiated in December 2010. The second TA is designed to support the Ministry of Industry and Trade (MOIT), Ministry of Transport (MOT), the province of Thanh Hoa, and the cities of Da Nang and Ho Chi Minh to develop action plans as per the National Target Plan to respond to climate change.

Subregional Energy Forum (SEF) Knowledge Sharing Session 1: Electricity Access in Viet Nam: Success Story and Challenges (Annex 11)

46. Dr. Nguyen Anh Tuan, Deputy Director, Senior Energy Economist and Department Manager, Institute of Energy, Ministry of Industry and Trade, briefed on the rural electrification program in Viet Nam, and gave the milestones and factors to rapid electricity access in the country. He listed the various rural electrification programs and discussed the institutional arrangements and management structure for rural electrification. He noted the factors favoring the success of the program, such as people's desire to have electricity, strong national commitment, customized public-private partnership, clear demarcation of duties, effective partnership between EVN and local utilities, multiple funding sources and modalities, clear planning criteria and standards, and complementarities of different options for "last miles". He discussed the challenges in sustaining the program's success.

47. The following are the highlights of discussions on the Viet Nam presentation:

- a. ADB noted the subsidies being provided for rural electrification and Dr. Tuan said that this would continue for some time.
- b. High systems losses were observed and efforts to reduce such losses were noted.
- c. AFD asked about the criteria used to determine options for off-grid electrification for the "last miles"; Dr. Tuan clarified that cost/viability played a major role in the choice of power source (whether mini-hydro, solar, wind, diesel, etc.).
- d. The process of EVN takeover of local utilities to reduce systems losses was discussed and it was noted that this is an ongoing process that would require substantial financing by EVN.
- e. In response to Lao PDR's query, Dr. Tuan noted that the major factor of success of rural electrification was the leadership exercised by EVN in the program.
- f. Mr. Jude informed of an ADB loan project to develop mini-hydro projects in three Viet Nam provinces, which includes financing for grid connection and off-grid distribution lines.

Subregional Energy Forum (SEF) Knowledge Sharing Session 3: Introduction to Carbon Capture and Storage (CCS) as CC Mitigation Approach (Annex 12)

48. Mr. Pradeep Tharakan, ADB, provided a background on CCS, including capture technologies and storage options, and its global rationale. He presented an overview of the various applications of CCS including its abatement costs and the requirements for CCS readiness. He then described ADB's interest in CCS. He noted the role of CCS in Southeast (SE) Asia, showing its limited current prospects, importance and prospects in the future, and citing current understanding of storage capacity in Indonesia, Thailand, the Philippines, and Viet Nam. He elaborated on the barriers to CCS deployment in SE Asia, such as lack of economic incentives, absence of regulatory framework, poor understanding of storage capacity, lack of awareness, capability and coordination, and lack of public awareness and acceptance. He presented the ADB regional TA "Determining the Potential for CCS in SE Asia" and showed the key activities, implementation approach and key milestones of the current Phase I (2010-2011). He noted coverage of the proposed Phase II (2011 onward), involving national activities in an eligible country, and showed the findings of the recently completed CCS TA for China.

49. The following are the highlights of discussions on the CCS presentation:

- a. Mr. Bui noted the need for further studies on CCS safety/environmental issues, given the leak hazards from highly concentrated CCS waste. Mr. Tharakan replied that these issues require careful risk analysis and continuing dialogue.
- b. Mr. Tharakan stressed that only coal plants that meet supercritical standards is a prerequisite for CCS projects so as to minimize the energy penalty.
- c. Myanmar expressed concerns about possible long-term harm from possible leakages of the carbon-di-oxide from storage sites. Mr. Tharakan said that in nature, once it is injected in supercritical phase, the stored gas is slowly converted to stable carbonates that stay underground for the very long term.
- d. The meeting noted the emergence of technologies that would help turn the gas into economically useful commodities such as cement.

Closing Session

50. **Synthesis of Discussions/ Agreements.** ADB (Mr. Jude) recalled the discussions on the country presentations (developments in the energy sector and country CC strategies) and noted the clear GMS policies on RE promotion and the gradual shift to market based pricing. He cited the key points that stood out in the discussions. For Viet Nam, he noted the projected increase in GHG emissions from the various coal and gas fired plants to meet the rapid rise in power demand, and the urgency of a comprehensive CC response strategy to offset this. Viet Nam would also need to consider pump storage for nuclear waste, given projected expansion of its nuclear program. For Myanmar the challenge is in effectively coordinating energy development among five different ministries overseeing the energy sector. He noted the substantial hydropower and gas resources, and development of oil and gas pipelines which would support the country's energy exports. There is a need however for more clarity in Myanmar's CC response. For Lao PDR the challenge is in coming up with a policy to manage oil and gas price and supply disruptions, given its strong dependence on oil and gas imports, and the need for it to consider strategic reserves for these fuels. China's video showed its impressive gains in energy development over a 30-year span.

51. The knowledge sharing session on Viet Nam's rural electrification experience briefed on the factors behind Viet Nam's success in rural electrification, with government leadership through EVN as the main factor. He noted that cross-subsidies and donor financing also

contributed to this success. On the CCS presentation, Mr. Jude noted that CCS technology is still evolving, but should be seriously considered since it is the only GHG mitigation option for important base-load coal plants. More studies are needed to examine closely CCS costs and possible adverse impacts.

52. **Consideration and Adoption of Proceedings.** Mr. Jude announced the distribution of the draft summary of proceedings for review by the participants. After the SEF reviewed the draft summary of proceedings, and after incorporation of suggested changes, the body therefore approved the minutes of the SEF-4 meeting *ad referendum*.

53. **Closing Remarks.** Mr. Jude thanked the participants and appreciated their substantive contributions to the meeting. He looked forward to future SEF knowledge sharing sessions. He noted that in the Bangkok meeting in December 2010, the GMS countries would be consulted on future topics for such sessions, preferably on areas where GMS members could obtain strategic and policy options from other GMS members' experiences or development partners' knowledge products.

54. **Visit to the Charging Station for Electric Vehicles** (organized by CSG)



**Greater Mekong Subregion
Ninth Meeting of the
Regional Power Trade Coordination Committee (RPTCC-9)
RPTCC-9 Sub-groups: Planning Working Group (PWG)
and Focal Group (FG)
Shenzhen, People's Republic of China (PRC), 26 October 2010**

Agenda and Program

- 25 Oct (Mon)** Arrival of Delegates
- 26 Oct (Tue)** **Day 1: PWG, FG and RPTCC-9 Meetings**
- 08:30am- 08:45am Registration
- 08:45am- 09:00am Opening Session
- Welcome Address by Mr. Xu Jilin, Division Chief, International Cooperation Department, NEB (Head of PRC Delegation)
- Welcome Address by Mr. Anthony Jude, Director, Energy and Water Division [SEEW], Southeast Asia Department, ADB
- 09:00am- 10:30am Presentation on Key Results, Conclusions and Recommendations
- Achieved under RETA 6440: Facilitating Regional Power Trading and Environmentally-Sustainable Development of Electricity Infrastructure in the GMS – (RTE Consultants)
- Discussions by Meeting Participants
- 10:30am- 11:00am Coffee Break (Shenzhen Room Foyer)
- 11:00am- 11:30am Ensuring Sustainability of GMS Regional Power Development – application of Strategic Environmental Impact Assessment (SEA)
- Mr. Carl Bernadac and Ms. Isabelle Vincent
Agence Francais de Developpement (AFD)
- 11:30am- 12:00 nn Presentation on Regional Institutional Arrangements to Develop GMS Power Trade – Lessons Learnt from ESMAP studies
- Mr. Dejan R. Ostojic and Mr. Jie Tang
World Bank (WB)
- 12:00pm - 01:00pm **Lunch Break** (buffet lunch at Coffee Garden)
- 01:00pm- 02:30pm Country Progress Reports on Power Development Plans and Transmission Interconnection Projects (Demand Projections, Planned Generation/Transmission Projects, and Planned Interconnections with GMS Countries) (15 minutes each)
- Cambodia
 - People's Republic of China
 - Lao PDR
 - Myanmar
 - Thailand
 - Viet Nam

- 2:30pm – 3:00pm Discussion on Key Priority Plans and Projects
Discussion by Meeting Participants
- 03:00pm- 03:30pm Coffee Break (Shenzhen Room Foyer)
- 03:30pm- 03:45pm Concept Note on Developing GMS Regional Coordination Center
Mr. Duy-Thanh Bui, Senior Energy Economist, ADB
- 03:45pm- 04:45pm Plenary Discussion:
- Implementation aspects of the successor RETA: Ensuring Sustainability of GMS Regional Power Development
 - GMS Institutional Arrangements for Power Trade: model, role and responsibilities, organization, etc.
 - Recap of Recommendations on Results of RETA 6440 (e.g., Master Plan Update, Database Usage and Application)
- 04:45pm- 05:15pm Closing Session
- Synthesis of Discussions/ Agreements by RPTCC Chair
 - Consideration and Adoption of Proceedings
 - Closing Remarks
- 05:15pm - Group Photo session
- 06:30pm - Dinner hosted by China Southern Grid (CSG)
Venue: Guangzhou Room, Shangrila Hotel



**Greater Mekong Subregion
Fourth Meeting of the
Subregional Energy Forum (SEF-4)
Shenzhen, People's Republic of China, 27 October 2010**

Agenda and Program

27 Oct (Wed)

Day 2: SEF-4 Meeting

08:30am – 08:45am Registration

08:45am - 09.15am Opening Session

Welcome Address by Mr. Anthony Jude (Director, Energy and Water Division [SEEW], Southeast Asia Department, ADB)

Introduction to the SEF-4 Proceedings and Intended Outcomes
- ADB Representative (Mr. Pradeep Tharakan [SEEW], ADB)

09:15am- 10:30am Country Presentations on Developments in Energy Sector and National Strategy for Climate Change Issue/Targets for Greenhouse Gas Reductions (15 minutes each)

- Viet Nam
- Thailand
- Myanmar
- Lao PDR
- People's Republic of China
- Cambodia

10: 30am – 11:00am Coffee Break (Shenzhen Room Foyer)

11:00am- 12:00nn Implementation Plan for RETA on Promoting Renewable Energy (RE), Clean Fuels (CF) and Energy Efficiency (EE) in the GMS

- Status of RETA (Approval, Financing)
 - Design and Monitoring Framework (DMF) and Key Activities and Outputs and Match with SEF Energy Roadmap and Priority Projects.
 - Designation of Focal Points/Implementing Agencies
 - Coordination Arrangements with Environment Operations Center (EOC) on Related Core Environment Program (CEP) Activities and with Working Group on Agriculture (WGA) on Rural Renewable Energy (RRE) Project
 - Discussions and Comments on Next Steps
- Presenter: Pradeep Tharakan

12:00nn – 01:30pm **Lunch Break** (buffet lunch at Coffee Garden)

01:30pm-02:00 pm SEF Knowledge Sharing Session 1: Viet Nam Experience in Rural Electrification, Vietnam
Dr Tuan Nguyen, Institute of Energy, Viet Nam

- 02:00pm-02:30pm SEF Knowledge Sharing Session 2: Wind Energy Development in China: Technology trends, tech-transfer incentives and policy innovations.
Dr. Hongliang Xu, Wind Energy Expert
- 02:30pm-03:00pm Introduction to Carbon Capture and Storage (CCS) as a Climate Change Mitigation Approach – Dr. Pradeep Tharakan, ADB
(Coffee to be served in the meeting room)
- 03:00pm- 03:30pm Closing Session
- Chair's Synthesis of Discussions/ Agreements in SEF-4
 - Consideration and Adoption of Proceedings
 - Closing Remarks
- 03:30pm
- Visit to the Charging Station for Electric Vehicles
(organized by CSG)



Greater Mekong Subregion
Ninth Regional Power Trade Coordination Committee Meeting
Fourth Subregional Energy Forum
Shangri-la Hotel, Shenzhen, PRC
26-27 October 2010

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**Greater Mekong Subregion
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Shangri-la Hotel, Shenzhen, PRC
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Greater Mekong Subregion
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26-27 October 2010

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**Greater Mekong Subregion
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ADB/GMS RETA 6440
Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion

“RETA No 6440 Presentation of Final Results and Way Forward”

Prepared by : **Michel CAUBET**, Project Team Leader
Component 1 Coordinator
Thierry LEFEVRE, Deputy Team Leader
Component 2 Coordinator

PWG, FG and RPTCC-9 Meetings of the RPTCC
Shenzhen, Peoples' Republic of China (PRC), 26 October 2010



PRESENTATION OUTLINE

1. RETA 6440 – Objectives
2. COMPONENT 1 – Results
3. COMPONENT 2 – Results
4. UPDATE OF THE RPTCC ROAD MAP
5. PROPOSED REGIONAL ORGANIZATION
6. WAY FORWARD



PRESENTATION OUTLINE

1. **RETA 6440 – Objectives**
2. COMPONENT 1 – *Results*
3. COMPONENT 2 – *Results*
4. UPDATE OF THE RPTCC ROAD MAP
5. PROPOSED REGIONAL ORGANIZATION
6. WAY FORWARD



1. RETA 6440 – OBJECTIVES

OBJECTIVES OF RETA 6440 – COMPONENT 1:

- ✓ **PLANNING** the **DEVELOPMENT** of Resources for the National Power Systems as part of the Development of Resources for the **REGIONAL ELECTRIC POWER SYSTEM**;
- ✓ Setting up **LEGAL FRAMEWORKS, RULES, PROTOCOLS** and Regional **MECHANISMS** and **BODIES** responsible for the reliable, secure and cost-effective operation of the Regional Interconnected Network and the introduction of a Regional Electricity Power Market;
- ✓ Implementing **MECHANISMS** and **STRUCTURE** for the Development and the Operation of Regional Electric Power Projects;



1. RETA 6440 – OBJECTIVES

OBJECTIVES OF RETA 6440 – COMPONENT 2:

- ✓ Ensuring that Investments and Infrastructure Development toward the RPT are **ENVIRONMENTALLY** and **SOCIALLY SUSTAINABLE**, and that Environmental and Social Aspects are considered at an earlier stage in the Planning Process;

GLOBAL OBJECTIVE OF RETA 6440:

- ✓ Proposing the Various Steps necessary to **SET UP** a **REGIONAL ORGANIZATION** that will be Responsible for the Implementation of these Actions, and for the Operation of the Regional Interconnected Power System.



PRESENTATION OUTLINE

1. RETA 6440 – Objectives
2. **COMPONENT 1 – Results**
3. COMPONENT 2 – Results
4. UPDATE OF THE RPTCC ROAD MAP
5. PROPOSED REGIONAL ORGANIZATION
6. WAY FORWARD



2. COMPONENT 1 – IMPLEMENTED ACTIVITIES

COMPONENT 1:

- **Training course on the “GMS Database and Website”**
Kunming, March 26-27, 2009
- **1st Training & Assistance Session for the Update of Cambodia PDP**,
Phnom Penh, 29 June to 3 July 2009;
- **2nd Training & Assistance Session**, to Cambodian Experts
24-28 August 2009;
- **COMP1 – Workshop #2, Parts I & II**, September 14 to 18, 2009;
- **COMP1 – Workshop #3**, January 20-22, 2010;
- **COMP1 – Workshop #4**, June 17-18, 2010;
- **COMP1 – Module 2, Training Session**, July 28-29, 2010;
- **COMP1 – Workshop #5, Final Workshop**, Sept. 29 to Oct. 1st 2010.

