



Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion:

The Case of “ADB/GMS RETA No 6440 – GMS Power Master Plan ”

Prepared by : Prof. T. Lefèvre, Director CEERD

5th Capacity Building Programme for Officers of
Electricity Regulatory Commissions
21-23 October 2012, Amari Atrium Hotel, Bangkok, Thailand



PRESENTATION OUTLINE

PART 1 – The GMS Road Map for Expanded Energy Cooperation

PART 2 – Presentation of ADB/GMS TA No 6440 - REG

PART 3 – Overview on the Proposed GMS Power Master Plan

PAR 4 – Recommendations and the Way Forward

ANNEX 1- GMS RPT Institutional Framework []

ANNEX 2 - Recommendations and the Way Forward []

ANNEX 3 – Proposed Capacity Building []

PRESENTATION OUTLINE

Part 1 – The GMS Road Map for Expanded Energy Cooperation

A. Goals and Major Strategic Objectives

B. Rationale for Regional Power Trade (RPT)

C. Benefits of Regional Power Market

D. Developing the Power Market – A Two-Pronged Approach

D1- Providing the Policy and institutional Framework

D2 - Developing the Grid Interconnection Infrastructure

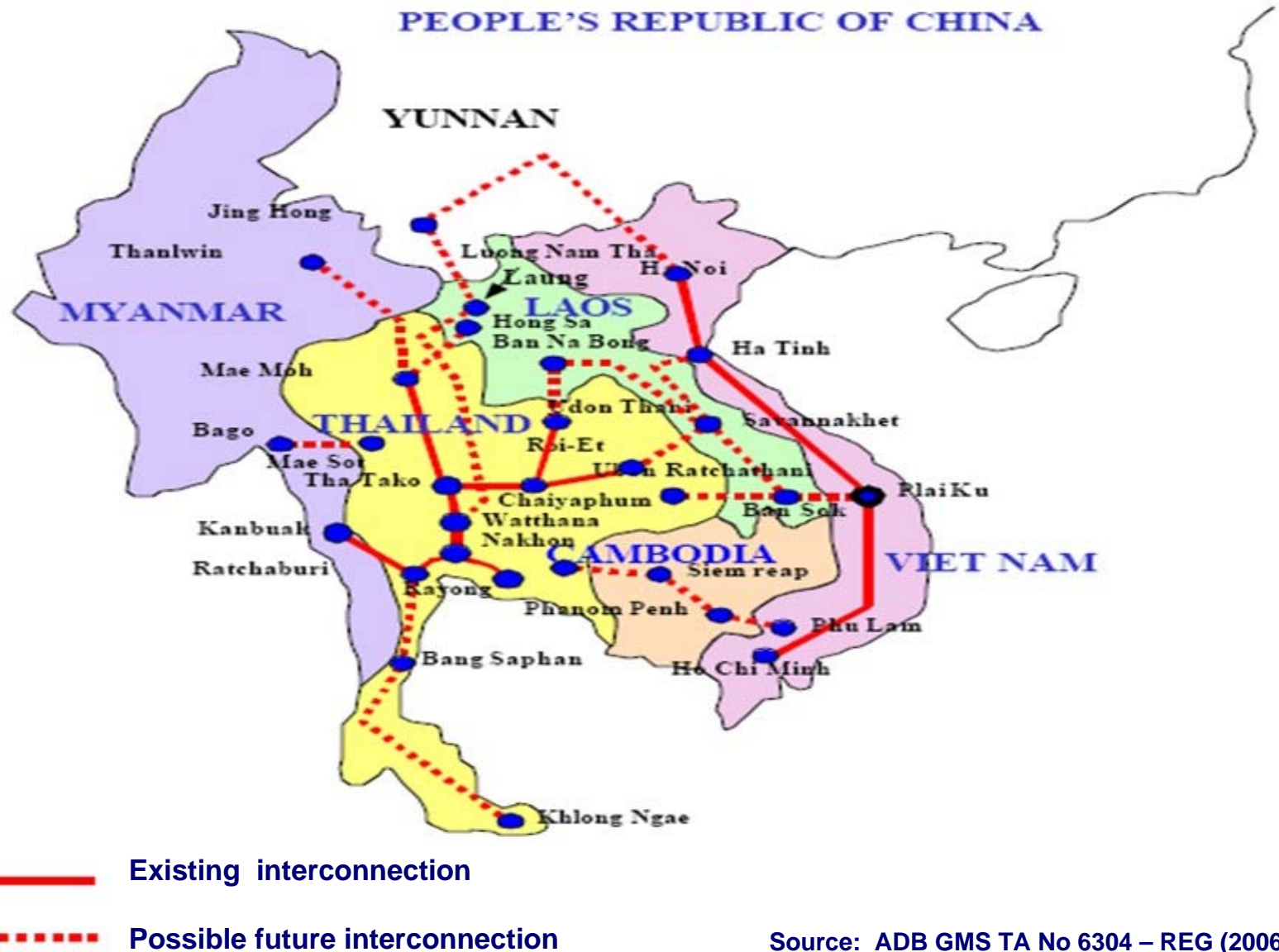
E. Road Map for the GMS Cross Border Power Trading

Part 2 – Presentation of ADB/GMS TA No 6440 – REG

Part 3 – Overview on the Proposed GMS Power Master Plan

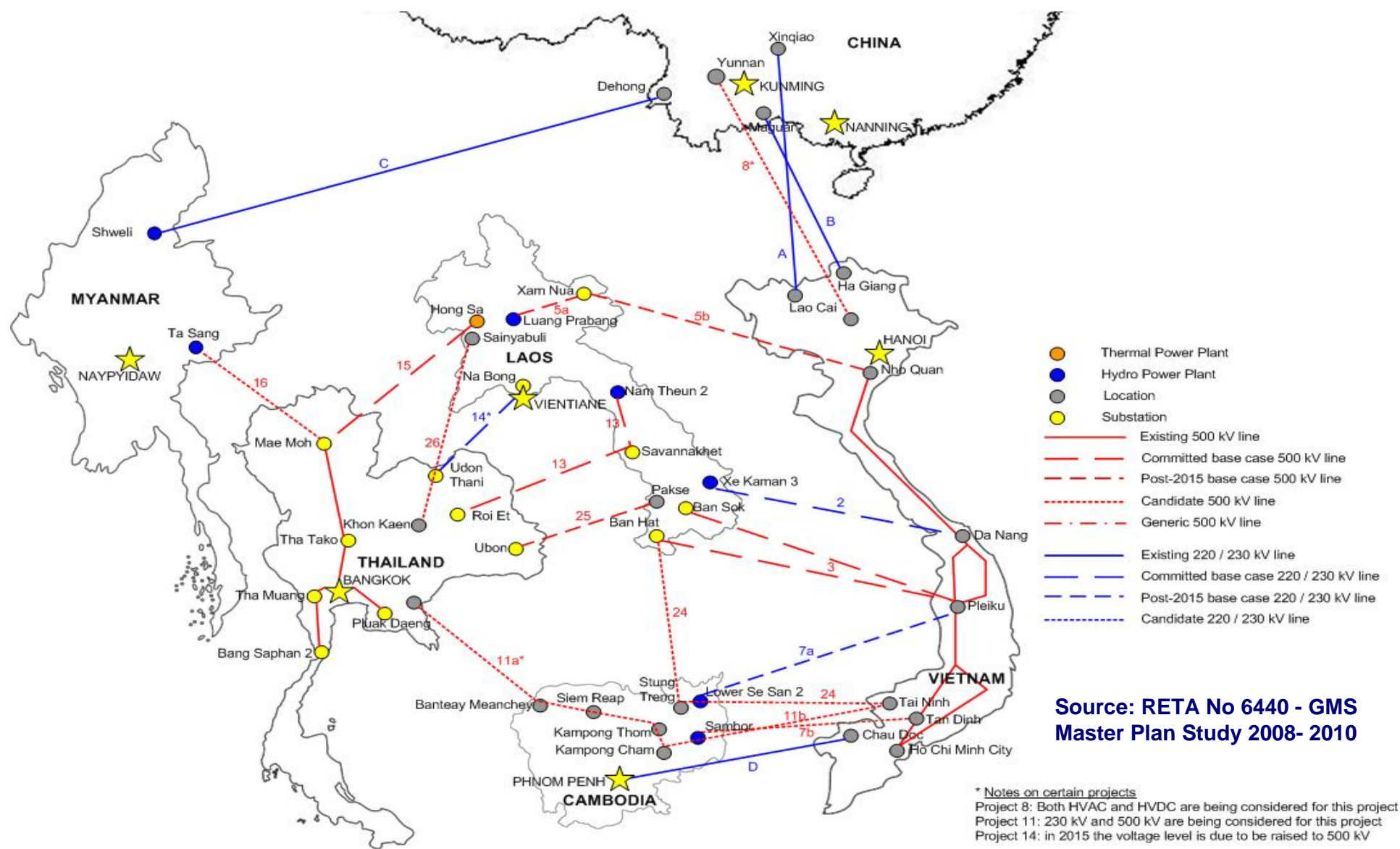
Part 4 – Recommendations and the Way Forward

Part 1 – GMS Road Map for Expanded Energy Cooperation



Source: ADB GMS TA No 6304 – REG (2006-2008)

Part 3 – Overview on the GMS Power Master Plan



A1- Goal:

- **An integrated approach to deliver sustainable, secure and competitive energy in the GMS**

A2- Major Strategic Objectives:

- **Enhance access to modern energy to all sectors / communities**
- **Utilize domestic resources in a more optimal, environmentally-sound manner / reduce oil dependence**
- **Improve regional energy security**
- **Promote private participation in GMS energy development**

B- Rationale for Regional Power Trade (RPT):