*PWG, FG and RPTCC-9 Meetings of the RPTCC
Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*

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MODULE 1 – RESULTS

MODULE 1 – IMPLEMENTED ACTIVITIES:

- **1st Training & Assistance Session for the Update of Cambodia PDP**, Phnom Penh, 29 June to 3 July 2009;
- **2nd Training & Assistance Session**, to Cambodian Experts
24-28 August 2009;
- **COMP1 – Workshop #2, Part I**, September 14 to 16, 2009
 - ✓ Country Reports;
 - ✓ Review of previous studies / Review and update of Data;
 - ✓ Existing situations and projections in each of the GMS Countries;
 - ✓ Presentation of the PDP Training and Assistance in Cambodia;
 - ✓ Draft Revised Cambodia PDP 2009;
 - ✓ Fuel price projections.

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Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*

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MODULE 1 – IMPLEMENTED ACTIVITIES:

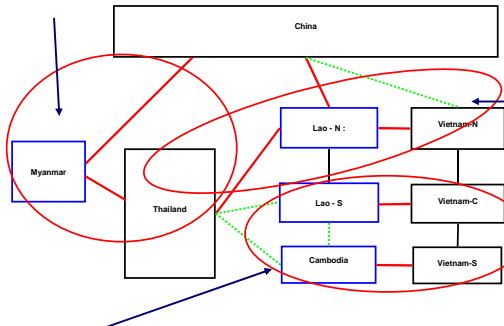
- **COMP1 – Workshop #3**, January 20 to 21, 2010
 - ✓ Review and Update of National Power Developments Plans;
 - ✓ Common Planning Criteria;
 - ✓ Potential Power Trade between the GMS Countries;
 - ✓ Review of the GMS Master Plan 2008 / Base Case Scenario for GMS Master Plan Update;
- **COMP1 – Workshop #4**, 17-18 June, 2010
 - ✓ Report on the GMS Interim Master Plan;
- **COMP1 – Workshop #5**, 29 Sept. - 1 Oct., 2010
 - ✓ Report on the Updated GMS Master Plan;

GMS Master Plan Update

- **Updates the GMS Master Plan for the 2010-2025 period;**
- **Runs simulations of the model for a range of regional power system scenarios;**
- **Identifies the potentially beneficial regional projects and compile a list of priority projects according to their merits;**
- **Identifies Three (3) Poles of Development – Three (3) Sub Regional Markets**

Three (3) Poles of Development – Three (3) Sub-regional Markets:

- **North West Pole:** Interconnections from Myanmar to China and Thailand – 28 GW Hydro Potential in Myanmar: Up to 20 GW to China; 5.5 GW to Thailand



- **East - West Northern Link:** Thailand, Lao North and Vietnam North – 10 GW Hydro Potential in Lao North
Open the possibility of opportunity exchanges between Thailand <-> Vietnam, and possible extension to China.

- **Southern Pole:** Lao South, Cambodia, Vietnam Centre and Vietnam South – 5 GW Hydro Potential in Lao & Cambodia.

Resilience Analysis – Main Conclusions

- The profitability of the interconnection projects between GMS countries resists **Negative Price Shocks**, either Interconnection and HPP Costs, or Fuel Price.
- Interconnection Projects linking Hydro to Gas-Fired CCGT Dominated Thermal Systems are the **Most Resilient** to any cost or price shocks.

Multi-Criteria Ranking - Rationale

- In the next **20 - 30 years**, all the countries of the GMS will become interconnected, either for large scale power trades based on Hydro Export, or for lower scale opportunity power exchanges taking advantage of temporary surplus or needs in the different countries.
- During the **2015-2025 period**, the priority interconnection projects would be those allowing large scale power exchanges between hydro rich countries and thermal dominated importing countries.

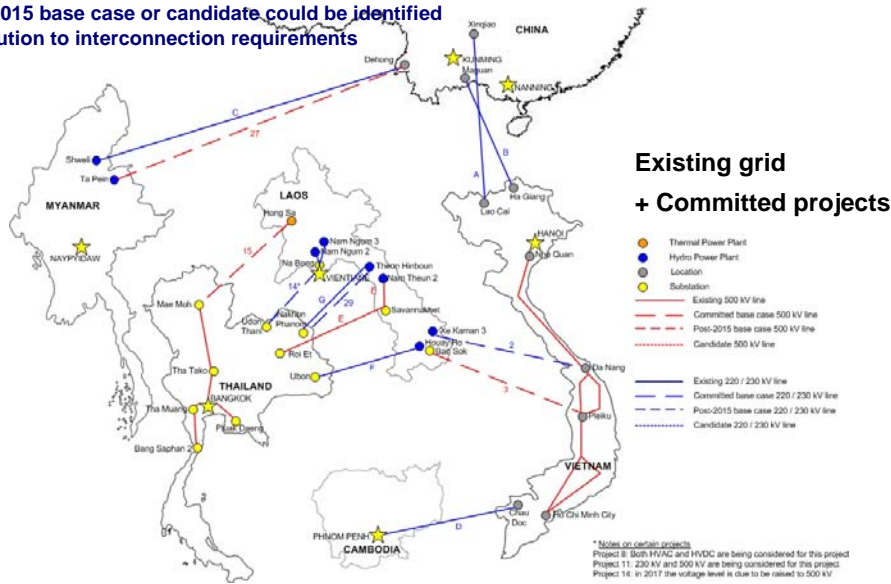
Conclusions

- **Benefits for the Region provided by the Expansion of Interconnections beyond 2015:**
 - **14 Billion \$ (NPV over 2010-2030) (mainly fossil fuels savings)**
 - **Reduction of CO2 emission by 46.4 Mt/year in 2020**
- **Comparison with Master Plan 2008: Except the Interconnection projects between Myanmar and PR China which were not identified, **only slight changes** have been noted for the other interconnection projects.**



Existing and Committed Projects

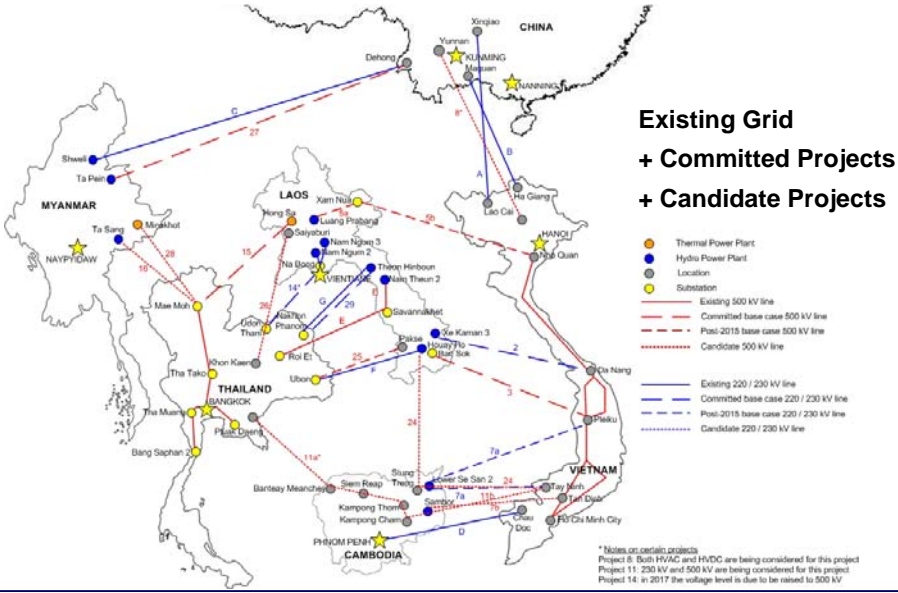
Post-2015 base case or candidate could be identified as solution to interconnection requirements



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 Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*



Post-2015 Base Case and Candidate Projects



*PWG, FG and RPTCC-9 Meetings of the RPTCC
 Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*

- **Interconnection Projects that are very profitable and should be considered as PRIORITY:**
 - Myanmar – China & Myanmar – Thailand (price gap, Myanmar large export potential)
 - Lao North – Thailand
 - Lao South – Vietnam South (through Vietnam C)
 - Lao North – Vietnam North
 - Cambodia – Vietnam South
- **Complementary Studies and / or Completion of Ongoing Studies are required for:**
 - Thailand / Lao South
 - Trilateral Lao S, Cambodia, Vietnam Center & South
 - Cambodia and Thailand

Recommendations

- **Need to refine Investment Costs, Social / Environmental Impacts and Costs of Export Oriented Hydro Projects.**
- **Need for a Cumulative Impact Assessment (SEA) of the Mekong River Projects.**
- **Need for Better Hydrology Data in Cambodia, Myanmar and Vietnam.**
- **The next regional GMS Master Plan update should be phased according to the completion of the other relevant studies, i.e. national PDPs, interconnection studies, CIA, etc.**
- **Launch Feasibility Studies on Priority Interconnection Projects as well as large scale HPP Projects (Mekong River mainstream).**
- **The next GMS Master Plan should be build on the findings of these new studies.**

Recommendations [Cont'd]

- **Cambodia: create a devoted Power Development Plan Team in charge of demand projection, generation and transmission planning.**
- **For the Region: continue and enhance the development of planning skills in the different countries.**

MODULE 2 – IMPLEMENTED ACTIVITIES:

- **COMP1 – Workshop #2, Part I**, September 14 to 16, 2009
 - ✓ Review of benefits from benchmark of cross-border interconnection projects;
 - ✓ Recommended methodology for benefit calculations and assessment;
- **Report on the Methodology Guidelines for Assessment of Benefits**
 - ✓ Draft Report by July 2010;
- **On-the-job Training**, in coordination with Module 1, July 28 to 30, 2010;
- **Assistance in further Assessment of Priority Projects**, coordinated with other Modules, August & September 2010.

MODULE 2 – IMPLEMENTED ACTIVITIES [Cont'd]:

- **COMP1 – Workshop #5**, Sept. 29-30, Oct 1, 2010
 - ✓ On-The-Job Training
 - ✓ Guide Lines for the Benefit Assessment
 - ✓ Evaluation of Future Scenarios

MODULE 3 – IMPLEMENTED ACTIVITIES:

- **COMP1 – Workshop #2, Part I**, September 14 to 16, 2009
 - ✓ Review of international power interconnection projects in the GMS - Findings on assessment and identification of the transmission candidate projects;
 - ✓ Analysis of the potential for synchronous operation;
- **COMP1 – Workshop #3**, January 20 to 21, 2010
 - ✓ Cost of Transmission Interconnection;
 - ✓ Updated List of Candidate Interconnection Projects;
 - ✓ Review of GMS Master Plan 2008 PDPs;
 - ✓ Vision of Regional Grid rather than Bilateral Connections;
 - ✓ Common Planning Criteria;

- **COMP1 – Workshop #4**, 17-18 June, 2010
 - ✓ Assessment of Potential for Synchronous Operation;
 - ✓ HVDC vs. AC Interconnection;
 - ✓ Performance Standards;
 - ✓ Metering Arrangements.

- **COMP1 – Workshop #5**, Sept. 29-30, Oct 1, 2010
 - ✓ Cost Model
 - ✓ Transmission Cost (\$/MWh)
 - ✓ Existing / Committed and Generic Interconnections
 - ✓ Actual Projects of Model Results versus Identified Candidate Projects.

MODULE 4 – IMPLEMENTED ACTIVITIES:

- **COMP1 – Workshop #2, Part II**, September 17 to 18, 2009
 - ✓ Prerequisites and organization of a modern and efficient Electricity Market, the “Basic Principles” to be applied;
 - ✓ Lessons to be learnt from International Experiences such as the European Continental Electricity Market, the Nordic Market, the North American Market and African Experience.

- **COMP1 – Workshop #3**, January 22, 2010
 - ✓ Review and Assessment of the Current Regulatory Framework in the GMS Countries;
 - ✓ Transmission Capacity, Access and Pricing Options for the GMS Countries;
 - ✓ Conceptual Design of the GMS Electricity Market;

MODULE 4 – RESULTS

- **COMP1 – Workshop #4**, 17-18 June 2010
 - ✓ Remaining Transmission Regulations.

- **COMP1 – Workshop #5**, Sept. 29-30, Oct 1, 2010
 - ✓ Proposed Implementation of the Conceptual Design of the GMS Electricity Market:
 - Market Implementation Process
 - Trading Arrangements of Market Implementation
 - Market Structure at Country Level.

MODULE 5 – RESULTS

MODULE 5 – IMPLEMENTED ACTIVITIES:

- **COMP1 – Workshop #5**, Sept. 29-30, Oct 1, 2010
 - ✓ Review of the structure of the existing GMS Regional Database and assessment of requirements following the consultations with the GMS Member Countries;
 - ✓ Proposed TORs for upgrading the structure of the existing GMS regional database.

PRESENTATION OUTLINE

1. RETA 6440 – Objectives
2. COMPONENT 1 – *Results*
3. **COMPONENT 2 – *Results***
4. UPDATE OF THE RPTCC ROAD MAP
5. PROPOSED REGIONAL ORGANIZATION
6. WAY FORWARD

PRESENTATION OUTLINE

1. RETA 6440 – Objectives
2. COMPONENT 1 – *Results*
3. COMPONENT 2 – *Results*
4. **UPDATE OF THE RPTCC ROAD MAP**
5. PROPOSED REGIONAL ORGANIZATION
6. WAY FORWARD

**PRESENTATION OUTLINE FOR
THE UPDATE OF THE RPTCC ROAD MAP**

- a) **ACTIVITIES & TIMELINES AS PER MOU-2**
- b) ACTIVITIES IMPLEMENTED UNDER RETA 6440
- c) UPDATE OF THE RPTCC ROAD MAP

MOU 2 – Signed in Vientiane, Lao PDR, on 31 March 2008, prescribing to fully achieve STAGE 1 during the period 2008-2010:

- **Stage 1:**
 - Initial period when only country-to-country power transactions are possible;
 - Cross border power trading mostly associated to PPAs between Utilities and IPPs.
- **Stage 2:**
 - Trading is possible between any pair of GMS countries, eventually using transmission facilities of a third regional country.



a) ACTIVITIES & TIMELINES AS PER MOU-2

Timelines to Fully Achieve Stage 1 – Four (4) Milestones:

Milestone 1: Complete the Indicative Power Interconnection Master Plan and Select Priority new Interconnection Projects for undertaking feasibility studies

Activities	Schedule
Complete the GMS indicative Master Plan for power development	2008
Select priority interconnection projects identified in the Master Plan	2009-2010
Develop feasibility studies of selected priority projects.	2009 Onwards
Update the regional indicative Master Plan	Every 2 to 3 Years



a) ACTIVITIES & TIMELINES AS PER MOU-2

Milestone 2: Complete the Study on Performance Standards

Activities	Schedule
Complete the study on GMS Performance Standards and consider for adoption the suggested GMS Performance Standards on new regional interconnections and for the synchronized operation of interconnected grids	2010
Consider for adoption the proposed transitional arrangements to achieve GMS Performance Standards	2010

a) ACTIVITIES & TIMELINES AS PER MOU-2

Milestone 3: Complete the Study on Transmission Regulations

Activities	Schedule
Complete the study on Transmission Regulations	2010
Consider for adoption the findings of the study to coordinate the operation and power flow control in grid-to-grid interconnections synchronization and operation	2010

a) ACTIVITIES & TIMELINES AS PER MOU-2

Milestone 4: Complete the Study on Standard Regional Metering Arrangements and Power Trade Rules

Activities	Schedule
Complete the study on standard regional metering arrangements and communications system in grid-to-grid interconnection for implementation during Stage 1 and consider for adoption the findings of the study	2010
Complete the study on power trade rules, including resolution mechanisms for disputes outside existing PPAs for implementation during Stage 1, and consider for adoption the findings of the study	2010



a) ACTIVITIES & TIMELINES AS PER MOU-2

Timelines to Prepare for Stage 2 – Four (4) Milestones:

Milestone 5: Undertake the Study to Identify the Regulatory Barriers to the Development of Power Trade and Implementation of Next Stage

Activities	Schedule
Complete the study to identify the regulatory barriers to development of power trade	2012
Consider for adoption the measures and institutional arrangements to address regulatory barriers	2012



a) ACTIVITIES & TIMELINES AS PER MOU-2

Milestone 6: Complete the Study on a GMS Grid Code (Operational Procedures)

Activities	Schedule
Complete the study on a GMS Grid Code and consider for adoption the findings of the study, which includes: <ul style="list-style-type: none"> •GMS Performance Standards; •Coordination procedures between System Operators to schedule and control cross border flows, management of deviations; •Metering and communications; •Sharing of power reserves and support during emergencies 	2010-2012

a) ACTIVITIES & TIMELINES AS PER MOU-2

Milestone 7: Complete the Study on Transmission Regulations	
Activities	Schedule
Complete the study on Transmission Regulations	2010
Consider for adoption the findings of the study to coordinate the operation and power flow control in grid-to-grid interconnections synchronization and operation	2010

a) ACTIVITIES & TIMELINES AS PER MOU-2

Milestone 8: Complete the Study on Stage 2 Transmission Regulations to allow Third Party Access, including Stage 2 Power Trade Rules, and Dispute Resolution Mechanism	
Activities	Schedule
Complete the study on Stage 2 Transmission Regulations	After 2012
Consider for adoption the findings of the study to include development of payment agreements/ tariffs for third party use, to compensate countries that host flows linked to third parties' trading	After 2012
Develop and consider for adoption power trade rules for short term cross border trading	After 2012
Develop and consider for adoption power trade rules for settlement of deviations to scheduled power trade in grid-to-grid interconnections	After 2012



PRESENTATION OUTLINE FOR THE UPDATE OF THE RPTCC ROAD MAP

- a) ACTIVITIES & TIMELINES AS PER MOU-2
- b) ACTIVITIES IMPLEMENTED UNDER RETA 6440**
- c) UPDATE OF THE RPTCC ROAD MAP



b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Timelines to Fully Achieve Stage 1 – Four (4) Milestones:

Milestone 1: Complete the Indicative Power Interconnection Master Plan and Select Priority new Interconnection Projects for undertaking feasibility studies

Activities	RG 6440	Deliverables	On
Complete the GMS indicative Master Plan for power development	Yes	<ul style="list-style-type: none"> • DFR – Update of the GMS Regional Power Master Plan • DFR - Benefit Assessment of Power Interconnection in the GMS 	Sept. 2010 Sept. 2010 (2008)
Select priority interconnection projects identified in the Master Plan	Yes	<ul style="list-style-type: none"> • DFR – Assessment of Candidate Transmission Projects 	Sept. 2010 (2009-2010)
Develop feasibility studies of selected priority projects	No		(2009 Onwards)
Update the regional indicative Master Plan	Yes	<ul style="list-style-type: none"> • DFR – Update of the GMS Regional Power Master Plan 	Sept. 2010

b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Milestone 2: Complete the Study on Performance Standards

Activities	RG 6440	Deliverables	On
Complete the study on GMS Performance Standards and consider for adoption the suggested GMS Performance Standards on new regional interconnections and for the synchronized operation of interconnected grids	Yes Partially (*)	<ul style="list-style-type: none"> DFR – GMS Reference Document on the Performance Standards 	Sept. 2010 (2010)
Consider for adoption the proposed transitional arrangements to achieve GMS Performance Standards	Yes Partially (*)	<ul style="list-style-type: none"> DFR – GMS Reference Document on the Performance Standards 	Sept. 2010 (2010)

(*) Necessitate in-depth coordinated network studies of the GMS Power Systems

b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Milestone 3: Complete the Study on Transmission Regulations

Activities	RG 6440	Deliverables	On
Complete the study on Transmission Regulations	Yes	<ul style="list-style-type: none"> DFR – Completion of the GMS Transmission Regulations DFR – Assessment of Potential for Synchronous Operation DFR - HVDC VS. AC Interconnection 	Sept. 2010 Sept. 2010 Sept. 2010 (2010)
Consider for adoption the findings of the study to coordinate the operation and power flow control in grid-to-grid interconnections synchronization and operation	Under process		(2010)



b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Milestone 4: Complete the Study on Standard Regional Metering Arrangements and Power Trade Rules

Activities	RG 6440	Deliverables	On
Complete the study on standard regional metering arrangements and communications system in grid-to-grid interconnection for implementation during Stage 1 and consider for adoption the findings of the study	Yes	<ul style="list-style-type: none"> DFR – Metering Arrangements 	Sept. 2010 (2010)
Complete the study on power trade rules, including resolution mechanisms for disputes outside existing PPAs for implementation during Stage 1, and consider for adoption the findings of the study	No (*)		(2010)

(*) The design of the regional electricity market and the proposed options for setting up a regional regulatory framework have been postponed to the next TA Stage as indicated in the MOU-2.



b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Timelines to Prepare for Stage 2 – Four (4) Milestones:

Milestone 5: Undertake the Study to Identify the Regulatory Barriers to the Development of Power Trade and Implementation of Next Stage

Activities	RG 6440	Deliverables	On
Complete the study to identify the regulatory barriers to development of power trade	Yes	DFR – Review of GMS Regulatory Framework	April 2010
		DFR – Review of International Experiences	April 2010
		DFR – Conceptual Design of the GMS Market	Sept. 2010
		DFR - Proposed Implementation of the Conceptual design for the GMS Market	Sept. 2010 (2012)
Consider for adoption the measures and institutional arrangements to address regulatory barriers	Under process		(2012)



b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Milestone 6: Complete the Study on a GMS Grid Code (Operational Procedures)

Activities	RG 6440	Deliverables	On
Complete the study on a GMS Grid Code and consider for adoption the findings of the study, which includes: <ul style="list-style-type: none"> •GMS Performance Standards; •Coordination procedures between System Operators to schedule and control cross border flows, management of deviations; •Metering and communications; •Sharing of power reserves and support during emergencies 	No		(2010-2012)



b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Milestone 7: Complete the Study on Transmission Regulations

Activities	RG 6440	Deliverables	On
Complete the study on Transmission Regulations	Yes	<ul style="list-style-type: none"> • DFR – Completion of the GMS Transmission Regulations • DFR – Assessment of Potential for Synchronous Operation • DFR - HVDC VS. AC Interconnection 	Sept. 2010 Sept. 2010 Sept. 2010 (2010)
Consider for adoption the findings of the study to coordinate the operation and power flow control in grid-to-grid interconnections synchronization and operation	Under process		(2012)



b) ACTIVITIES IMPLEMENTED UNDER RETA 6440

Milestone 8: Complete the Study on Stage 2 Transmission Regulations to allow Third Party Access, including Stage 2 Power Trade Rules, and Dispute Resolution Mechanism

Activities	RG 6440	Deliverables	On
Complete the study on Stage 2 Transmission Regulations	No		(After 2012)
Consider for adoption the findings of the study to include development of payment agreements/ tariffs for third party use, to compensate countries that host flows linked to third parties' trading	No		(After 2012)
Develop and consider for adoption power trade rules for short term cross border trading	No		(After 2012)
Develop and consider for adoption power trade rules for settlement of deviations to scheduled power trade in grid-to-grid interconnections	No		(After 2012)

*PWG, FG and RPTCC-9 Meetings of the RPTCC
Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*

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PRESENTATION OUTLINE FOR THE UPDATE OF THE RPTCC ROAD MAP

- a) ACTIVITIES & TIMELINES AS PER MOU-2
- b) ACTIVITIES IMPLEMENTED UNDER RETA 6440
- c) UPDATE OF THE RPTCC ROAD MAP**

*PWG, FG and RPTCC-9 Meetings of the RPTCC
Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*

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c) UPDATE OF THE RPTCC ROAD MAP

Timelines to Fully Achieve Stage 1 – Four (4) Milestones:

Milestone 1: Update the Indicative Power Interconnection Master Plan and Select Priority New Interconnection Projects for undertaking Feasibility Studies

Activities	Schedule
Update the regional indicative Master Plan	Every 2 to 3 Years
<p>Note: this Regional Power Master Plan should internalize environmental and social impacts related to existing and future candidates to expansion (generation and transmission) to ensure the long term sustainability of these plans.</p>	<p><i>(Next one in 2013)</i></p>



c) UPDATE OF THE RPTCC ROAD MAP

Milestone 2: Complete the Study on Performance Standards

Activities	Schedule
<p>Complete the study on GMS Performance Standards and consider for adoption the suggested GMS Performance Standards on new regional interconnections and for the synchronized operation of interconnected grids by undertaking coordinated in-depth network studies (transient stability studies).</p> <p><i>This needs to have a complete and detailed Data Base describing the GMS Power Systems,</i> as well as the related valuation of the environmental and social impacts as well as of the abatement costs of these systems.</p>	2011 and Onwards



c) UPDATE OF THE RPTCC ROAD MAP

Milestone 3: Complete the Study on Transmission Regulations

Activities	Schedule
Adopt and implement the proposed GMS Policies: <ul style="list-style-type: none"> •Policy on Scheduling and Accounting; •Policy on Coordinated Operational Planning; •Policy on Communication Infrastructure; •Policy on Data Exchanges. 	2011-2012
Adopt and implement the proposed GMS co-ordination, organized on the basis of the three hierarchical levels: CO-ORDINATION CENTRE, CONTROL BLOCK and CONTROL AREA.	2011-2012
Adopt and implement the standard regional metering arrangements and communications system in grid-to-grid interconnection.	2011-2012



c) UPDATE OF THE RPTCC ROAD MAP

Milestone 4: Complete the Study on Power Trade Rules

Activities	Schedule
Complete the study on power trade rules, including resolution mechanisms for disputes outside existing PPAs for implementation during Stage 1, and consider for adoption the findings of the study.	2011-2012



c) UPDATE OF THE RPTCC ROAD MAP

Timelines to Prepare for Stage 2 – Four (4) Milestones:

Milestone 5: Complete the Study on a GMS Grid Code (Operational Procedures)

Activities	Schedule
Complete the study on a GMS Grid Code and consider for adoption the findings of the study, which includes: <ul style="list-style-type: none"> •GMS Performance Standards; •Coordination procedures between System Operators to schedule and control cross border flows, management of deviations; •Metering and communications; •Sharing of power reserves and support during emergencies 	2011-2012



c) UPDATE OF THE RPTCC ROAD MAP

Milestone 6: Implement the proposed recommendations of Step 1 related to the implementation of the Conceptual Design of the GMS Electricity Market

Activities	Schedule
Implementation of Prerequisites for the GMS Market: <ul style="list-style-type: none"> •Action 1: Creation of a Permanent Organization for developing the Regional Market (Regional Level) •Action 2: Set up of the future GMS Coordination Centre (Regional Level) •Action 3: Creation of ISOs/TSOs as grid operators and setting up of the Single Buyer Model (National Level) •Action 4: Drafting of Market Codes in every GMS country (National Level) 	2011 and onwards



c) UPDATE OF THE RPTCC ROAD MAP

Milestone 6: Implement the proposed recommendations of Step 1 related to the implementation of the Conceptual Design of the GMS Electricity Market [Cont'd]

Activities	Schedule
Implementation of Prerequisites for the GMS Market: <ul style="list-style-type: none"> •Action 5: Progressive increase of regulated electricity prices (National Level) •Action 6: Transfer of the operation of the private lines to the national ISOs/TSOs (National Level) •Action 7: Start where possible of Regional Synchronous Operation (Regional Level) •Action 8: Neutral transformation of existing long term PPA Contracts into financial contracts for differences – CFD where necessary. 	2011 and onwards



c) UPDATE OF THE RPTCC ROAD MAP

Milestone 7: Complete the Study on Stage 2 Transmission Regulations to allow Third Party Access, including Stage 2 Power Trade Rules, and Dispute Resolution Mechanism

Activities	Schedule
Complete the study on Stage 2 Transmission Regulations	After 2012
Consider for adoption the findings of the study to include development of payment agreements/ tariffs for third party use, to compensate countries that host flows linked to third parties' trading; and Follow the proposed implementation of the conceptual design for the GMS Market.	After 2012
Develop and consider for adoption power trade rules for short term cross border trading	After 2012
Develop and consider for adoption power trade rules for settlement of deviations to scheduled power trade in grid-to-grid interconnections	After 2012

PRESENTATION OUTLINE

1. RETA 6440 – Objectives
2. COMPONENT 1 – *Results*
3. COMPONENT 2 – *Results*
4. UPDATE OF THE RPTCC ROAD MAP
- 5. PROPOSED REGIONAL ORGANIZATION**
6. WAY FORWARD

PRESENTATION OUTLINE FOR THE REGIONAL ORGANIZATION

- a) RATIONALE FOR A REGIONAL ORGANIZATION**
- b) GOVERNANCE STRUCTURE
- c) GMS COORDINATION CENTRE

a) RATIONALE FOR A REGIONAL ORGANIZATION

There is a need for co-ordination of the efforts of each GMS Member Countries with the aim to:

- ✓ To increase cooperation in the **development of regional plans and investment** for expanding sustainable generation and transmission;
- ✓ To systematically internalize the **environmental and social impacts** in the preparation of the GMS Power Expansion Plans;
- ✓ To facilitate common understanding of **power sector reform strategies and harmonized regulatory regimes**;
- ✓ To promote **power trade** and ensure **equitable trading regimes**;
- ✓ To facilitate learning and support **new information and communication technologies**.

a) RATIONALE FOR A REGIONAL ORGANIZATION

Therefore, it is it is proposed :

- To complete the present regional organization for the implementation of the GMS Electricity Market (Inter-Governmental MoU) by establishing an **Inter-Utility MoU**;
- Signed by the Chief Executive Officers (CEO) of the **Electricity Utilities**;
- That establishes the basic management and operating principles of the **Regional Electricity Market (REM) Organization**.



a) RATIONALE FOR A REGIONAL ORGANIZATION

Basic Principles expressed in the MoU under which the GMS Power Trade Organization could operate:

- To **co-ordinate** and **co-operate** in the planning, development and operation of their systems to minimize costs and to protect the environment and **offer equitable compensations** to the people affected by these systems;
- To fully **recover** their costs and **share** equitably in the resulting benefits;
- To **reduce** the overall amount of capital needed for system expansion in the region by promoting implementation of “bankable” projects on a least-cost basis;
- To **create** an investment environment for the region’s power sector that will facilitate the financing of priority generation and transmission projects;



a) RATIONALE FOR A REGIONAL ORGANIZATION

- To **create** an ongoing forum in which regional power issues can be discussed and worked out within an agreed-upon policy framework and set of operating principles;
- To **create** a transparent and reliable mechanism for the prompt settlement of commercial electricity transactions;
- To **address** in good faith issues relating to interconnections in a spirit of co-operation and transparency; and
- To **act** in solidarity and refrain from taking advantage of each other.



a) RATIONALE FOR A REGIONAL ORGANIZATION

Proposed Design Criteria for the REM Organization:

- The REM should be an independent legal entity;
- Funding for REM’s own administrative operations should come from its members rather than be dependent on governmental budget appropriations;
- The REM should operate on a strict commercial basis with no interference by a Government;
- The REM should be subject to appropriate regulation to prevent the accumulation of market power and the abuse of monopoly control over essential facilities
- The REM’s decision making procedures should comport with international standards for transparency, documentation, and procedural integrity;



a) RATIONALE FOR A REGIONAL ORGANIZATION

- **Membership** in the REM can include all entities who own or operate major generation or transmission facilities in the region, who have made a firm commitment to make a major investment in generation or transmission facilities in the region, or who are or could be a bulk power customer; all entities who are physically interconnected and have an impact on system operation must be members;
- The process for developing and for changing power trade rules over the course of time must be perceived as **transparent, fair and well grounded**, and it should not be subject to domination or manipulation by any one entity or one group;
- The internal organizational structure of the REM should provide for **sufficient representation** of interests, but also assure the timely **delegation of decision** making to appropriate bodies.



a) RATIONALE FOR A REGIONAL ORGANIZATION

- Members should be able to **appeal**, in a responsible manner, decisions made by the REM's various internal bodies and to receive a timely response;
- There should be a credible method of **enforcing** decisions.