- **National forecasts see demand for electricity continuing to grow at the rate between 9% and 15% per year for the next decade.**
- **GMS countries are characterized by uneven load demand and quite different resource bases:**
 - ✓ Biggest hydropower resources are in Myanmar, Laos and also in Viet Nam;
 - ✓ Thailand has limited mineral as well as hydropower resources;
 - ✓ Cambodia has diverse resources including hydropower and natural gas but yet to be fully developed;
 - ✓ PR China, SR Vietnam and Thailand have huge Power Demands and then huge needs for power imports.
- **Thus, regional cooperation in power trading presents excellent opportunities for efficient utilization of regional energy resources in meeting growing national electricity demand.**

C- Benefits of Regional Power Market

- **Provide energy security and regional stability;**
- **Help utilize efficiently the subregion’s energy potential by reducing investments in power reserves to meet peak demand, reduce operational costs, achieve more reliable supply, and reduce system losses;**
- **Achieve environmental benefits by substituting hydropower to present coal and other fossil fuels present uses; and**
- **Countries with energy surplus can also benefit from interconnection by servicing their deficit areas more efficiently with power imports from other grids.**

D- Developing the GMS Power Trade - A Two-Way Approach


- **D1- Providing the Policy and Institutional Framework for increasing cooperation in power trade;**
- **D2- Developing the Grid Interconnection Infrastructure through a building block approach allowing cross-border dispatch of power.**

D1- Policy and Institutional Framework Development for Power Market

- **Experts Group on Power Interconnection and Trade (EGP)**

Meetings:

The **EGP** was created in June 1998 to develop detailed work programs and recommend its findings to the **EPF** to promote the development of the regional transmission network and facilitate the expansion of cross-border power trade.

- **RPTCC:** In 2002, at the first **GMS summit**, the Inter-Governmental Agreement on Regional Power Trade was signed by the leaders of six GMS countries. **A Regional Power Trade Coordination Committee (RPTCC) tasked with coordinating and implementing activities was created in 2002 consisting of representatives from power utilities and energy ministries in each GMS country: [see Annex 1 **
- ✓ **Focal Group (FG) of RPTCC** tasked with coordinating priority **RPTCC** activities in each country
- ✓ **Planning Working Group (PWG)**, tasked to undertake planning and system operation studies that would help the GMS countries move towards common power trading guidelines.

- **Development of a Regional Power Database and Web Site**

1. **Purpose**

- ✓ Safe channel for gathering, storing and exchanging of relevant information on the energy sector in the region;
- ✓ Communication between GMS countries regarding the development of regional power trading;
- ✓ Platform for the interaction of GMS countries toward the development of the regional power market;
- ✓ Board for the announcements of upcoming meetings, events, news and other significant developments (ex. Information for progress of power market development in the region).

2. **Deployment and Status**

- ✓ The website database hosted by China Telecoms, Guangzhou;
- ✓ CSG is in-charge of System Administration whereas System enhancements, error resolution, and other activities associated to the program scripts are not included in the responsibilities of the CSG System Admin.;
- ✓ Each GMS member country provides 1 country administrator;
- ✓ Technically, ownership of the database and website belong to all GMS countries with CSG as its caretaker.

- **ADB Assistance to RPTCC**

1. **TA5920-REG: Regional Indicative Master Plan on Power Interconnection in the Greater Mekong Subregion (2000);**
2. **TA 6100-REG: Study for a Regional Power Trade Operating Agreement in GMS (2003-2005);**
3. **TA 6304-REG: GMS Power Trade Coordination and Development (2006-2008);**
4. **TA 6440-REG (Package 1): Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion (2008-2010) [Finalized 31st Nov. 2010];**
5. **TA 6440-REG (Package 3):Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion – [2009-2010 – Has been canceled];**
6. **TA 6440-REG (Package 1- Cont.): Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion (2011) - Setting Up a Regional Organization for GMS Power Trade [Started in 2011 – Finalized by mid-2012];**
7. **RETA 7764 "Ensuring Sustainability of GMS Regional Power Development" [To be started November 2011 - Under Implementation].**

D2- Developing The Grid Interconnection Infrastructure

- **Existing Power Trading in GMS**

1. Power trading in the GMS started in 1971 with Lao PDR’s power export from its Nam Ngum hydropower plant to the northeastern portion of Thailand.
2. Modest cross-border exchanges have been engaged in by the GMS countries which resulted in the electrification of remote areas of one country from the nearby system of another.
3. Bilateral agreements, one way power flow.

- **ADB financed Regional Power Projects in GMS**

Country	Project Name	Year of Approval	Approved Amount (\$ million)
LAO	Theun-Hinboun Hydropower	1994	270.0
LAO	Nam Leuk Hydropower Development	1996	112.6
CAM	Cambodia: GMS Transmission	2003	95.0
LAO	Nam Theun 2 Hydropower	2005	1,250.0

E- Roadmap for Cross Border Power Trading

- **Stage 1**: The existing cross border transmission lines are mostly associated with Power Purchase Agreements (PPAs) between a Power Utility and Independent Power Producer (IPP) located in one GMS country selling power to a power utility in another GMS country.
- **Stage 2**: Corresponds to the moment when trading will be possible between any pair of GMS countries, eventually using transmission facilities of a third regional country. However in this stage the available cross border transmission capacity is limited and based on surplus capacity of lines linked to PPAs.
- **Stage 3**: Will be linked to the development of transmission links specifically dedicated to cross border trading. During this Stage some GMS countries may have completed a transition to competitive markets, where multiple buyers-sellers are allowed to enter in cross border transactions.
- **Stage 4**: Corresponds to the situation when most of GMS countries have moved to a multiple sellers-buyers regulatory frameworks, so a regional wholly competitive market can be implemented.

- **Implemented Activities under Stage 1: ADB/GMS TA 6440-REG**
- **Study on a GMS Performance Standards for:**
 - (i) **new regional interconnections and for the synchronized operation of interconnected grids, and**
 - (ii) **the transitional arrangements to achieve the GMS Performance Standards by 2010;**
 - **Study on Transmission Regulations to coordinate the operation and power flow control in grid-to-grid interconnections synchronization and operation;**
 - **Finalize power interconnection master plan and select priority new interconnection projects for undertaking feasibility studies;**
 - **Study on standard regional metering arrangements and communications system in grid-to-grid interconnections;**
 - **Study on power trade rules, including resolution mechanisms for disputes outside the existing PPAs.**
 - **Revision of the GMS Road Map for Cross Border Power Trading**

➤ Other Activities under Implementation under Stage 1

- **TA 6440-REG (Package 1- Cont.): Facilitating Regional Power Trading and Environmentally Sustainable Development of Electricity Infrastructure in the Greater Mekong Subregion (2011) - Setting Up a Regional Organization for GMS Power Trade [Sponsored by SIDA, Started in early 2011 – Finalized by mid-2012]:** However, the Regional Organization has not yet been set-up, but an Intergovernmental Memorandum of Understanding for the establishment of the Regional Power Coordination Centre (RPCC) in the GMS Subregion should be signed soon, before end of 2012
- **RETA No 7764 - "Ensuring Sustainability of GMS Regional Power Development" - To integrate the Environmental and Social components into the ADB/GMS RETA No 6440 Master Plan [Sponsored by AFD, started in the 4th quarter of 2011 - Under Implementation].**

PRESENTATION OUTLINE

Part 1 – The GMS Road Map for Expanded Energy Cooperation

Part 2 – Presentation of ADB/GMS TA No 6440 - REG

A. Objectives of ADB/GMS TA No 6440 - REG

B. ADB GMS RETA No 6440 (REG) Organization

C. Component 1 – GMS Master Plan's Main Results

D. Component 2 – Environmental & Social Main Results

E. Component 1 and 2 Technical Reporting

F. Main Project's Conclusions

Part 3 – Overview on the Proposed GMS Power Master Plan

Part 4 – Recommendations and the Way Forward

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 of the Setting up **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** and **STRUCTURE** for the Development and the Operation of Regional Electric Power Projects;
- 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;
- 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.

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 ended on 30th November 2010.**

- **Component 1 was 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 was 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)

C- Component 1: Results and On-going Activities

- **Kick-off Meeting with National Experts**, Bangkok, 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 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 to 28 August 2009;
- **COMP1 – Workshop #2, Part I**, September 14 to 16, 2009;
- **COMP1 – Workshop #2, Part II**, September 17 & 18, 2009;
- **COMP1 – Workshop #3**, January 20 to 22, 2010;
- **COMP1 – Workshop #4**, June 17 & 18, 2010;
- **COMP1 – Module 2, Training Session #1**, July 28 & 29, 2010;
- **COMP1 – Workshop #5, Final Workshop**, 28 to 30 September 2010.

D- Component 2: Results and On-going 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 On-the-Job Training-Cum-Field Trip #4** to the Nam Theun II and Theun-Hinboun Hydropower Projects, Lao PDR, July 5 to 10, 2010;
- **COMP2 – Workshop #5, Final Workshop**, 28 to 30 September 2010.

E- Project Technical Reports

● Component 1 Main Reports:

- ✓ **Component 1**: Review of International Experience and Recommendations for Establishing a GMS Power Market;
- ✓ **Module 1**: Revised and Updated GMS Power Master Plan Report (2009-2025);
- ✓ **Module 2**: Recommended Methodology, Best Practices and International Examples for Evaluation of Benefits Sharing of Regional Interconnection, including Calculations and Assessments;
- ✓ **Module 3**: Assess Proposed Interconnection Lines for Cross-Border Interconnections (incl. transmission capacities, costs and impacts on system planning, etc..), Assess Needs for Load Flow Analysis in Particular Cross-Border Connections, Determine the Impact of Interconnections on System Power Synchronization during Power Exchanges, Assess Capacity of GMS Power Utilities in Power Interconnection, and Recommend National and Transborder Transmission System Upgrades;
- ✓ **Module 4**: Review and Assess the GMS Countries Power Regulatory Frameworks (incl. tariffs, open access for IPPs, and to transmission facilities, grid and metering codes, independent regulatory bodies, etc...), Identify Barriers Toward Competition and Assess Stages for the Evolution and Establishment of an Independent Moderator of the Power Market;

- ✓ **Module 4: Review Experience of other Power Pools in the World and Define Steps to Achieve the Immediate Institutionalization** of a GMS Regional Regulatory Body Forum (RF) - **Revise the GMS Cross-border Power Trading Road Map** to be approved by RPTCC;
- ✓ **Module 5: Review and Assessment of the GMS Data Base** Requirements Report, and Draft Terms of Reference for the Update of the Structure of the GMS Data Base;
- ✓ **All Modules**: All Workshops and Trainings Proceedings, Reports and Materials.