PRESENTATION OUTLINE FOR THE REGIONAL ORGANIZATION

- a) RATIONALE FOR A REGIONAL ORGANIZATION
- b) GOVERNANCE STRUCTURE**
- c) GMS COORDINATION CENTRE

The proposed Governance Structure is:

Executive Committee
(RPTCC)

➤ **Executive Committee (RPTCC):**

- Is the highest decision making body for the REM;
- Comprises representatives of Ministries in charge of Energy and of operating members of the REM;
- Facilitates the co-ordination of appropriate measures towards the implementation of the GMS Power Trade Organization;
- Engages the Members in accordance with the prescribed provisions in order to facilitate the implementation of programs and projects;
- Approves the new applications for membership.

The proposed Governance Structure is:

Executive Committee
(RPTCC)

Management Committee

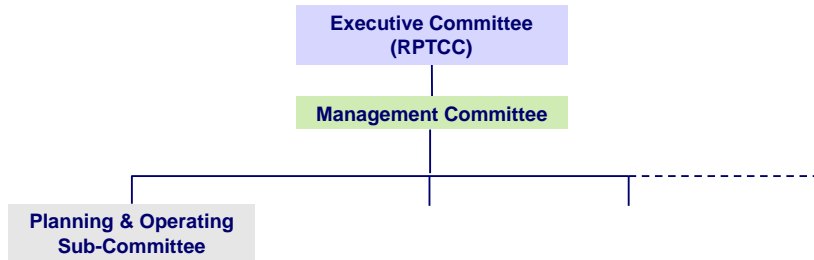
➤ **Management Committee:**

- Composed of the Chief Executives of Transmission Owning/Operating Members or of National Electricity Utilities when they are vertically integrated;
- Has decision making authority to develop and implement initiatives to achieve the mission of the REM;
- Acts as the Governing Authority and shall formulate the objectives of the REM and approves the GMS Coordination Centre budget;
- Approves the governance structure of the REM;
- Oversees the work and decides on the recommendations of the Sub-Committees and the Coordination Centre Board;



b) GOVERNANCE STRUCTURE

The proposed Governance Structure is:



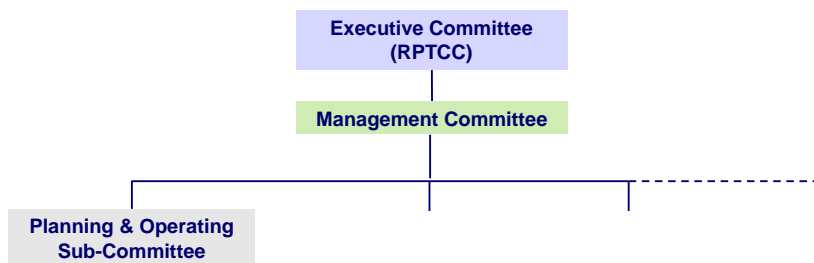
➤ **Sub-Committees:**

- Provide support and advice to the Management Committee on all matters concerning collective policy formulation functions for developing, maintaining and updating common “rules of practice” on technical, planning, operational, environmental aspects and market issues of the REM.
- Composed of technical experts drawn from the REM membership;



b) GOVERNANCE STRUCTURE

The proposed Governance Structure is:



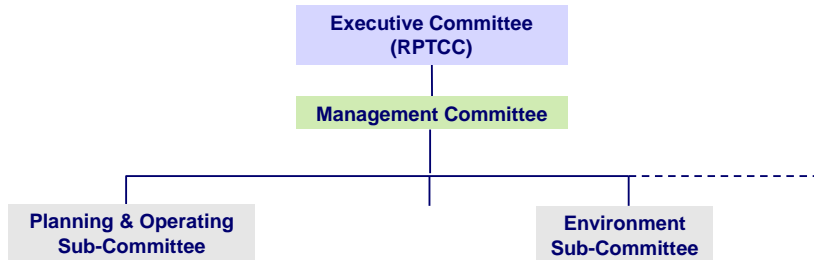
➤ **Planning & Operating Sub-Committee:**

- Establish and update common planning and reliability standards (Stage 1);
- Review periodically the GMS Master Plan (Stage 1);
- Establish and update the methods and standards used to measure the technical performance (Stage 1);
- Conduct system operational studies (Stage 2);



b) GOVERNANCE STRUCTURE

The proposed Governance Structure is:



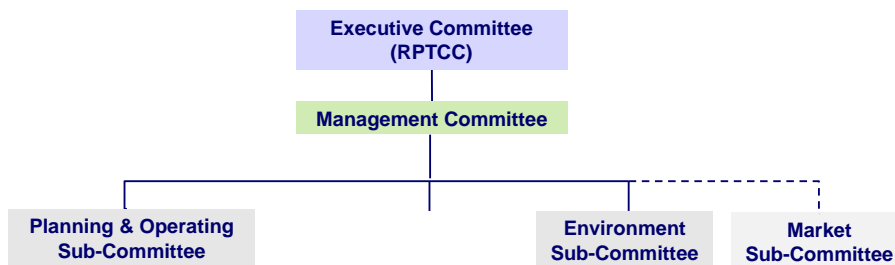
➤ **Environment Sub-Committee:**

- Alert and advise the Management Committee about environmental, social and other matters (Stage 1);
- Develop Environmental Guidelines for GMS and review and evaluate such guidelines from time to time (Stage 1);
- Liaise with environmental organizations of Governments of Member States through the appointed representatives (Ministries and EOC for example) (Stage 1).



b) GOVERNANCE STRUCTURE

The proposed Governance Structure is:



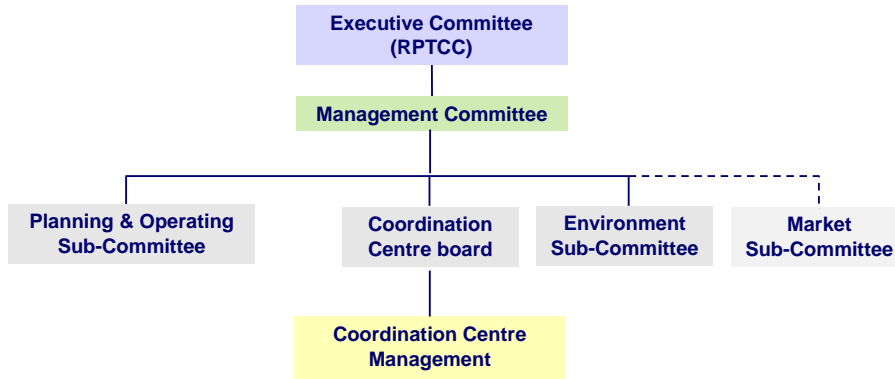
➤ **Market Sub-Committee (2nd Stage):**

- Design and make recommendation of a suitable market structure for GMS (end of Stage 1 – Stage 2);
- Determine criteria to authorize Members to trade (Stage 2);
- Is Responsible to admit and authorize Members to trade (Stage 2).



b) GOVERNANCE STRUCTURE

The proposed Governance Structure is:



- The Coordination Centre Board consist of Representatives of National Power Utilities with decision making power, plus the Chairpersons of the Sub-Committees and the Coordination Centre Manager as a non-voting member.

*PWG, FG and RPTCC-9 Meetings of the RPTCC
Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*



PRESENTATION OUTLINE FOR THE REGIONAL ORGANIZATION

- a) RATIONALE FOR A REGIONAL ORGANIZATION
- b) GOVERNANCE STRUCTURE
- c) GMS COORDINATION CENTRE**

*PWG, FG and RPTCC-9 Meetings of the RPTCC
Shenzhen, Peoples' Republic of China (PRC), 26 October 2010*



c) COORDINATION CENTRE

➤ Main Duties of the Coordination Centre:

✓ Stage 1:

- Establish and update a data base containing historical and other data to be used in Planning and System Operation studies;
- Develop and advise on the use of the GMS Guidelines and Rules as applicable e.g. Operating Guidelines (to be established between the Operating Members), Market rules and Environmental Guidelines, etc.;
- Provide information and give technical advice / support to Members of the GMS Power Trade, in matters pertaining to parallel operation;
- Evaluate the impact of future projects on the operation of the Power Trade and advise the Management Committee;
- Perform various operational planning studies to highlight possible operating problems;



✓ Stage 2:

- Monitor continuously the operation of the GMS Power Trade;
- Monitor transactions between Operating Members and between Members and non-Members;
- Monitor time correction procedures;
- Monitor the inadvertent power flows and the return in kind between the Members;
- Provide routine daily reports, data and information relevant to the operation of the GMS Power Trade to the Operating Sub-Committee and to the Members;
- Monitor and report on the control performance criteria to all the Operating Members;
- Convene, following a disturbance affecting the parallel operation of the Power Trade, a post disturbance committee;
- Advise on the feasibility of wheeling transactions.

➤ **Funding of the Coordination Centre:**

- Members shall pay their contributions up front for the Financial Year based on the approved budget of the Coordination Centre.
- **Example:** The contributions of each Member could be calculated in accordance with:
 - ✓ ...% shall be deemed to constitute a benefit payable only by the host Member.
 - ✓ ...% shall be shared equally between all GMS Members (including Independent Transmission Companies and Independent Power Producers and service providers).
 - ✓ ...% shall be allocated between the Operating Members in proportion to the actual energy measured in MWh and imported from other Members or other Parties during the Financial Year.
 - ✓ ...% shall be allocated between the Operating Members in proportion to the actual energy measured in MWh for exported energy to other Members or other Parties during the Financial Year.

➤ **Funding of the Coordination Centre [Cont'd]:**

- ✓ ...% shall be allocated between all GMS Members in proportion to their Annual System Peak Demand in the Financial Year.
- ✓ ...% shall be allocated between Operating Members in proportion to the combined 75°C thermal rating of their interconnections with other Members.

PRESENTATION OUTLINE

1. RETA 6440 – Objectives
2. COMPONENT 1 – *Results*
3. COMPONENT 2 – *Results*
4. UPDATE OF THE RPTCC ROAD MAP
5. PROPOSED REGIONAL ORGANIZATION
- 6. WAY FORWARD**

6. WAY FORWARD

- ❑ **In addition to the UPDATED RPTCC ROAD MAP presented in Part 3 of this Presentation, it is highly recommended to:**
 - **Complete the present regional organization by establishing an Inter-Utility Memorandum of Understanding (MOU)**
 - **Add as a Major New Component of the RPTCC Road Map for Regional Cross Border Trade:**
 - ✓ **A permanent Regional Organization;**
 - ✓ **With the GMS Coordination Centre as the Executive Instrument of the Regional Organization;**
 - ✓ **Working tightly with GMS Sub-committees to be defined according to the priorities.**
- ❑ **All activities prescribed in the UPDATED RPTCC ROAD MAP could be monitored by the GMS Coordination Centre in cooperation with the GMS Sub-committees.**

- ❑ **Given the amount of capital that must be raised in order to interconnect all of the GMS Countries and fulfill the GMS updated Master Plan: It must be designed so that it reduces the region’s investment risk perceived by new investors.**
 - **The institutional design of REM’s regulatory framework is of critical importance. It must be designed so that it reduces the region’s investment risk perceived by new investors.**
 - **The regulatory framework must provide safeguards against monopoly abuse and would encourage and protect cross-border energy trading and investment.**
 - **It shall have sufficient and credible legal force to give potential domestic and international investors comfort.**

- ❑ **International experience has shown that a critical element of successful power trade operations is the existence of an internal dispute resolution mechanism that is perceived by all members as being fair, impartial and efficient.**
 - **All parties should be able to appeal the decision of one of the REM’s decision-making bodies and receive an answer in a timely manner.**
 - **All members of the REM should also be encouraged to use this internal mechanism before turning to the various well-accepted methods of international dispute resolution, as may be appropriate if internal dispute resolution is not successful.**

- ❑ **It is recommended to set forth the recommended strategy for implementing the GMS REM, which is to:**
 - **Choose an institutional design for the REM that will create a competitive advantage to attract both domestic and international investment into the region.**
 - **Adopt for the REM a region-wide Legal Framework that:**
 - ✓ **Respects each country’s sovereign right to shape and time its own policies for power sector reform and restructuring;**
 - ✓ **Assures fair and non-discriminatory treatment for investors;**
 - ✓ **Protects invested capital;**
 - ✓ **Permits open access to essential transmission facilities at fair prices; and**
 - ✓ **Establishes fair and credible mechanisms for resolving disputes.**

- **Focus initially on encouraging competition for the market by requiring open, competitive and transparent bidding for the right to build new power plants and transmission lines in the region, and then later, allowing or encouraging competition in the electricity market as it grows in size and maturity.**
- **Build sufficient flexibility into the REM’s institutional design to enable it to deal effectively and in a timely manner with changing circumstances, emerging problems, or new opportunities; and**

- ❑ **Plan a phased evolution of the REM and regional energy trading over time as the region’s installed capacity grows, new players enter the market, and competitive forces in GMS’s power markets develop:**
 - **Beginning first with the accommodation of bilateral contracts;**
 - **Understanding the need for “Single Buyer” transmission systems in the countries, as long-term PPAs remain required;**
 - **Finally moving on to a more structured, competitive spot market; and**
 - **Eventually creating an open, but appropriately and adequately regulated, competitive power market for GMS.**

THANK YOU FOR YOUR ATTENTION



ADB/GMS TA 6440 - REG
Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion

“ADB/GMS RETA No 6440 Component 2 Presentation: Implemented Activities, Outputs and Main Results”

**Prepared by : Prof. T. Lefèvre, Project Deputy Team Leader
Coordinator Component 2**

PWG-9, FG-9 and RPTCC-9 Meetings of the RPTCC - Shenzhen, PR China, 26 October 2010



PRESENTATION OUTLINE

- Part 1 – Introduction of RETA No 6440 (Package 1)**
- Part 2 – Component 2 - Implemented Activities and Outputs**
- Part 3 – Cooperation with Component 1 & GMS Partners**
- Part 4 – Component 2- Conclusions and Recommendations**



PRESENTATION OUTLINE

Part 1 – Introduction to RETA No 6440 (Package 1)

- A. Objectives of ADB/GMS TA No 6440 - REG
- B. ADB GMS RETA No 6440 (REG) Organization
- C. Project's Web site

Part 2 – Component 2 - Implemented Activities and Outputs

Part 3 – Cooperation with Component 1 & GMS Partners

Part 4 – Component 2- Conclusions and Recommendations



Part 1 – Introduction to RETA No 6440 (Package 1)

A- Objectives of RETA No 6440:

- **Planning** the Development of Resources for the National Power Systems as part of the Development of Resources for the Regional Electric Power System;
- Proposing the Setting up of the **Legal Frameworks, Rules, Protocols and Regional Mechanisms & Bodies** responsible for the Reliable, Secure and Cost-effective Operation of the Regional Interconnected Network and the Introduction of a Regional Electricity Power Market;
- Proposing **Implementing Mechanisms & Structure** for the Development and the Operation of Regional Electric Power Projects;
- Ensuring that Investments and Infrastructure Development toward the RPT are **Environmentally & Socially Sustainable**, and that Environmental and Social Aspects are considered at an earlier stage in the Planning Process;
- Proposing the **Various Steps** necessary to **Set-up a Regional Organization** that will be Responsible for the Implementation of these Actions, and for the Operation of the Regional Interconnected Power System.