- **Component 2 Main Reports:**

- ✓ **Component 2 - SEA: Analysis of SEA in the GMS** and Identification of Gaps, Needs and Areas for Capacity Development;
- ✓ **Component 2 - EIA/EMP: Analysis of EIA/EMP** in the GMS and Identification of Gaps, Needs and Areas for Capacity Development;
- ✓ **Module 1 - SEA Pilot Project Proposal** (TORs and Proposed Budget);
- ✓ **Module 2 - EMP/SDP: Recommended EMP and SDP Annexes to the Concession Agreement** of a Large Power Development Project;
- ✓ **All Modules**: All Workshops and Trainings Proceedings, Reports and Materials.

- **First conclusions and recommendations on the GMS Power Master Plan have been presented by the Consultant and agreed by RPTCC Representatives present at the Final Workshop, particularly:**
 - ✓ The Meeting has agreed on the Base Case (based on the presently approved GMS Countries' PDPs), and also on an Alternative Base Case taking into account the reinforcement of the transmission capacity between Vietnam North, Centre & South;
 - ✓ Other Alternative Cases have also been discussed and approved.
- **The principles for synchronous operation of the GMS national grids have been presented. Synchronous operation in the GMS is feasible if common rules and standards for operation are adopted;**
 - ✓ For operation of the interconnections, two coordination control centers would need to be set up: one in China covering China and Myanmar; and one in Thailand or Vietnam covering the remaining GMS countries;
 - ✓ When synchronous operation of the interconnection will not be possible, HVDC Technology should be considered;
 - ✓ A new version of the GMS Performance Standards has been presented. which shall in the future be the Reference for each GMS Country to plan and implement corrective measures to comply with these Reference Standards.

- ✓ Metering Arrangements have been proposed with an IT infrastructure for the management and settlement of power flows over the interconnections tie-lines;
- ✓ The Transmission Regulations have been completed and presented. They have been developed considering a pyramidal architecture based on the setting up of two coordination control centers and on control block per country;
- **The Consultant concluded that the GMS Countries shall now envisage what is the best way to achieve all the objectives and concepts presented during Workshop #4 as well as in the past Workshops of the ADB/GMS TA No 6440 - REG;**
- **The process to achieve these objectives is not a one spot activity, it is rather a continuous activity, which needs now to be undertaken and monitored by a Permanent Regional GMS Coordination Entity assisting the GMS Countries to fulfill the identified gaps under the guidance and supervision of the RPTCC;**
- **The project is probably mature enough now to seriously consider this proposal of creating a Permanent Regional GMS Coordination Entity and revising accordingly the existing Road Map for GMS Cross Border Power Trading (see Part 4 – Conclusions and Recommendations).**