Part 1 – Introduction to RETA No 6440 (Package 1)

B- ADB/GMS TA No 6440 - REG Organization:

- **A strong Association of well-known International Consulting Firms was created under the leadership of RTE International :**
 - ✓ RTE International – FRANCE;
 - ✓ EDF- CIH, Hydro Engineering Centre – FRANCE;
 - ✓ Nord Pool Consulting AS (NPC) – NORWAY;
 - ✓ Power Planning Associates (PPA) – UK;
 - ✓ Franklin Paris, Legal Firm – FRANCE;
 - ✓ Centre for Energy Environment Resources Development (CEERD) – THAILAND.
- **Two Components:**
 - ✓ **Component 1:** *Facilitating Regional Power Trading*, taken in charge by the Project Team Leader (RTE International)
 - ✓ **Component 2:** *Environmentally Sustainable Development of Infrastructures*, taken in charge by the Deputy Team Leader (CEERD)
- **The project started on 1st September 2008, and is scheduled to end on 31st October 2010.**



Part 1 – Introduction to RETA No 6440 (Package 1)

- **Component 1 is Composed of Five Modules:**
 - ✓ **Module 1:** Regional Power Interconnection Master Plan (EDF-CIH);
 - ✓ **Module 2:** Methodology for Assessment of Benefits of Power Interconnection (NPC);
 - ✓ **Module 3:** Power Transmission Studies (RTE & PPA);
 - ✓ **Module 4:** GMS Regulatory Framework (RTE, NPC, PPA, Franklin);
 - ✓ **Module 5:** Update of the Structure of the Existing Regional Database (RTE)
- **Component 2 is Composed of Two Modules:**

Mainly Analysis/Studies/Evaluation & Capacity Building on:

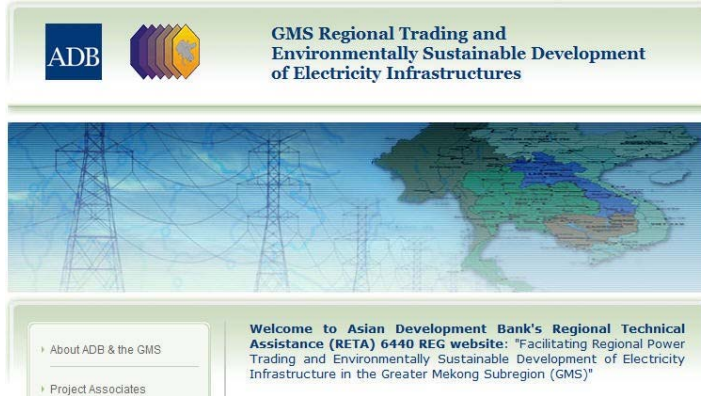
 - ✓ **Module 1:** SEA - Strategic Environmental Assessment (CEERD)
 - ✓ **Module 2:** EIA - Environmental Impact Assessment (CEERD)
- **A Project Office** was set up in Bangkok, under the management of CEERD



Part 1 – Introduction to RETA No 6440 (Package 1)

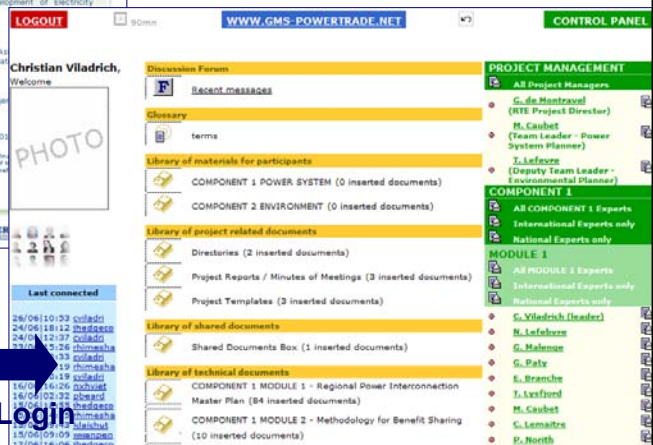
C- Project Web site

- **A Web Site for the Project** www.gms-powertrade.net was launched on January 2009, to help team members sharing reports and documents with user friendly upload/download tools, and later on to inform the General public on the developments & outputs of the Project.



< Public website at www.gms-powertrade.net

**Restricted area:
access to user's account**





Part 1 – Introduction to RETA No 6440 (Package 1)

Website structure

- **A public part, accessible to all Internet users:**
 - ✓ Project presentation / Partners description
 - ✓ Agenda of activities
 - ✓ Training page (password accessed) for training materials made available online
 - ✓ Contact page
- **A restricted area for the project team:**
 - ✓ Team members directory (list of National & International Experts sorted by Component / Module, with email shortcuts)
 - ✓ Searchable Library of Project Documents (templates, reports, presentations, data files, technical documents, etc.) managed by the team members themselves

COMPONENT 1 MODULE 1 - Regional Power Interconnection Master Plan									
	Title	Category	Authors	Published Date	Inserted By	Inserted Date		Mb	UPLOAD
	CDRom Laco Component 1		LACO	18/03/09	adminbkk	19/03/09		4.16	
	GMS Master Plan 2008 - Power point presentation - HCMC Nov2008	Presentations	Soluziona Mercados	01/11/2008	cviladrich	03/02/09	DOWNLOAD	0.57	
	GMS Master Plan 2008 - Power point presentation -	Presentations	Soluziona Mercados	01/06/2008	cviladrich	03/02/09		0.60	



PRESENTATION OUTLINE

Part 1 – Introduction to RETA No 6440 (Package 1)

Part 2 – Component 2 – Implemented Activities and Outputs

- A. Component 2 – Specific Objectives
- B. Component 2 – Methodology
- C. Component 2 – The Team
- D. Component 2 – Implemented Activities
- E. Component 2 – Technical Reporting

Part 3 – Cooperation with Component 1 & GMS Partners

Part 4 – Component 2- Conclusions and Recommendations



Part 2 – Component 2 - Implemented Activities and Outputs

A- Component 2: Specific Objectives

1. **To assess the capacity** of the environmental authorities and power companies in GMS countries for environmental planning and preparation of environmental management documents.
2. **To provide training** to environment ministries and power companies in environmental planning and management.
3. **To provide capacity development** in establishing regular monitoring mechanisms within the power utilities to standardize environmental management plans (EMP) practices.
4. **To build capacity** through proposed pilot EIAs and implementation of EMPs for power projects, in cooperation with the GMS Biodiversity Corridors Initiative (EOC) supported by ADB.
5. **To provide practical training** in preparation and implementation of EMPs, specifically in monitoring of environmental safeguards and regional ambient standards.



Part 2 – Component 2 - Implemented Activities and Outputs

B- Component 2: Methodology

The Methodology used includes:

- **Desk studies**, to prepare work plans, reports, trainings and pilot studies proposal;
- **Meetings and interviews** with GMS stakeholders and regional experts;
- **Expert Surveys** to identify and confirm the needs, contents, timing and duration of trainings;
- **Workshops** (inception, regional workshop on past experiences on regional power sector integration and SEA, and final);
- **Implementation of Regional on-the-job trainings on EIA, SEA and EMP;**
- **Field trips** to identified power projects with EMP “best practices”.



Part 2 – Component 2 - Implemented Activities and Outputs

The inputs (STORS) from Component 2 National Experts were:

General STORS:

- Provide General Documentation
- Prepare a Desk Review of Status of Policy and Legislation
- Provide the Status of Environmental Impact Assessment Tools in Environmental Policies and Legislations
- Assess the Institutional Structures, Mandates and Procedures
- Provide Other Specific Data and Information

SEA Component STORS

- Provide Insights on National and Regional Strategic Issues
- Support for the SEA National Capacity Building Program Preparation

EIA Component STORS

- Provide Information on Power Interconnections Corridors
- Support for the EIA/EMP National Capacity Building Program Preparation
- Support for On-the-job training EMP/SDP for Power Utilities and Environment Ministries Preparation



Part 2 – Component 2 - Implemented Activities and Outputs

C- Component 2: The Team

International Experts:

- **Dr. Thierry Lefevre:** Component 2 Coordinator, Energy and Environmental Planner
- **Dr. Wanpen Wirojanagud:** SEA/EIA Expert
- **Mr. Goran Lifwenborg:** SEA Expert
- **Dr. Richard Frankel:** EIA/EMP Expert
- **Dr. Montri Suwanmontri:** EIA/SDP/SEA Expert

GMS National Experts:

- **Cambodia:** **Mr. Duong Phirom:** SEA/EIA Expert
- **Lao PDR:** **Mr. Koutiane Sitthivong:** SEA Expert; and
Dr. Sengdeuane Wayakone: EIA Expert
- **PR China:** **Dr. Jiayu Xu:** SEA Expert; and
Dr. Siyu Zeng: EIA Expert
- **SR Vietnam:** **Ms. Nguyen Thi Thu Huyen:** SEA Expert; and
Mr. Pham Truong Son: EIA Expert
- **Thailand:** **Dr. Kitti Kumpeera,** SEA/EIA Expert



Part 2 – Component 2 - Implemented Activities and Outputs

D - Component 2: Implemented Activities

- **Kick-off Meeting with National Experts**, Nov. 17 & 18, 2008;
- **Inception Meeting – Workshop #1**, Ho Chi Minh City, Nov. 19 to 22 Nov. 2008
- **Participation to Training course on the “GMS Database and Website”**, Kunming, March 26-27, 2009;
- **1st PDP Training in Cambodia**, 29 June to 3 July, 2009;
- **COMP 2 - Regional Stakeholder Consultation Workshop #2**, Bangkok, 9 & 10 July, 2009;
- **2nd PDP Training in Cambodia**, 24 to 28 August, 2009;
- **COMP 2 - Regional SEA On-the-Job Trainings-Workshop #2**, Bangkok, 14 to 18 September, 2009;
- **COMP 2 - Regional EIA/EMP On-the-Job Trainings-Workshop #3**, Bangkok, 14 to 18 September, 2009;
- **COMP 2 - EMP/SDP On-the-Job Training-Cum-Field Trip #4** to Nam Theun II and Theun-Hinboun Ext. Hydropower Projects, Lao PDR, July 5 to 10, 2010;
- **COMP2 – Workshop #5, Final Workshop**, 28 to 30 September 2010.

PWG-9, FG-9 and RPTCC-9 Meetings of RPTCC - Shenzhen, PR China, 26 October 2010 15 / 28



Part 2 – Component 2 - Implemented Activities and Outputs

E - Component 2: Main Technical Reports and Outputs

- **SEA: Analysis of SEA in the GMS and Identification of Gaps, Needs and Areas for Capacity Development;**
- **EIA/EMP: Analysis of EIA/EMP in the GMS and Identification of Gaps, Needs and Areas for Capacity Development;**
- **EMP/SDP: Recommended EMP and SDP Annexes to the Concession Agreement of a Large Power Development Project;**
- **SEA and EIA: GMS Country Reports;**
- **SEA Pilot Project Proposal: Pilot SEA for the Preparation (ex-post) of PDP VII in Vietnam: TORs and Proposed Budget for a SEA Pilot Proposal for GMS Countries**
- **SEA Training: Proceedings of the SEA Regional On-the-Job Training;**
- **EIA/EMP Training: Proceedings of the EIA/EMP Regional On-the-Job Training;**
- **EMP/SDP Training: Proceedings of the EMP/SDP Regional On-the-Job Training-cum-Field Trip.**

PWG-9, FG-9 and RPTCC-9 Meetings of RPTCC - Shenzhen, PR China, 26 October 2010 16 / 28

PRESENTATION OUTLINE

- Part 1 – Introduction of RETA No 6440 (Package 1)
- Part 2 – Component 2 – Implemented Activities and Outputs
- Part 3 – Cooperation with Component 1 & GMS Partners**
- Part 4 – Component 2 - Conclusions and Recommendations

Part 3 – Cooperation with Component 1 & GMS Partners

Component 1 - PDP Training in Cambodia

- **1st Training & Assistance Session for the Update of Cambodia PDP**, Phnom Penh, 29 June to 3 July 2009;
- **2nd Training & Assistance Session** to Cambodian Experts, Phnom Penh, 24-28 August 2009.

Component 2 participated to both Trainings with several presentations on SEA and other environmental and social subjects linked with sustainable PDP development

Component 2 - Cooperation with GMS Partners:

- **Linking with EOC Activities: Participation of RETA No 6440 to:**
 - ✓ **EOC Clusters Inception Meetings:** in Vientiane - 12-13 May 2009; and in Phnom Penh - 28 May 2009;
 - ✓ **EOC GMS WGE 15th Annual Meeting** - Bangkok, 2-3 July, 2009;
- **Linking with MRC Activities - Participation of RETA No 6440 to:**
 - ✓ **Mission to Vientiane** - 5 June 2009;
 - ✓ **SEA Workshops** in Phnom Penh, 27-28 Jan; and in Vientiane, 19-20 May 2010.



Part 3 – Cooperation with Component 1 & GMS Partners

- **Systematic Invitation of EOC and MRC Experts** to all activities implemented by RETA No 6440 **Component 1 and 2**, including:
 - ✓ **Component 1: Workshops #1 (20-22 Nov. 2008), #2 (16-20 Sep. 2009), #3 (20-22 Jan. 2010), #4 (18-19 June 2010), and #5 (29 Sep. – 01 Oct. 2010);**
 - ✓ **Component 1 Training on Benefits of Interconnection (28-30 July 2010);**
 - ✓ **Component 2 Regional Stakeholder Consultation Workshop #2 on the SEA, EIA and EMP Trainings contents: Bangkok, 9-10 July 2009;**
 - ✓ **Component 2 Regional SEA Regional On-the-Job Training: Bangkok, 14-18 Sep. 2009;**
 - ✓ **Component 2 Regional EIA/EMP Regional On-the-Job Training: Bangkok, 14-18 Sep. 2009;**
 - ✓ **Component 2 Regional EMP/SDP On-the-Job Training-Cum-Field Trip: Lao PDR, July 5 to 10, 2010;**
 - ✓ **Component 2 final Workshop #5: Bangkok, 29 Sep - 1st Oct. 2010.**



Part 3 – Cooperation with Component 1 & GMS Partners

- **Participation to PWG, FG and RPTCC and SEF Meetings:**
 - ✓ **PWG-6, FG-7 and RPTCC-7 and SEF-2 Meetings of the RPTCC - Ho Chi Minh City, SR Vietnam, 19-22 November 2008;**
 - ✓ **PWG-7, FG-8 and RPTCC-8 Meetings of the RPTCC - Luang Prabang, Lao PDR, 25-27 November 2009;**
 - ✓ **PWG-9, FG-9 and RPTCC-9 and SEF-4 Meetings of the RPTCC - Shenzhen, PR China, 26-27 October 2010.**



Part 3 – Cooperation with Component 1 & GMS Partners

- **Component 2 - Research Activity:** GMS Cross-Country Study on SEA Status and Future Prospects:
 A common intern was contracted by both EOC and CEERD to carry on with this research activity
- **EOC and MRC Cooperation with Component 1 and 2** for the implementation of the PDP Trainings in Cambodia in Phnom Penh, Cambodia in July 2009 and August 2010:
 Several lectures on environmental issues were delivered together with EOC and MRC Experts;
- **Sustainable Regional Power Master Plan (RPMP) - Linking RETA No 6440 (Pack I) Components 1 and 2** (AFD Financing Proposal):
 Components 1 & 2 Experts have cooperated with AFD in identifying shortcomings in the present RETA No 6440, particularly on Environmental and Social Issues and their link with the preparation of the Regional Master Plan. ADB published recently the project information sheet concerning this project, which could be approved by the ADB Board soon.



Part 3 – Cooperation with Component 1 & GMS Partners

Component 1 & 2 - Other Suggestions for Joint Activities:

- **Linking the MRC SEA Study with RETA No 6440 Regional Power Master Plan,** and also in relation with the Lao PDR Power Master Plan
 This option has been discussed with MRC. However, the MRC SEA Pilot Study was just finalized in July 2010, too late for RETA No 6440 to integrate these inputs into the present GMS Regional Master Plan.
- **Linking the EOC SEA Study in Lao PDR with RETA No 6440 Regional Power Master Plan, RETA No 6440 SEA Training and possibly Field Trips:**
 This option was initially discussed with EOC (organization of a PDP Training for Lao PDR experts integrating environmental and social issues, and possibly a Field Trip). However, ADB did not approved this project development within RETA No 6440.
- **Replication of Cambodia’s PDP Training in Lao PDR and in SR Vietnam:**
 This activity was discussed with EOC and with Lao PDR GMS Coordination which were very much interested in its possible implementation. Component 1 and 2 Experts prepared a full proposal for the PDP Training in Lao PDR, which would have required the software and equipments to be provided by RETA No 6440 as well as the basic training, and EOC would have provided some training capacities on environmental and social issues. However, ADB did not approved this proposal.



Part 3 – Cooperation with Component 1 & GMS Partners

Component 2 - Potential Cooperation with GMS Partners:

Several other potential cooperation proposals for linking RETA N0 6440 with other Regional Institutions were also discussed with GMS Partners, but which did not prospered as has been explained at Workshop #5:

- **Pilot SEA Study Proposals:**
 - ✓ Linking with SEA on 8 dams on the Mekong Mainstream in Lao PDR (EOC);
 - ✓ Linking with SEA for Developing the Nam Ou Hydropower cascade, Phongsaly Province, Lao PDR;
 - ✓ Linking with SEA of Hydropower Development (11 dams) in the LMB (MRC)
 - ✓ Linking with SEA for Preparation of PDP VII in Vietnam (EOC - IEV).
- **Pilot CIA Study Proposal:**
 - ✓ Linking with Nam Ou Hydropower Cascade, Phongsaly Province, Lao PDR.
- **Field Trips:**
 - ✓ Linking with Eight dams on the Mekong Mainstream in Lao PDR (EOC).



Part 3 – Good Practice Dissemination



Owned and produced by: Sponsors:



THURSDAY 4 NOVEMBER

09:00 - 10:30

Session 8: Environmental Perspectives on Sustainable Hydropower

Environmental issues and resource management are crucial factors for hydropower development. This session looks at the matter from an Asian perspective.
Chair: Stephen Sparkes, Senior Social Scientist/Social and Environmental Division Manager, NORPLAN/Multiconsult, Laos

Nam Theun 2, setting environmental and social standards for large hydroelectric projects

Jean-Christophe Phalbe, Director, EDF South Asia Division, Thailand



Building social good practice for hydropower development projects in the GMS

Montri Suwanmontri, International Environment/Social Specialist, Dr. Montris & Associates, Thailand



Building good practices for evaluation and implementation of environmental impact assessment (EIA) and environmental management and monitoring plans (EMP) for hydropower projects in the GMS

Richard J. Frankol, Adjunct Professor, Natural Resources & Environmental Management Center, Mao Fah Luang University, Thailand

Title to be confirmed

*Representative from the International Hydropower Association

10:30 - 11:00

Networking Coffee Break

www.renewableenergyworld-asia.com

PRESENTATION OUTLINE

- Part 1 – Introduction of RETA No 6440 (Package 1)
- Part 2 – Component 2 – Implemented Activities and Outputs
- Part 3 – Cooperation with Component 1 & GMS Partners
- Part 4 – Component 2 - Conclusions and Recommendations**

Part 4 – Component 2 - Conclusions and Recommendations

- ADB RETA 6440 Project Component 2 conducted an analysis of SEA, EIA/EMP practices in the six GMS countries using a systematic framework;
- Strengths and Weaknesses in existing environmental assessment systems and capacity development needs were identified;
- It was found that the levels of SEA, EIA, EMP & SDP implementation and capacity development needs are highly variable among the six GMS countries;
- For Example, SEA is still a novel practice and none of the countries in the sub-region has developed fully functional SEA systems, meanwhile EIA is well developed in almost all the GMS Countries, except Myanmar, and is continuing to evolve into a more effective environmental management tool in the GMS region.
- However EMP and SDP practices still need to be strongly reinforced and supported by all Stakeholders (Public and Private Actors from International, Regional and National entities) in all GMS Countries;



Part 4 – Component 2 - Conclusions and Recommendations

- Implementation of SEA for policies, plans and programs will further strengthen the effectiveness of the EIA/EMP process and together both tools will help achieve the goal of sustainable development in the GMS.
- Then the greatest needs for the sub-region as a whole are:
 - To develop, consolidate and enforce sound SEA regulations, including administrative arrangements, procedural guidelines and enforcement mechanisms; and
 - Development of SEA capacities within environmental ministries and sector planning agencies in the GMS Countries.
- Equitable management of the region’s natural resources requires that all the Member States understand and contribute to the identification of potential impacts of current and planned economic activities, particularly in the energy and Power sectors in the region;
- Therefore, existing gaps, weaknesses and capacity development needs in environmental assessment identified in this Study (including SEA, EIA, EMP and SDP) should be addressed;



Part 4 – Component 2 - Conclusions and Recommendations

- Globally, ADB RETA 6440 project has contributed to the sustainable development of energy resources in the region by:
 - ✓ Identifying existing strengths, weaknesses and capacity building needs for developing and strengthening environmental assessment, management and monitoring practices in the sub-region; and
 - ✓ Providing preliminary training on EIA, SEA, EMP & SDP implementation to environmental ministries, energy planning authorities and electric utilities in all the six GMS countries;
- Finally, Component 2 has studied the possibilities of various potential Pilot Projects, and recommended their implementation in the near future as a way to acquaint and to effectively train GMS Countries Energy and Environmental Experts with the use of SEA for the Development of National Energy Master Plans and PDPs, but also for the preparation of future Regional Power Master Plans;
- At final Workshop #5 detailed presentations have been done by Component 2 IEs which gave more light on the activities implemented, as well as on the main results and recommendations that the Component 2 Consultant Team has prepared for the GMS Stakeholders in the fields of SEA, EIA, EMP & SDP (see Proceedings).



THANK YOU FOR YOUR ATTENTION

Carbon Capture & Storage S.E. Asia

ADB Technical Assistance Proposal

Pradeep Tharakan
Asian Development Bank
October 2010

Outline

- Background on CCS
- The Role of CCS in S.E.Asia
- Barriers to CCS Deployment in S.E.Asia
- ADB Regional TA on CCS

The views expressed in this paper/presentation are the views of the author and do not necessarily reflect the views or policies of the Asian Development Bank (ADB), or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequence of their use. Terminology used may not necessarily be consistent with ADB official terms.

What is CCS?

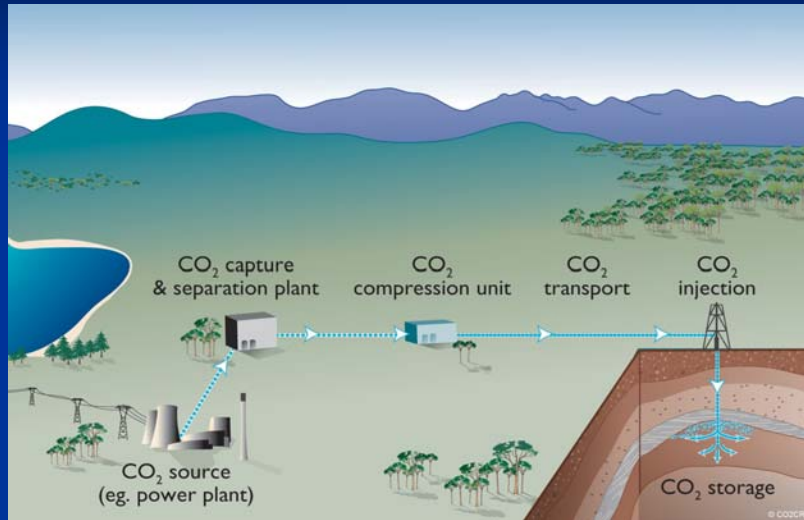


Figure 1: Illustration of a CCS System (Source: CO₂CRC www.co2crc.com.au)

Capture Technologies

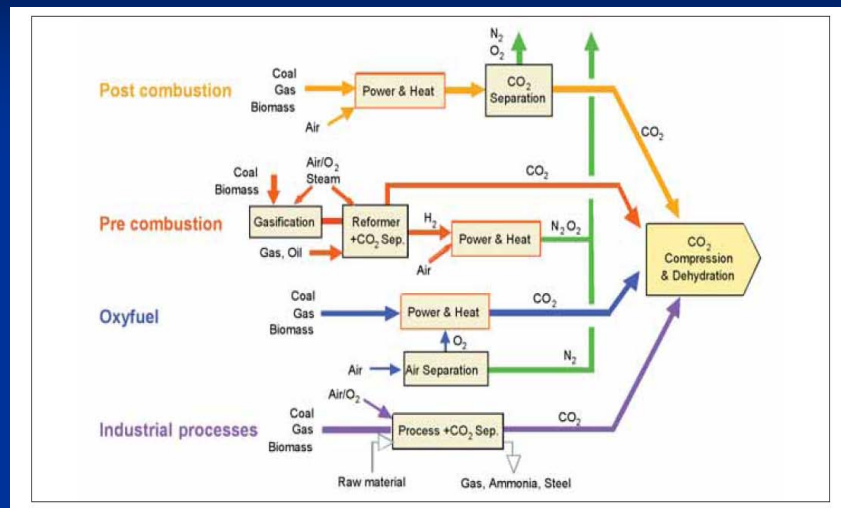


Figure 3: Different Capture Technologies

Storage Options

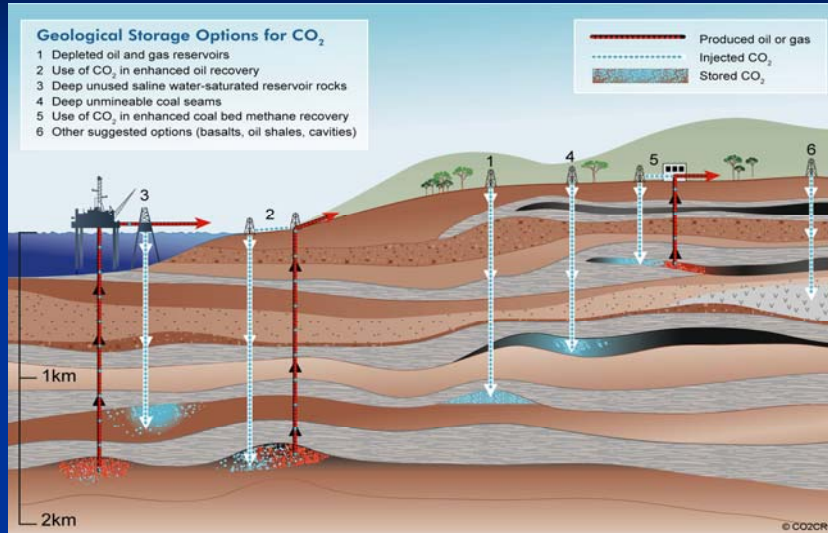


Figure 4: Different Storage Options (Source: CO2CRC)

Rationale for CCS globally

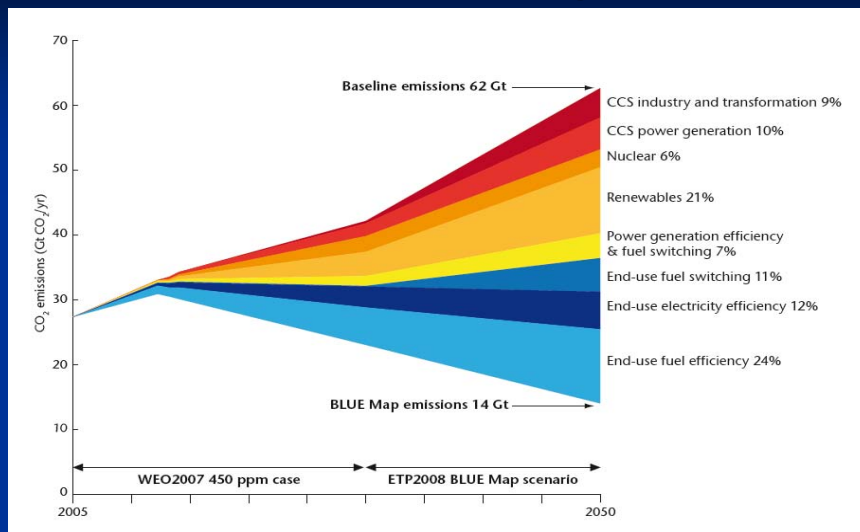


Figure 2: CCS delivers one-fifth of the lowest-cost GHG reduction solution in 2050 (Source: IEA, Energy Technology Perspectives 2008)

Applications of CCS

- Enhanced Oil Recovery
- Power Generation (coal-fired power plants)
- Industrial/Petrochemical Processes (Natural Gas Processing Plants, Steel Plants)



White Tiger EOR Project – Viet Nam

CCS Abatement Costs

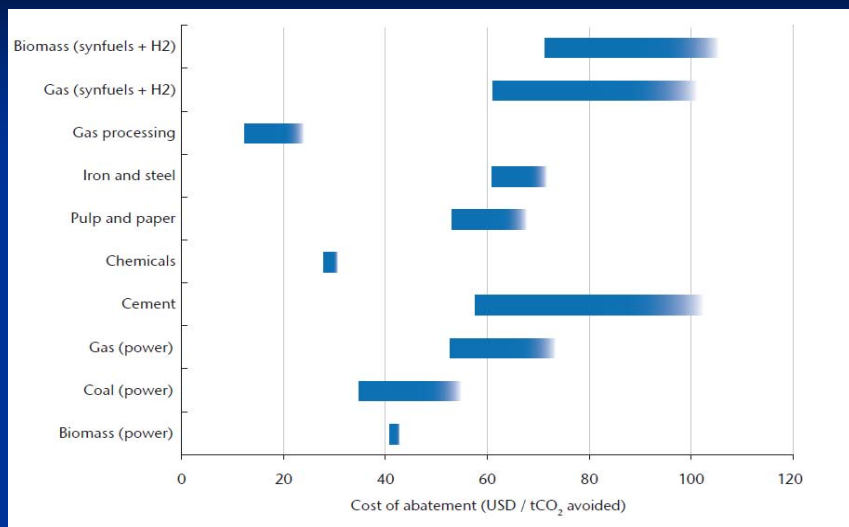


Figure 4: CCS abatement costs across different sectors
(Source: IEA CCS Technology Roadmap 2009)

CCS Projects Globally

- 6 Commercial Projects:

- Sleipner (Norway)
- Snøvit (Norway)
- In-Salah (Algeria)
- Gorgon (Australia)
- Weyburn (Canada)
- Rangeloy (US)



Sleipner CCS Project

- 19-43 projects committed by 2020
- Small pilot coal-fired power plant projects in Germany and the US
- Concept of CCS-ready coal-fired power plants

CCS Readiness



ADB's interest in CCS

- ADB's Energy Policy (2009) lists CCS as a clean technology approach
- GCCSI established a AU\$21.5m CCS Fund in ADB
- Three TAs on CCS in China, India and S.E.Asia with a total value of \$2.5m

Outline

- Background
- **The Role of CCS in S.E.Asia**
- Barriers to CCS Deployment in S.E.Asia
- Recommendations

Key Questions to Answer

- What is the potential for CCS in S.E.Asia now, and in the next 20-40 years?
- What are the barriers to its commercial deployment in the region?
- What need to be done to address those barriers and prepare for CCS deployment?