PRESENTATION OUTLINE

Part 1 – The GMS Road Map for Expanded Energy Cooperation

Part 2 – Presentation of ADB/GMS TA No 6440 - REG

Part 3 – Overview on the GMS Power Master Plan

A. GMS Present Situation

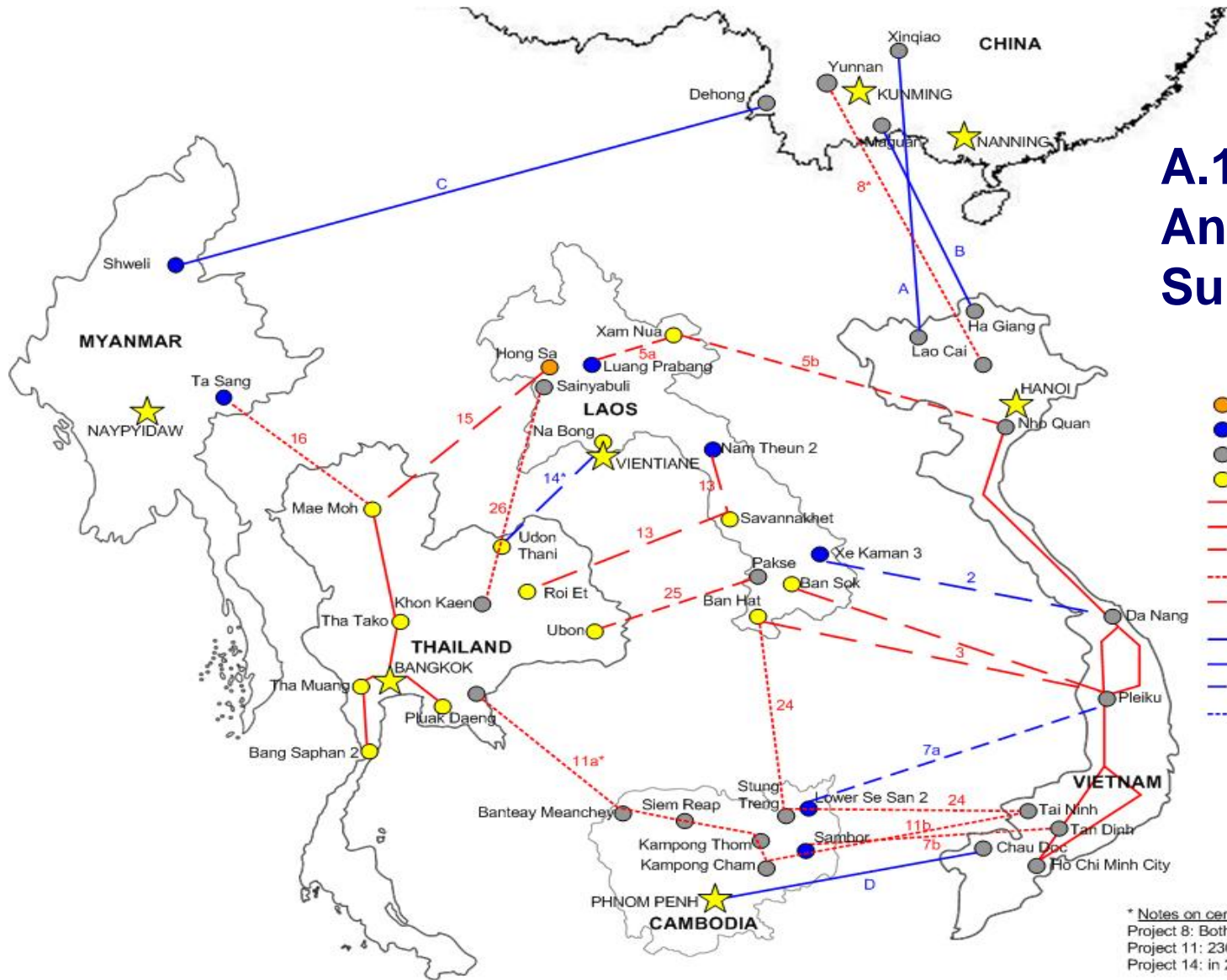
B. Power Trade Development

C. International Experiences

D. Proposed Concept Design

E. Proposed Implementation

Part 4 – Recommendations and the Way Forward



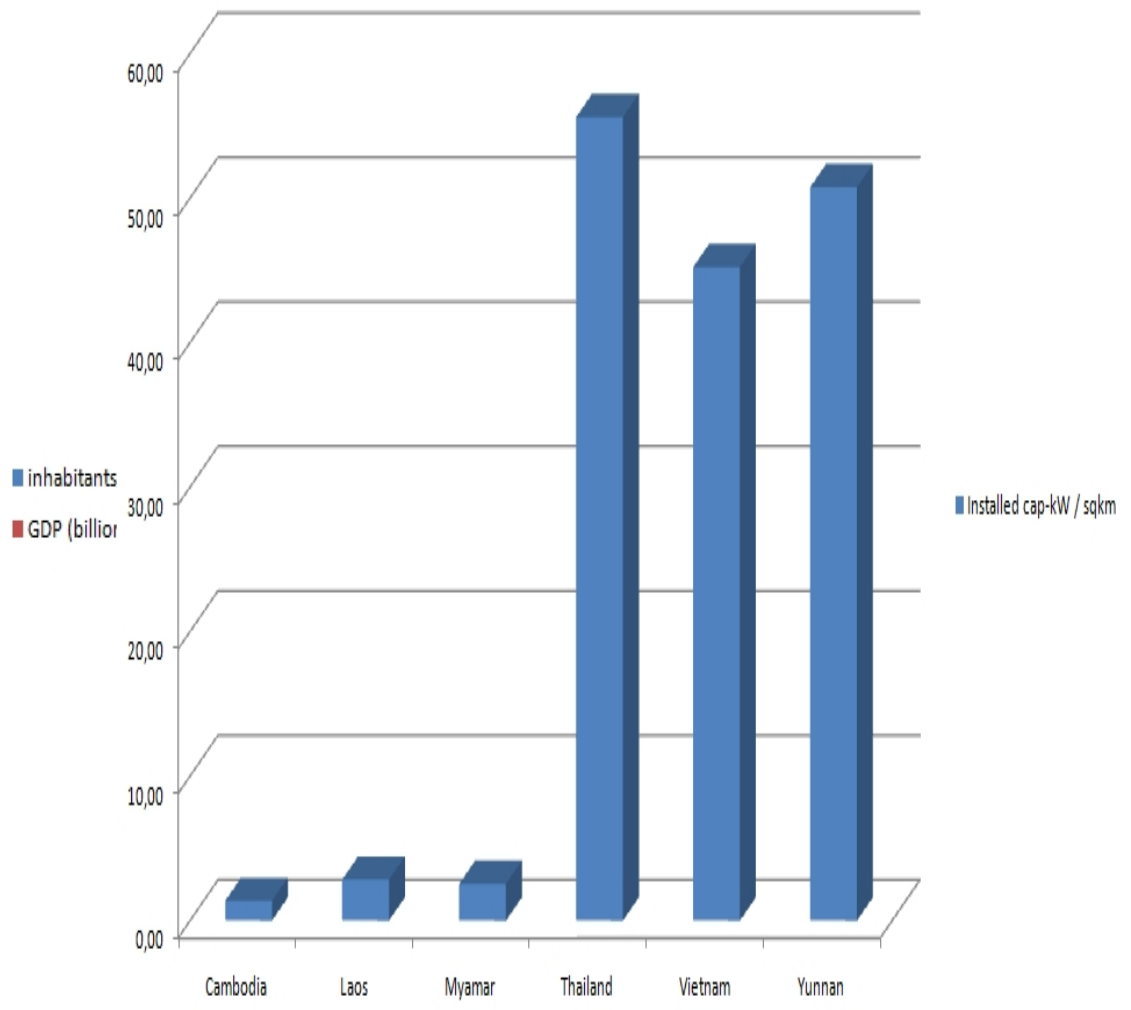
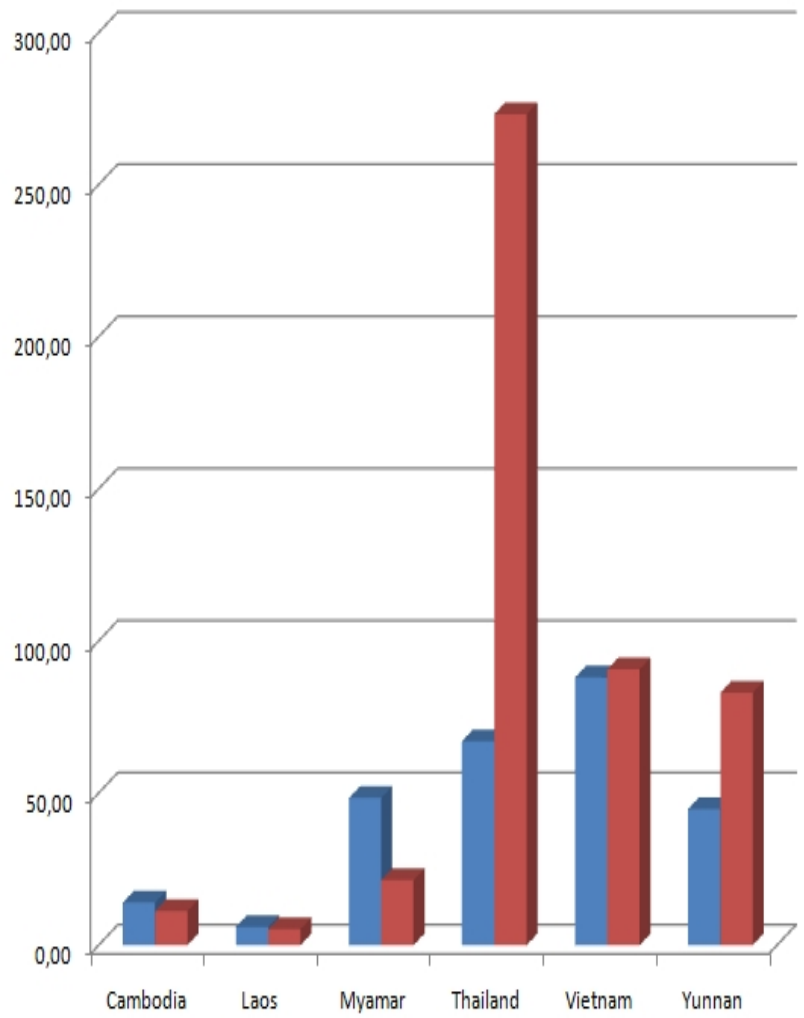
A.1 - GMS Situation: An interconnected Sub-region

- Thermal Power Plant
- Hydro Power Plant
- Location
- Substation
- Existing 500 kV line
- - - Committed base case 500 kV line
- - - - - Post-2015 base case 500 kV line
- · - · - Candidate 500 kV line
- · - · - · - Generic 500 kV line
- Existing 220 / 230 kV line
- - - Committed base case 220 / 230 kV line
- - - - - Post-2015 base case 220 / 230 kV line
- · - · - Candidate 220 / 230 kV line

Source: RETA No 6440 - GMS Master Plan Study 2008- 2010

** Notes on certain projects*
 Project 8: Both HVAC and HVDC are being considered for this project
 Project 11: 230 kV and 500 kV are being considered for this project
 Project 14: in 2015 the voltage level is due to be raised to 500 kV

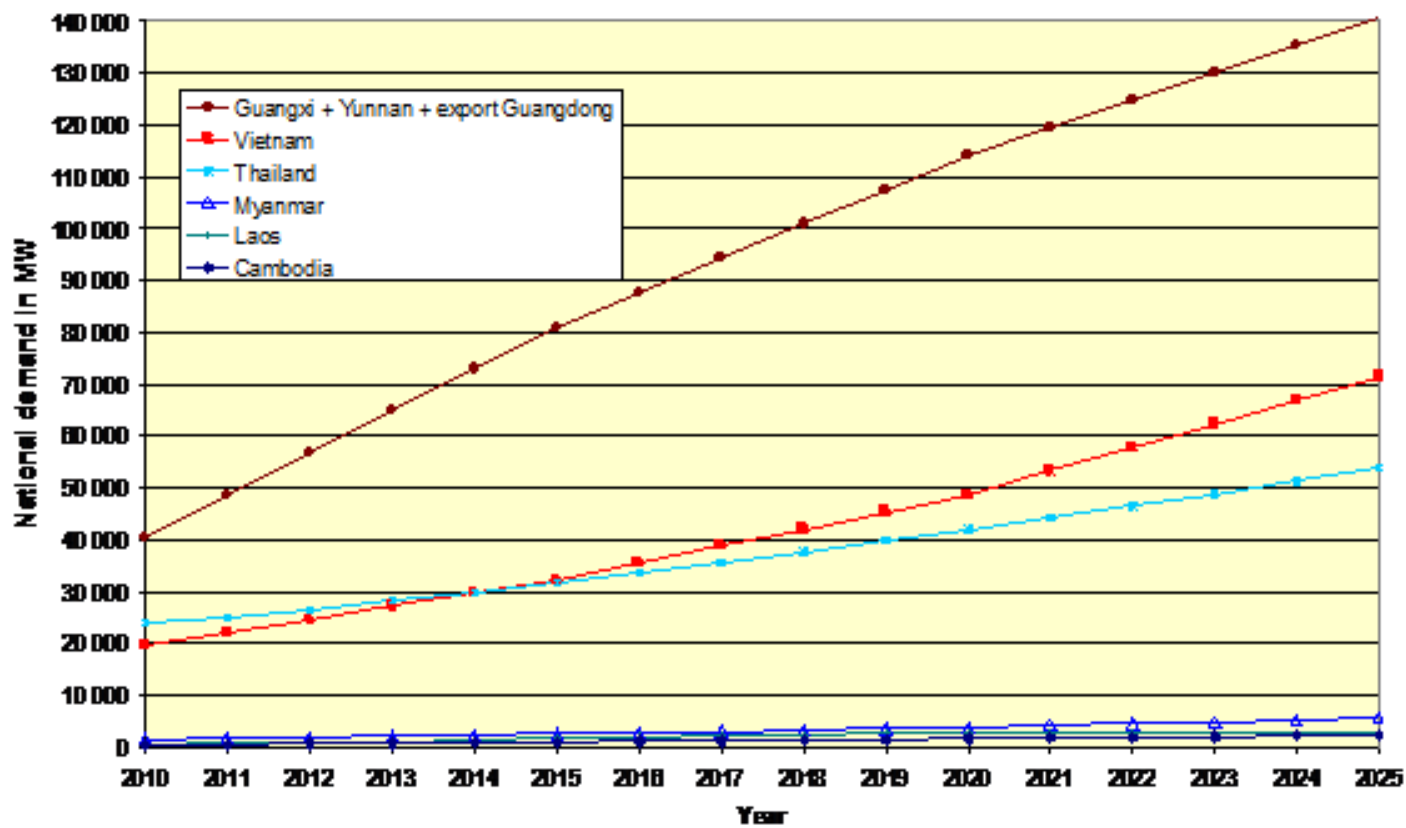
A.2 - GMS Situation: An Heterogeneous Sub-region



Source: RETA No 6440 - GMS Master Plan Study 2008-2010

A.3 - GMS Situation: Vast Demand Growth Towards 2025

Demand projection in the GMS countries



Increase located in China, Thailand and Vietnam:

- China: X 3.5**
- Thailand: X 2.2**
- Vietnam: X 4.5**
- GMS: X 3.3**

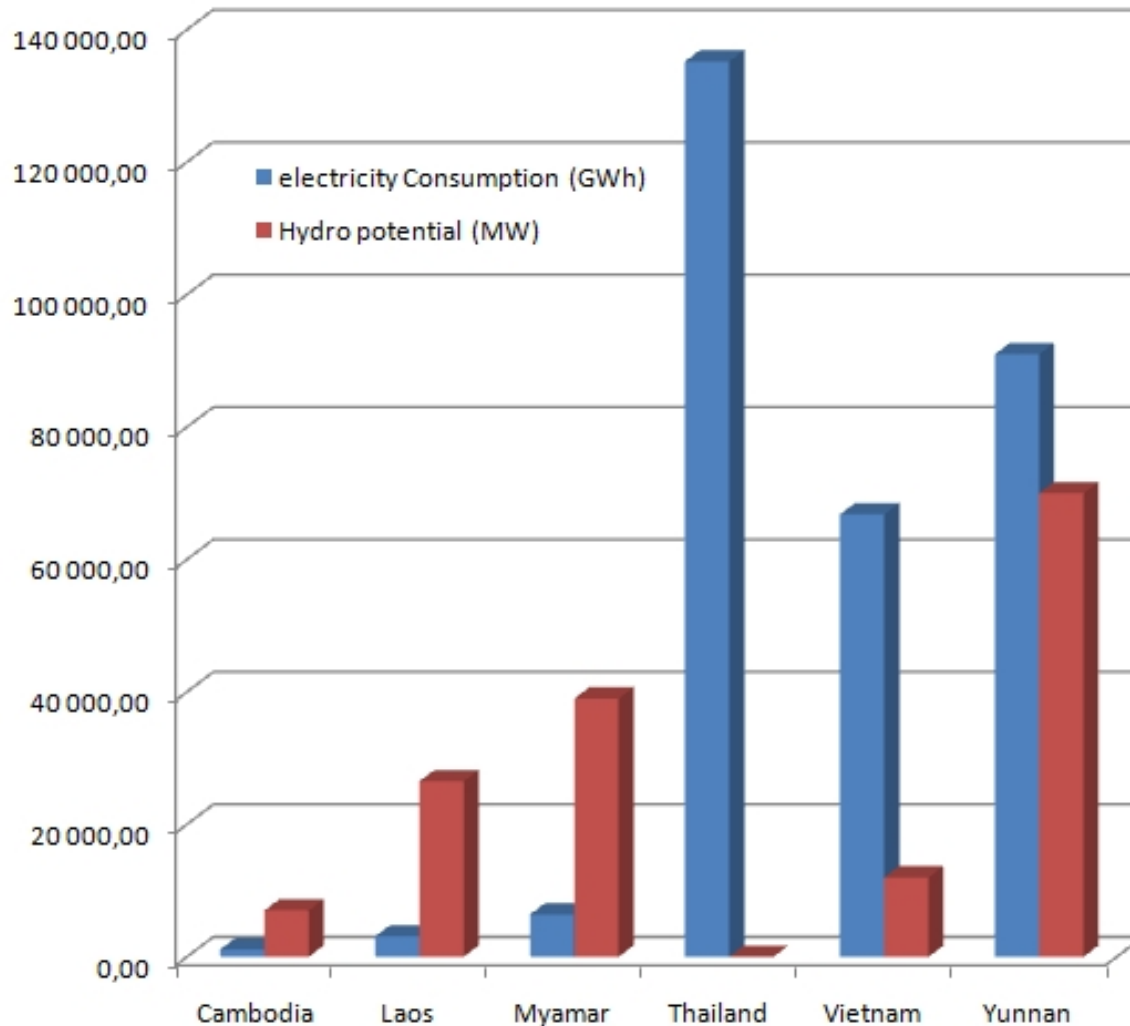
Annual growth in 2025:

- China: + 5,300 MW**
- Thailand: + 2,600 MW**
- Vietnam: + 4,600 MW**
- GMS: + 13,000 MW**

**Total GMS demand:
260 GW in 2025**

Source: RETA No 6440 - GMS Master Plan Study 2008-2010

A.4 - GMS Energy Situation: Three Main Power Exporters



The hydro-resources are located in Laos, Cambodia and Myanmar

The demand markets are in China, Thailand and Vietnam

Lao : 14.3 GW of hydro projects (< 50 \$/MWh) mostly located in the North/Central region.

Export market : Thailand, Vietnam, China.

Myanmar : 28 GW of hydro projects (<25 \$/MWh).

Export market : Thailand, China for both power & NG

Cambodia : 2.6 GW of hydro projects (<50 \$/MWh).

Export market : Thailand, Vietnam.

Source: RETA No 6440 - GMS Master Plan Study 2008-2010

A.5 - GMS Energy Situation: The Balance between the Level of Power Imports ↔ Interdependence

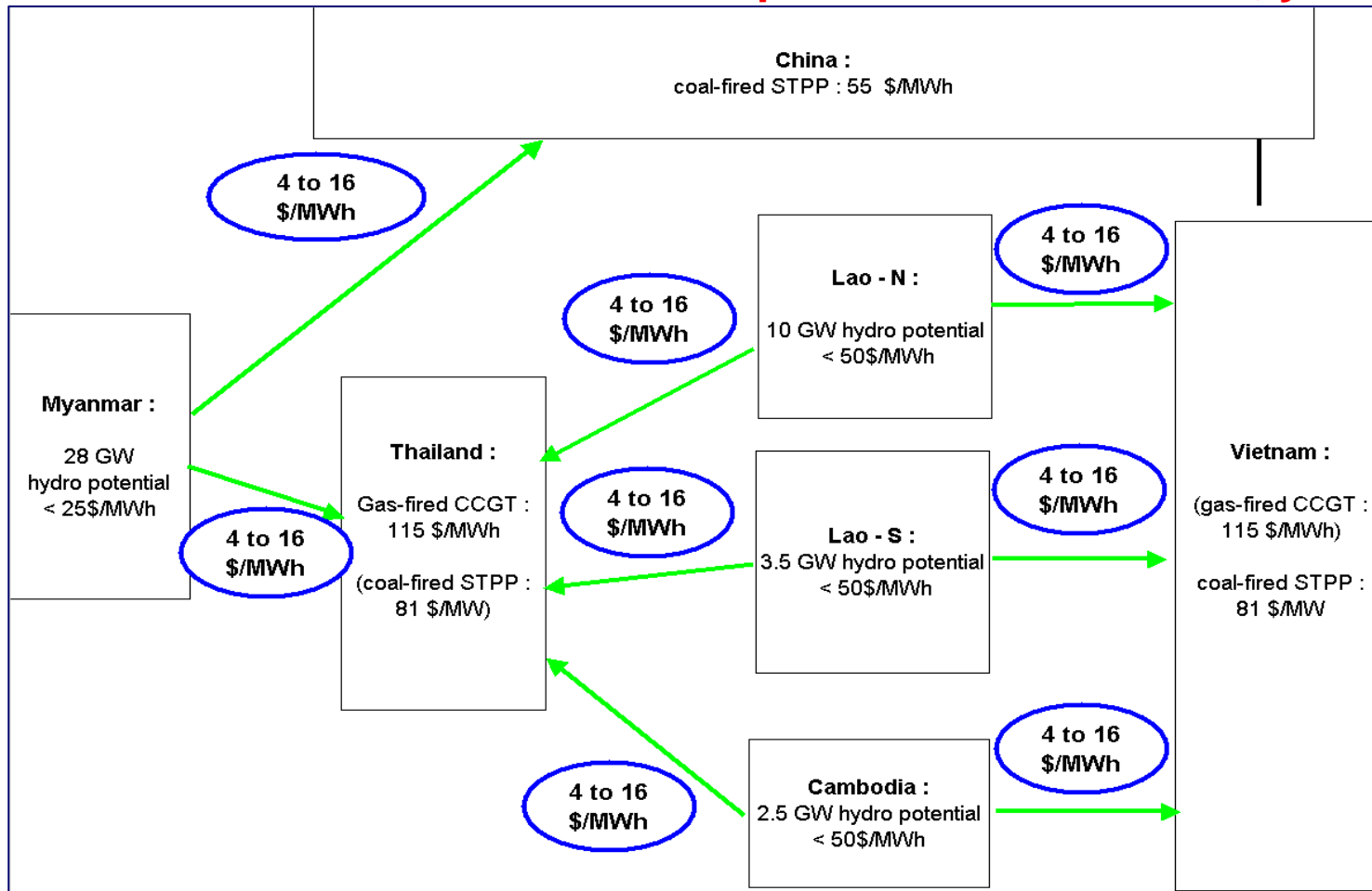
- Pending agreements between China and Myanmar: 16 to 20 GW by 2030
- MOU between Thailand and Myanmar: 1.9 GW
- MOU between Thailand and Lao PDR: 7 GW
- MOU between Vietnam and Lao PDR: 5 GW
- Thailand: "acceptable max" import = level equivalent to already signed MoUs (7 GW from Laos, and 1.9 GW from Myanmar; i.e. 13% and 9% of 2010 and 2025 peak demands respectively)
- Vietnam: "acceptable max" import = 10% of peak demand

Importing Country	Total MOUs or Agreements
China	> 16 GW
Thailand	8.9 GW
Vietnam	5 GW
Total agreed imports	> 30 GW

Source: RETA No 6440 - GMS Master Plan Study 2008-2010

B.1 - Power Trade Development: Benefit of Interconnection

Power Trade is OK when Price Gap > Transmission Cost, year 2025



- A large competitive hydro potential totals 45 GW < 50 \$/MWh:
28 GW in Myanmar,
14.3 GW in Lao,
2.6 GW in Cambodia