CCS – Limited prospects currently

- Energy emissions per capita is low
- Point sources of emissions are small and scattered
- CCS is too costly
- Other energy priorities:
 - Security of energy supply
 - Improving energy access for the poor

CCS – Important in the future

- Region's primary energy demand increases by 76% (2007-2030)
- Coal sees the biggest increase

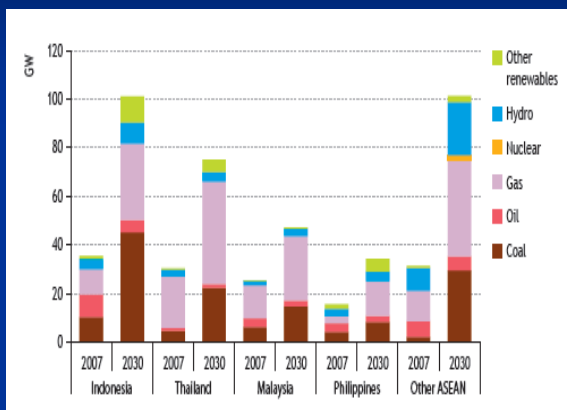


Figure 5: ASEAN generation capacity by country and fuel
(Source: World Energy Outlook 2009, IEA)

CCS –important in the future

- Energy-related emissions is set to double by 2030
- With CCS, reduction potential of 22% of emissions under the BAU scenario in 2050

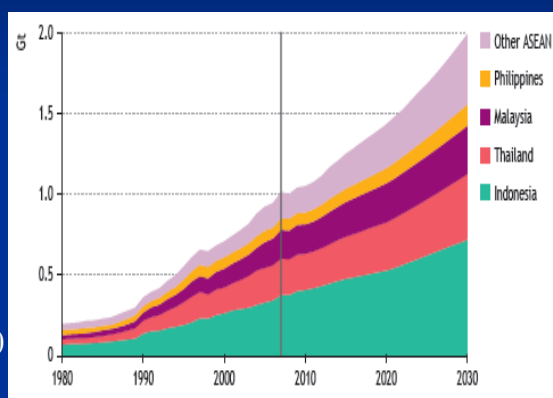


Figure 6: ASEAN energy-related CO2 emission by country - Reference Scenario
(Source: World Energy Outlook 2009, IEA)

Interest in CCS in S.E.Asia







Understanding Carbon Capture and Storage Potential In Indonesia

November 2009

Prepared by:
Indonesia CCS Study Working Group

The assessment under the cooperation between Indonesia and United Kingdom: Strategic Programme Fund Technical Implementation: On Understanding Carbon and Capture Potential in Indonesia.







Assessment of the capture and storage potential of CO₂ co-produced with natural gas in South-East Asia
May 2010



Asia Pacific Economic Cooperation




CO₂ Storage Prospectivity of Selected Sedimentary Basins in the Region of China and South East Asia
June 2009









Strategic Analysis of the Global Status of Carbon Capture and Storage

Report 3: Country Studies Indonesia

Final Report



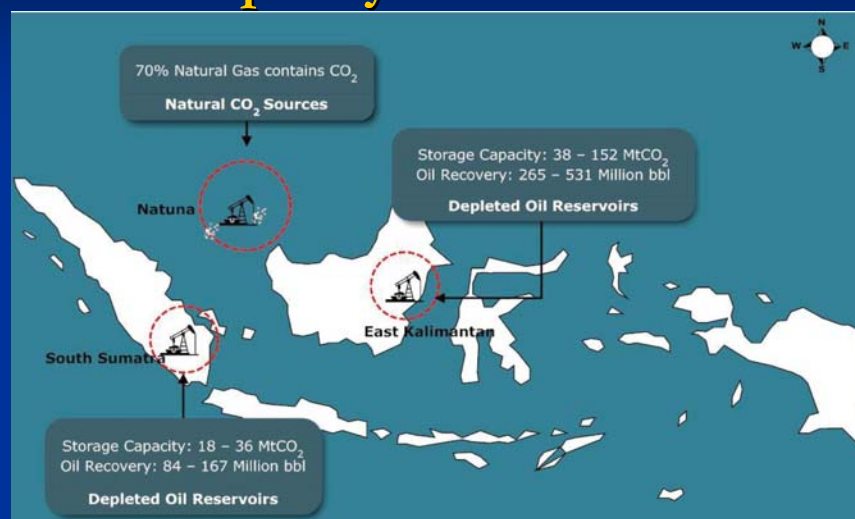

Guidelines for CCS-Ready Power Plants in Developing APEC Economies
(EWG 01/2008A Project Preliminary Report)

Rod Boyd
Amir Tadros
Tony Barnwell

Key Results

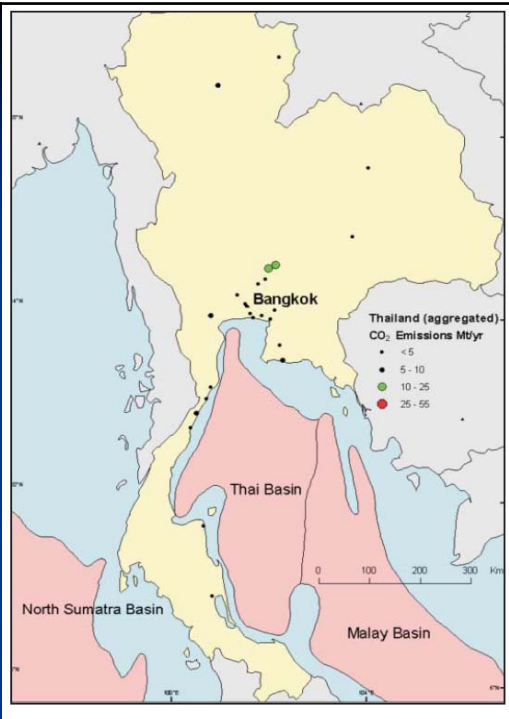
- Preliminary assessments suggest moderate to high storage potential
 - Depleting oil & gas fields
 - Deep Saline Aquifers
- Caveats:
 - High uncertainties
 - Limited data

Current Understanding of Storage Capacity – Indonesia



Source: World Energy Council, 2009

Current Understanding of Storage Capacity - Thailand



Source: APEC, 2005

Current Understanding of Storage Capacity - The Philippines



Source: APEC, 2005

Technology

- High Costs:

Retails Electricity Tariffs in S.E.Asia	3-19 (US cents/kWh)
Added cost of CCS*	2 – 5 (US cents/kWh)
Mitigation cost* - without EOR	30-71 (US\$/tCO ₂ avoided)
CER Price	16** (US\$/tCO ₂)

*: IPCC Special Report on CCS, 2005

** : December 2010 Forward Contract Price (Carbon Positive)

- Significant energy output loss in power plants (“the energy penalty”)

Lack of Economic Incentives

- No GHG reduction targets, except for Indonesia
- CCS is currently not included in the CDM
- Current carbon prices are inadequate to ensure viability of CCS.
- CCS is currently not eligible for tax incentives applicable for clean technologies

No Regulatory Framework

- International marine laws (London Convention and Protocol) do not apply
- No National Regulatory Framework
- Existing Laws might apply but were designed without CCS in mind, for example:
 - Unclear fiscal regimes for CCS-EOR or CCS-EGR
 - Inadequate Environmental Impact Assessment requirements
- Some key regulatory issues:
 - Transboundary treatments
 - Long-term liability
 - Pore-space ownership
 - Permitting regimes
 - Conflict with other industries

Poor Understanding of Storage Capacity

- Limited number of assessments done for this region:
 - APEC 2005 Preliminary Assessment (Indonesia, the Philippines, Thailand, Malaysia)
 - APEC 2010 CCS Opportunities in Natural Gas Processing Sector (Indonesia, Vietnam, Thailand, Malaysia, Brunei)
 - Indonesia – Understanding of CCS Potential in Indonesia, 2009
 - Vietnam – Assessing CCS Potential in Vietnam, 2009
- Assessments are very preliminary with great uncertainties
- Very limited access to seismic and geological data – controlled by the governments

Lack of Awareness, Capability & Coordination

- Low or non-existent awareness of CCS amongst:
 - Government Sector
 - Industry: Polluters and Potential Storage Developers
 - Research Community
 - Public
- Hence, lack of coordination amongst key actors along the CCS chain (from source to sink)
- Lack of Capability in:
 - Policy Development and Enforcement
 - CCS Technology
 - CCS will have to compete with a number of industries for human resources

Public Awareness and Acceptance

- Develop and implement public engagement and consultation plans:
 - Relevant industries
 - Potential affected communities
 - General Public
 - Draw on previous works and lessons learnt (Australia and IEA)



Nick Otter, Interim CEO, GCCSI, April, 2009

Outline

- Background
- The Role of CCS in S.E.Asia
- Barriers to CCS Deployment in S.E.Asia
- **ADB Regional TA on CCS**

Determining the Potential for CCS in S.E Asia

- **First Phase (2010-2011) – Current TA**
 - Conduct an analysis of the potential for CCS, culminating in a road map for a CCS demonstration project in Indonesia, the Philippines, Thailand, and Viet Nam.
- **Second Phase (2011-) – Proposal**
 - A national TA project in each eligible country (i.e., a country with CCS potential and a willingness to commit resources for a demonstration or pilot project) to: (i) establish the enabling environment, (ii) examine the technical aspects related to capture and/or storage, (iii) identify and prepare prefeasibility reports for pilot projects, and (iv) carry out initial geological investigations for the storage aspects of the pilot projects.

Key Activities

- Create an inventory of large power and industrial CO₂ sources
- Create an inventory of possible sites - using secondary data and explicit screening criteria - for geological storage of captured CO₂
- Identify a promising demonstration project or projects
- Develop an internal network of agencies and personnel with the capacity to carry such projects forward

Implementation Approach

- October 2010 – June 2011
- Team of International Consultants to work closely with national consultants/Institutes under the guidance of the national implementing agency (focal point) and the CCS working group
- The total cost of the TA is estimated at \$1.150 million equivalent. Of this, \$900,000 will be financed on a grant basis by the Carbon Capture and Storage Fund under the Clean Energy Financing Partnership Facility, and administered by the ADB. The grant will cover remuneration, travel and per diem for the international experts, and national experts or institutes; related training seminars and conferences; and TA administration and support costs. The counterpart institutions in the focus countries will finance the remaining \$250,000 equivalent in-kind.
- Partnership with IEA Greenhouse Gas R&D Center, IPAC, GCSSI.

Key Milestones

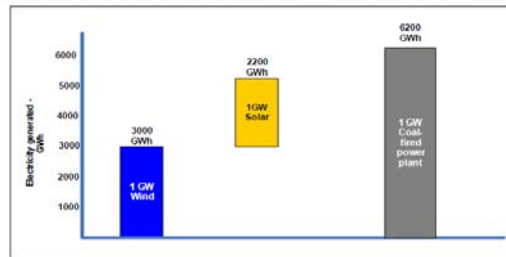
- Inception and Planning Workshop (November 2010 – January 2011)
- Scoping Analysis and development of draft demonstration road map (October 2010 – March 2011)
- Meeting to discuss draft road map (February 2011)
- Study tour to CCS projects (e.g. Canada or EU) (April 2011)
- Regional Workshop to discuss road maps from all countries (May 2011)
- Endorsement of demonstration road map for focus countries (May-June 2011)
- Decision on whether to proceed with Phase II.

Findings from the China CCS TA

- More than 26 billion USD in public funds has been committed in OECD for CCS projects in developed countries. There is no dedicated mechanism for supporting CCS in developing countries.
- The barriers that apply in developed countries are often magnified in developing countries.
- A dedicated CCS fund is called for that will support early demonstrations in developing countries as a way to kick-start CCS projects.

Findings from the China CCS TA

Figure 7. Comparison of Electricity Output from Various Technologies Based on Utilization Factor



GW = gigawatt, GWh = gigawatt-hour.
Source: Data from the People's Republic of China and Authors' experience.

Thank You

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Electricity access in Vietnam: Success story and challenges

Dr. Nguyen Anh Tuan



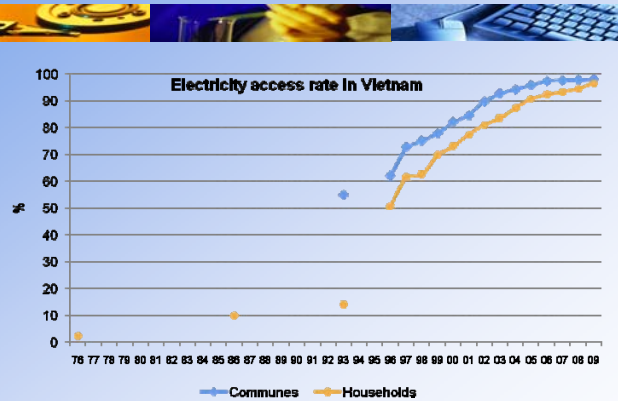
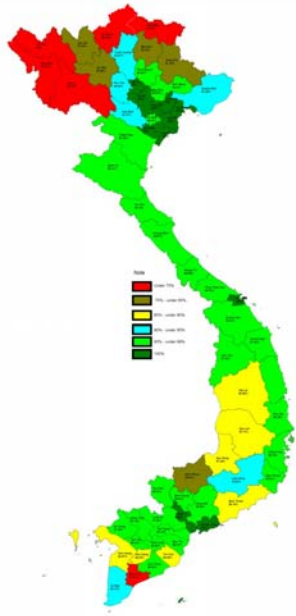
GMS 9th meeting of RPTCC-9: PWG and FG
26-27 October 2010, Shenzhen, PRC

Country features

Official name	Socialist Republic of Vietnam
Population in 2009	87 millions Urban : 29.8% Rural: 71.2%
GDP per capita (current US\$)	1990: 113 2000: 392 2009: 1133
Geographical Administration	Provinces: 63 Communes/Wards: 10 941 Rural communes: 9 087
Rural communes have access to electricity in 2009	8888
Households have access to electricity in 2009	20.7 million HH (96.6%)
Average exchange rate in 2009	1 US\$ = 17,843 VND

The views expressed in this paper/presentation are the views of the author and do not necessarily reflect the views or policies of the Asian Development Bank (ADB), or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequence of their use. Terminology used may not necessarily be consistent with ADB official terms.

Rural electrification in Vietnam



By the end of 2009, 96.6 % households in Vietnam has access to electricity, of which 96.34% are connected to the national grid and 0.26% are off-grid electrified.