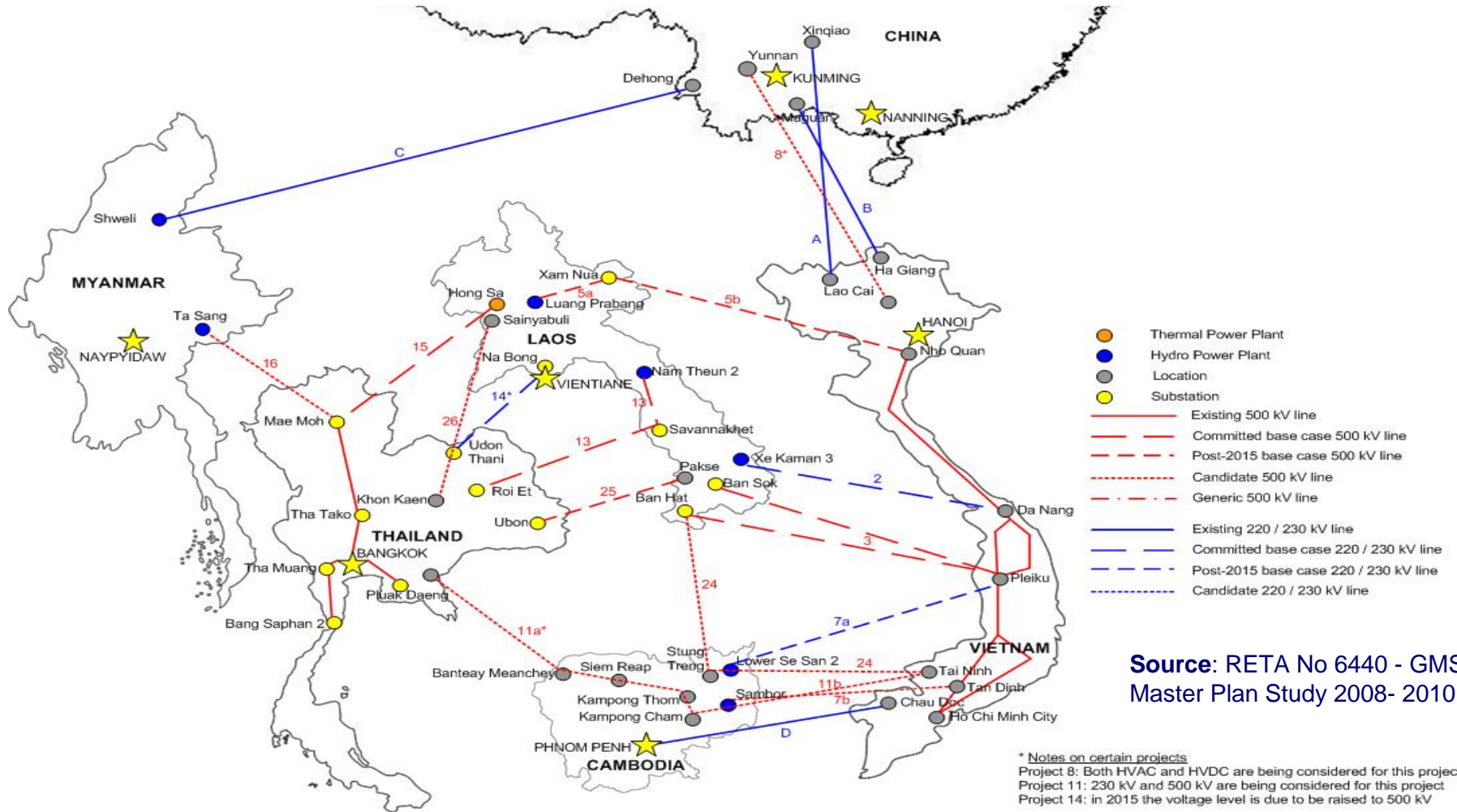
- More than 20 GW out of 45 GW committed in the present PDPs :
16 GW in China,
3.6 GW in Thailand,
2.6 GW in Vietnam

- If using the 45 GW potential about 17% of the power will “cross borders” in 2025

Source: RETA No 6440 - GMS Master Plan Study 2008-2010

B.2 - Power Trade Development: The infrastructure

Committed and Candidate Interconnections in 2025 = 22 Interconnection Projects



B.3 - Power Trade Development: The Institutional Framework

- Two Inter-governmental MoUs, agreed on a four-stage approach to the development of GMS power trade (defined in the MoU on the Road Map for Implementing the GMS Cross-border Power Trading);
- The MoUs prescribe the institutional arrangements for Stage 1 implementation - Establishment of the Regional Power Trade Coordination Committee RPTCC (2004) tasked to determine the initial steps for regional power trade and its two sub-groups (2006) - Focal Group (FG) and Planning Working Group (PWG), and updating the GMS Power Transmission Master Plan, including candidate transmission interconnections and Road Map for implementation (Assistance from ADB/GMS TA 6440-REG);
- **A GMS Permanent Regional Coordination Entity dedicated to Power Trade is not yet in place.**

C.1 – International Experiences from the GMS Power Trade

What Works - Infrastructure:

- Limited cross border transmissions do exist and more are coming
- Specially dedicated lines owned by an investor and operated based on long term PPAs
- Shared benefits of optimizing generation investment cost
- The bi-lateral import-export works and is growing
- Evident demand for new transmission capacity (about 17% of the power supply will cross the borders in 2025)

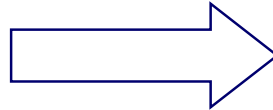
What Works – Institutional Framework:

- Political commitment for cross-border trade
- Ongoing national power sector reforms
- Liberal legislation - Independent Power Producers and license based regulation
- Institution tasked to determine the steps for initial implementation (RPTCC) – **no regional institution dedicated to power trade**
- Updated National PDPs and the GMS Master Plan (2010)
- Massive support from ADB and other International Donors

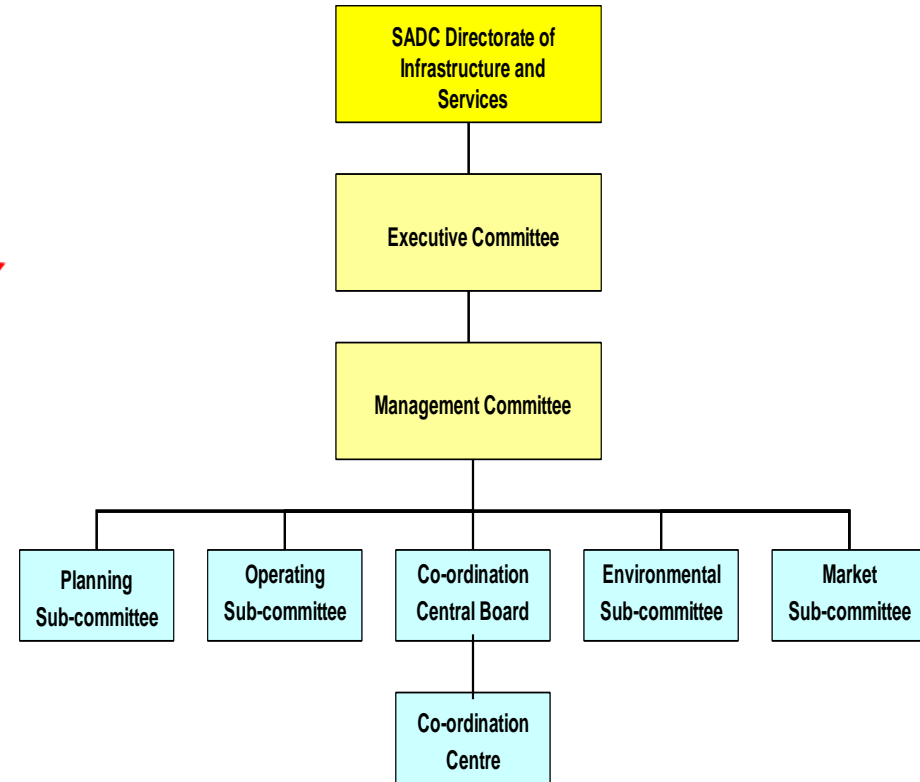
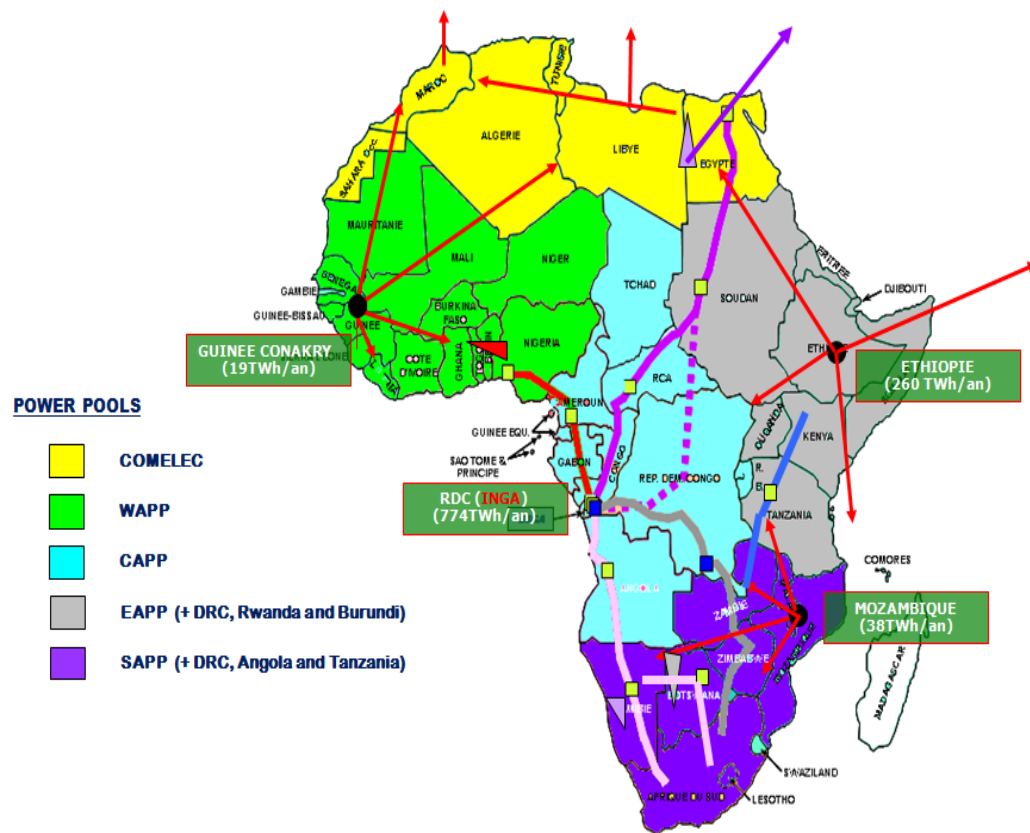
C.2 – International Experiences from Africa: How could it work:

Key driver for African Power Pools: improved security of supply

5 Power Pools and Shared Vision for 2025



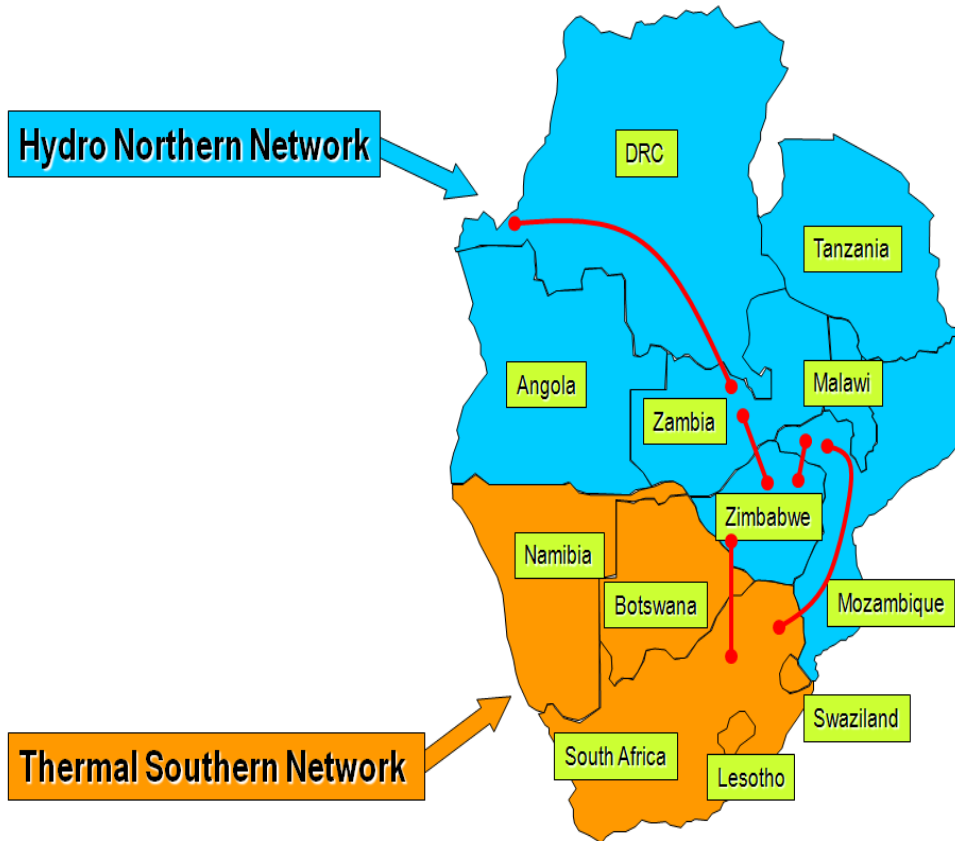
Similar Institutional Structure



Source: RETA No 6440 - GMS Master Plan Study 2008-2010

C.3 – International Experiences: How does it work: SAPP

Southern African Power Pool (SAPP) Members



Experiences:

- Growing incentive for regional investments through enlarging the national markets
- Trading through “a core” sub-regional grid
- Functioning short-term generation market stepping into a competitive day ahead market (DAM)
- Ongoing coordinated national reforms
- Common Pool Plan, Investment Plan and ownership of its implementation

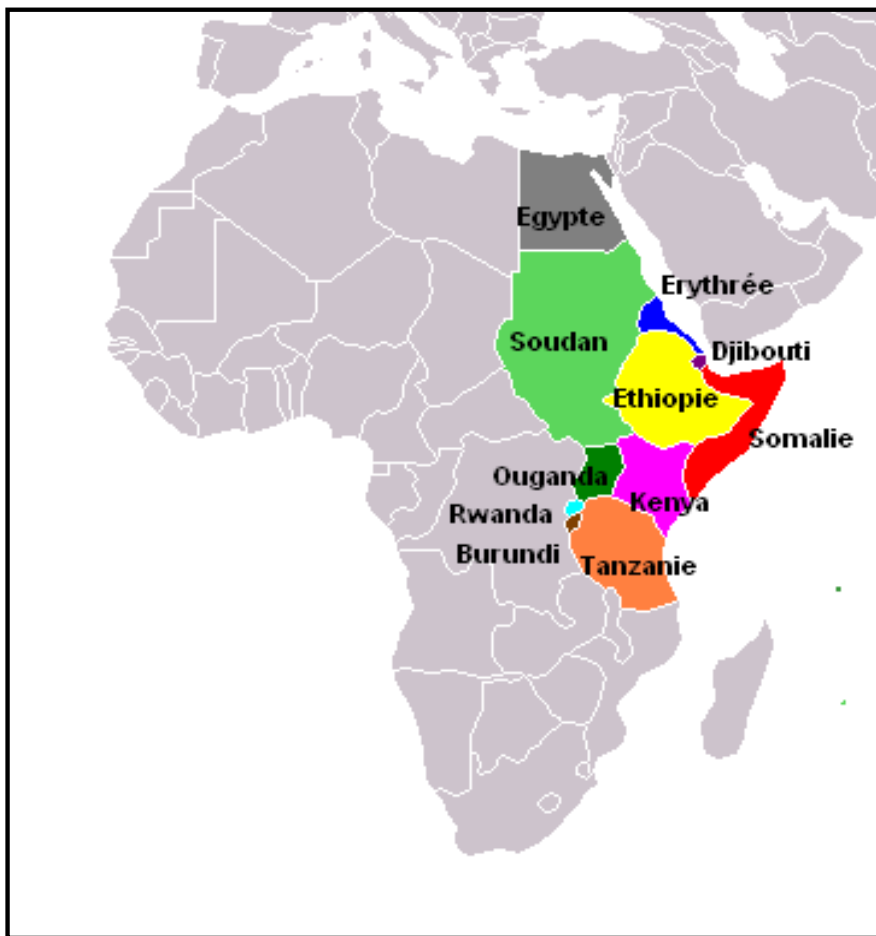
But:

- Slow market integration and regional investments
- Very limited trading volumes due to delayed investments in generation

Source: RETA No 6440 - GMS Master Plan Study 2008-2010

C.4 – International Experiences: How it will work: EAPP

Eastern Africa Power Pool (EAPP) Members



Challenges:

- Cross-regional pool – challenging decision making
- No interconnections no backbones in the countries “in the centre”
- Very uneven power demand in the countries (small markets)
- No power trade in most countries

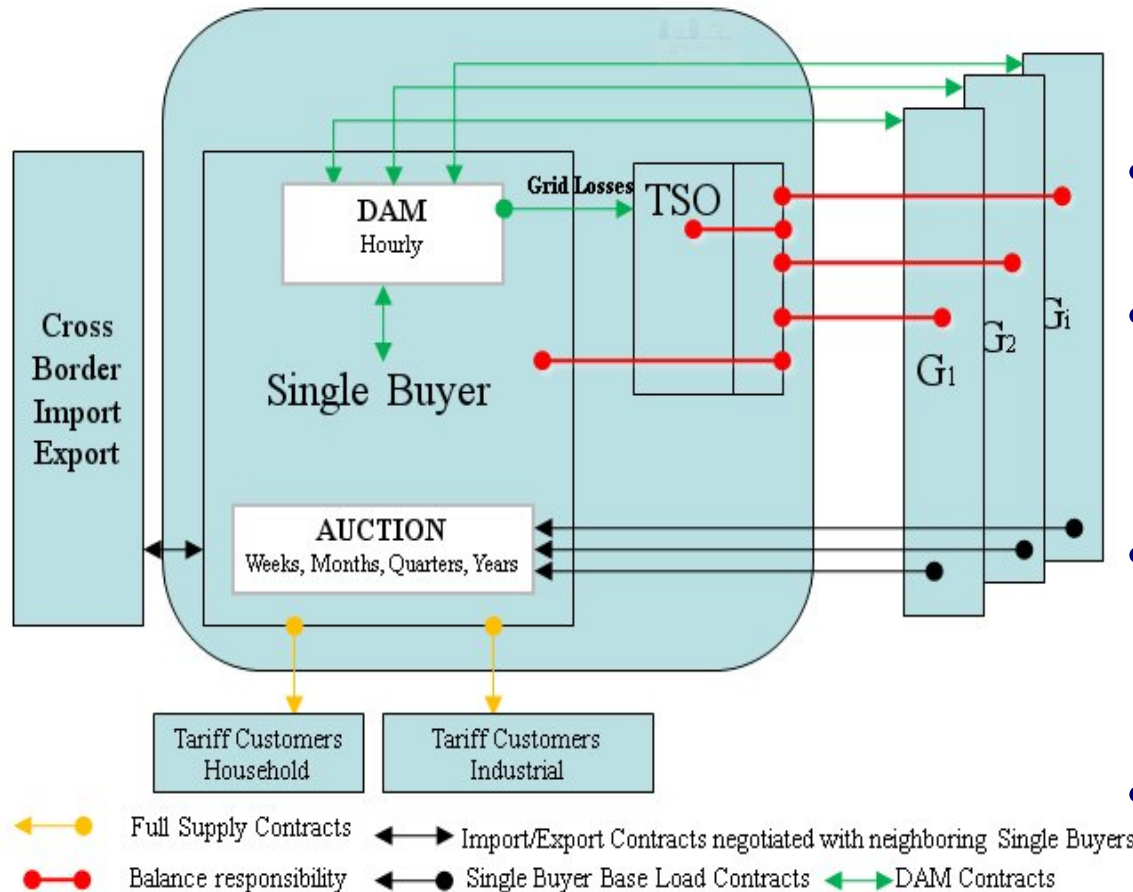
But:

- Strong commitment centered around the hydro resources of Nile Basin
- Incentive for regional interconnections THROUGH ENLARGING THE NATIONAL MARKETS
- Focus on a “core” sub-regional pool
- Common Master Plan, Investment Plan and ownership of implementation

Source: RETA No 6440 - GMS Master Plan Study 2008-2010

D – Proposed Concept Market Design

Initial Step Combining Single Buyer Operations and DAM



Example – Lao National Market:

- A Thai investor (EGAT or IPP) has invested in a HPP in Lao getting power through a dedicated cross-border line at price agreed in a PPA.
- The investor will have to buy the power from the Lao TSO (the Single Buyer) at Lao market price.
- The PPA is transformed to a Financial Contract for Differences (CFD) with the Lao TSO. The investor will be compensated by Lao TSO for the price difference from the PPA price.
- The power plant is obliged to sell all his power to the TSO and will be paid at the market price but through the CFD will pay back to the TSO the price difference from the PPA price.
- A Day Ahead Market (DAM) will emerge for surplus power, which will not have noticeable influence on the auction price.