Some milestones in rural electrification development

up to 1995	1995 - 1999	From 1999	From 2001	To 2009
<ul style="list-style-type: none"> Community driven individual, or group, commune build grids MV & LV Buy at subsidized tariff and sell at unregulated tariff EVN managed some MV systems to pumping station 	<ul style="list-style-type: none"> Divers forms of LDU Retail tariffs decided locally, no regulation Observed retail tariffs about US 40 cents EVN piloted 8 communes 	<ul style="list-style-type: none"> Decree 22 (1999) Demarcation of Responsibility Transfer MV to EVN 	<ul style="list-style-type: none"> Legal status of Utility required, as coop or company Bulk tariff to rural 420d/kwh. Ceiling 700d/kwh set by Gov Province could allow retail tariffs >700 EVN takes over LDU 	<ul style="list-style-type: none"> Electricity Law (July 2005) Retail tariffs uniform across country 600 d/kwh Bulk tariff for LDU 420d/kwh up to block up 50kwh Expect more LDUs will be taken over by EVN (to date about 50%)

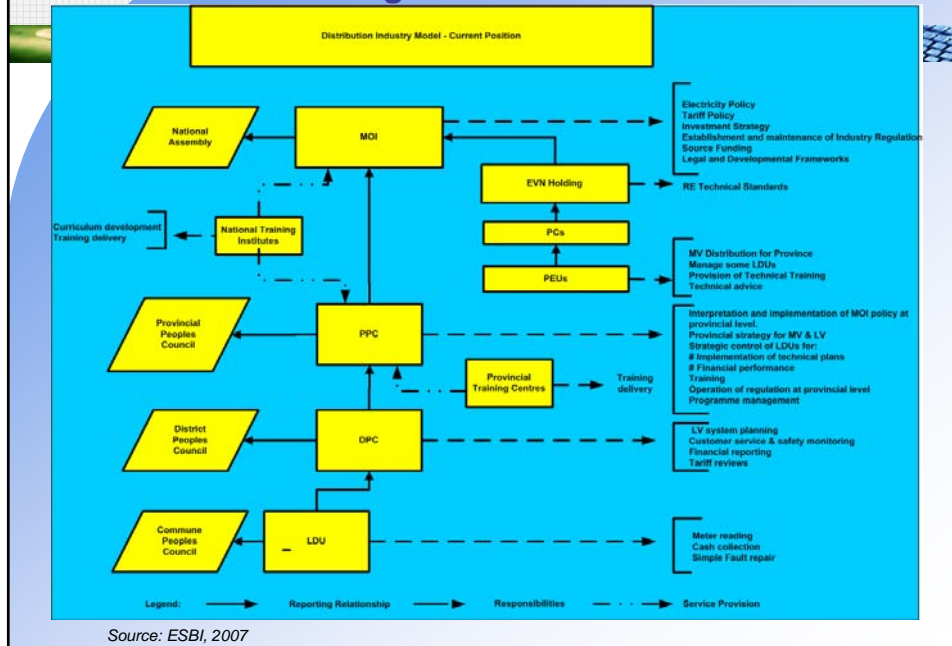
Factors contributing to rapid electricity access



Rural electrification programs

Electrification programs	Sources	Amount (m.US\$)	Objective	Timeframe
Program 135, -Phase I -Phase II	GoV	10,000 b VND 12,000 b VND	Provide grants to all poor communes to improve living standards, create favorable conditions to reduce poverty, underdevelopment	1998 – 2005 2006 – 2010
RE I (Rural Electrification)	WB	150.0	Electrification to 900 communes	2000 – 2004
Energy Efficiency, equitization and RE	WB/GEF	4.5	Construction of new and rehabilitation of SHPP, RE enterprises and distribution networks.	2002-2007
RE II	WB	220.0	Grid extension, roads upgrade and loss reduction	2005 - 2011
RE for Quang Nam province	OPEC	10.0		
Swedish Vietnam Rural energy program	Sida	6.31	Acceleration of the Electrification in rural and mountainous areas	2004-2010
Rural electrification program for the South	AFD (France)	20.9	Electrify 78 communes	2001-2006

Institutional arrangement for rural electrification



Rural Electrification management structure

Form of Management	Communes	Percentage
Commune Electricity Groups	4,842	62.8 %.
EVN power companies	1,466	19 %
Electricity Services Co-operatives	755	9.8 %
Companies owned by Province or districts	408	5.3 %
Unregistered Agents	233	3 %.
Joint stock companies	5	0.05
Private companies	1	0.01
Total	7,710	100%

Good conditions and favorable contexts

Vietnam disposes good and cheap hydropower potential

GDP has grown at an annual average of 8.2% with all sectors growing rapidly

Vietnam has interconnected power grid since 1995. Strong SOU (EVN) played a leader role.

Good basic conditions and favorable contexts for electrification

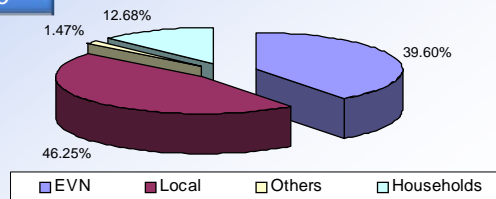
Strong desire of people to have electricity

Expenditure per month (k.VND)	Income per month (k. VND)					Average
	<200	200 - 1000	1000 - 2000	2000 - 5000	>5000	
<12.5	100%	100%	100%	100%	100%	100%
<25	19%	32%	62%	85%	48%	54%
<75	6%	6%	18%	40%	43%	17%
<200	0%	0%	2%	14%	10%	3%
>200	0%	0%	0%	0%	5%	0%

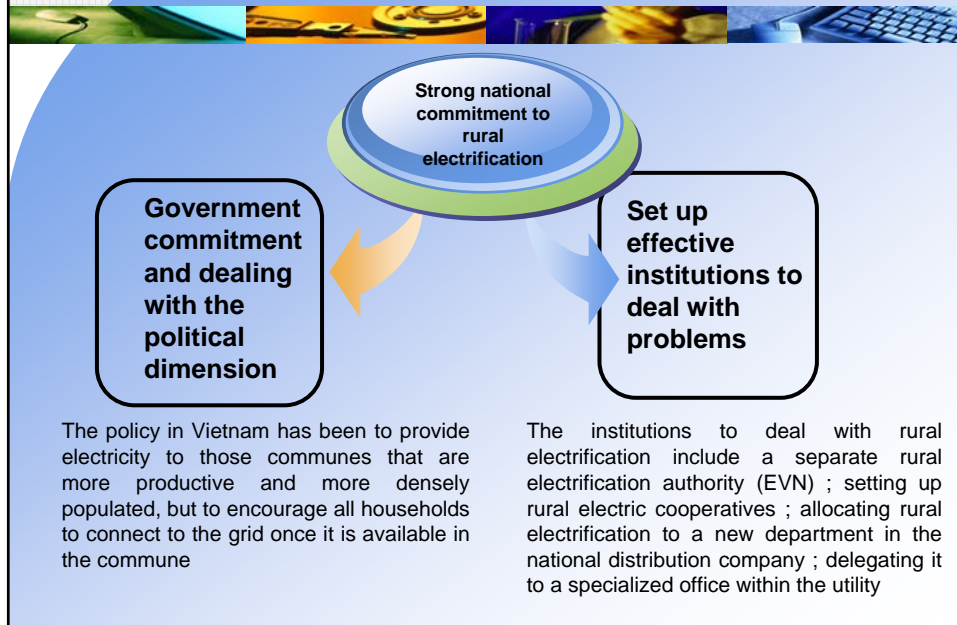
"Electricity- Roads- Schools- Health care"

Most people opt for Electricity

Contribution structure for rural electrification



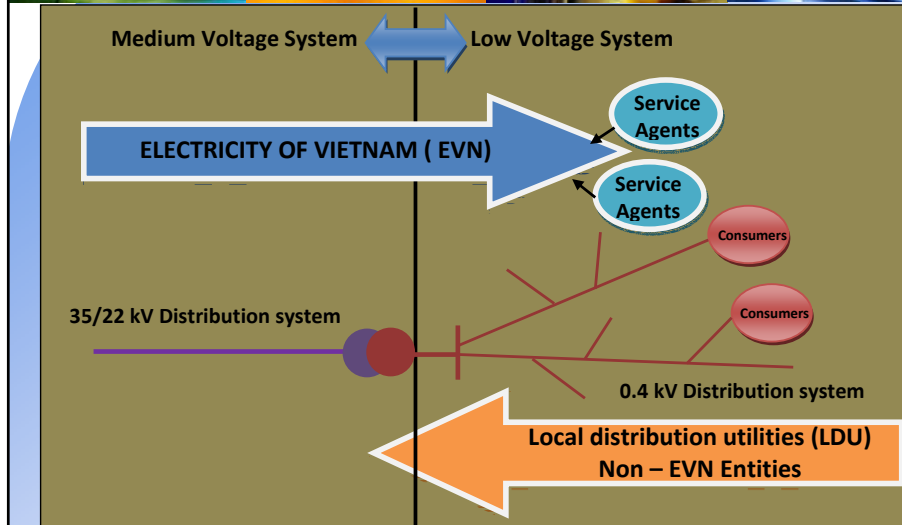
Strong national commitment & adaptive



Customized Public Private Partnership

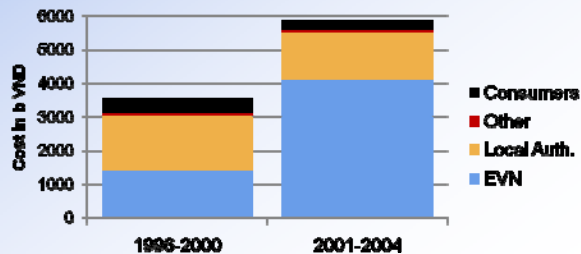


Clear demarcation



Effective partnership between EVN and local utilities

- Delegates the responsibility to LDU → Losses reduced dramatically under 10% in 2009 from above 20% in 90x.
- Outsourcing services – Service Agent model
 - Agent is a local person in a commune, hired by EVN to collect the bill, lines checking, other works, and liaison person.
 - Service Agent model reduces EVN's operating costs by 30 to 40%.
 - One agent could be in charge of 300 to 1000 customers, and receive fees from 30 to \$120 per month.
- Broad participation in sharing responsibilities and costs



Multiple funding sources and modalities

Central Gov, EVN or PC, Provincial gov., Local authorities, Consumers, Private, Banks, Donors

Subsidy for grid expansion capital costs

Lowering the barriers to obtain a supply

Reducing construction and operating costs

Clear planning criteria and standards

Ranking based on their locations, social conditions, pop., potential consumption, ability to pay, economic development

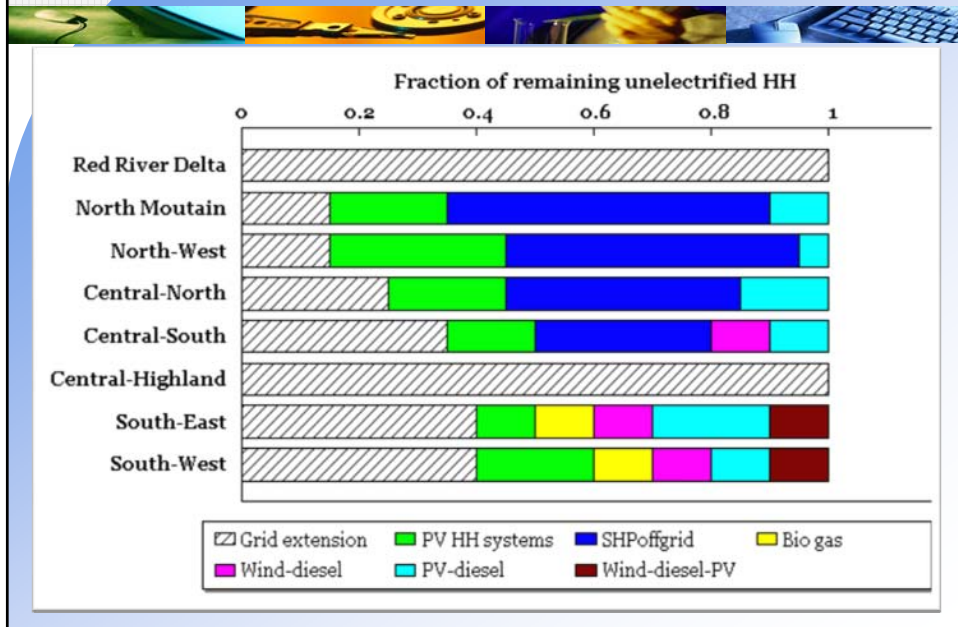
Screening procedure involves quantitative criteria – assure fastest possible cost recovery

- Distance to the nearest MV : 3.75 points
- Relative pop. size : 3.75 points
- Transportation, roads etc. : 2.0 points
-

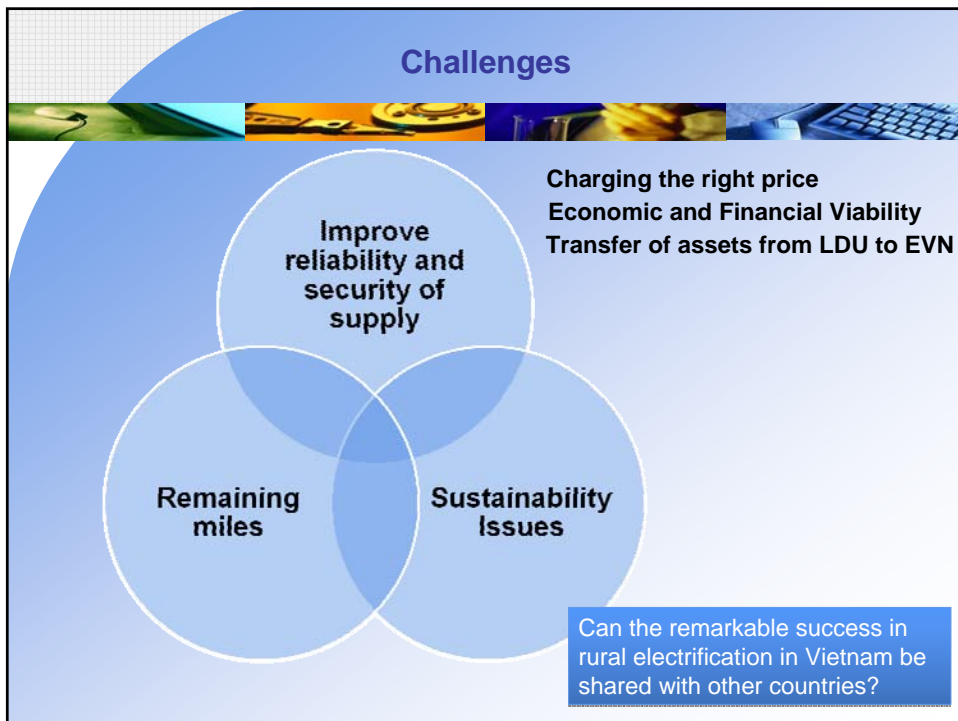
From no-planning, no-directives, no-technical standards in early 90x → establish regulatory framework (Standards, Guidelines, Ministerial circulars on technical issues), enforcement of technical standards in place

- Reduce losses
- Well adapted for each regions (6-10-35 kV with 3-phase with neutral no direct earthing, no single phase dist. in North; 15 kV with 3-phase with direct earthing neutral, single phase dist. in South; Both techniques in Center)

Complementarities of different options for “last miles”



Challenges



Thank You !

For more information

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