Source: RETA No 6440 - GMS Master Plan Study 2008- 2010

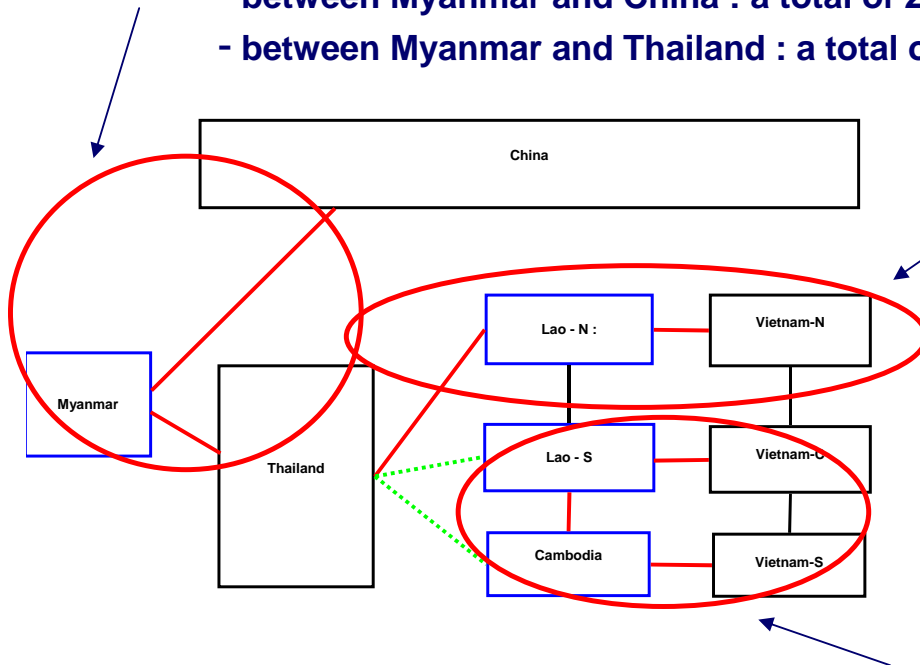
E.1 – Proposed implementation: A Step-by-Step Approach:

- **Creation of a Permanent Regional Coordination Entity of stakeholders involved in Power Trade**
- In each country unbundling of the TSO – Transfer of transmission assets;
- The TSO (Transmission System Operator) assumes the role of national “Single Buyer”;
- Regulated Third Party Access to the national grids;
- Price neutral splitting of existing long term PPAs in transmission and generation agreements;
- Price neutral transformation for the existing PPAs to Financial CFD (Contracts for Differences);
- Start of synchronous operation within the national grids;
- Grid and Market Codes in each country, but harmonized for the GMS;
- Creation of a Trading Platform (a Pool) in each country operated by the TSO/Single Buyer;
- Obligation for each producer to sell to the TSO/SB full volumes from the former PPAs on capped prices + surplus power if any, on DAM free prices;
- Creation in each country of a balance mechanism (an intra - day balance market) operated by the TSO;
- Coupling of the trading platforms through increased interconnection capacity (no saturation) and progressive lifting the price caps.

E.2 – Proposed Implementation: Grid Integration Option:

Three Poles of Development:

- **North West pole: interconnections from Myanmar to China and Thailand :**
 - 28 GW hydro potential in Myanmar
 - between Myanmar and China : a total of 20,000 MW developed between 2015 and 2028
 - between Myanmar and Thailand : a total of 5,800 MW developed between 2015 and 2028



- **East - West Northern link (Thailand, Laos North and Vietnam North) :**
 - 10 GW hydro potential Laos North,
 - TH - LN : 1,500 MW new interconnection capacity,
 - LN - VN : 2,400 MW new interconnection capacity.

- **Southern grid : (Laos South, Cambodia and Vietnam Center and South)**
 - 7 GW hydro potential in Laos S & Cambodia

Source: RETA No 6440 - GMS Master Plan Study 20008- 2010

E.3 – Proposed Implementation: Business-as-Usual Option - Continuing the Bi-lateral Trade:

- No negative experiences only temporary slow down in generation investments due to financial recession;
- The role of the “Single Buyer” in relation to cross border trade is less encouraging for private investors than the current PPAs;
- The GMS Master Plan will provide candidates for interconnection investments and ADB could finance the studies;
- There is no way that the countries “in the centre” will construct backbones for the sake of “National Pools”, even less think of National Pools (NP);
- Thailand’s development of a NP seems politically very difficult for foreseeable future;
- National Pool in Myanmar seems also far from implementation?
- No need for any Regional Institution – just continuing with the forum function of the RPTCC.

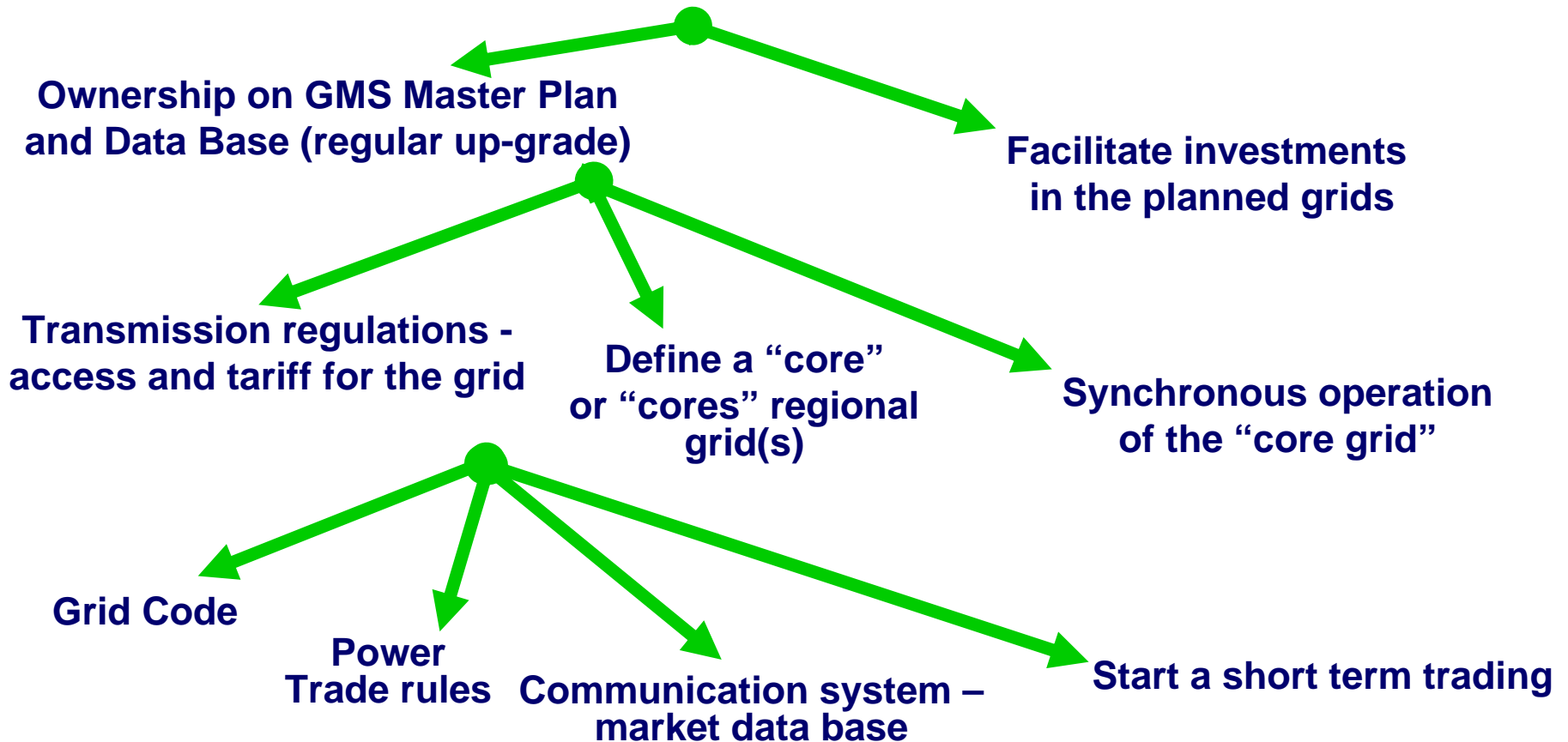
But: The MOU on the Road Map states:

- **Stage 1 – Bi-lateral Power Trade established between neighboring countries – 2010**
- **Preparation for Stage 2 – 2010-2012**
- **Stage 2 – Power Trade between any pair of GMS countries**

E.4 – Proposed Implementation: Challenges Ahead - Is there any Preferred Regional Option?

Step-by-step:

Political Agreement to set-up a Small GMS Institution - “A Regional Coord. Unit”



PRESENTATION OUTLINE

PART 1 – The GMS Road Map for Expanded Energy Cooperation

PART 2 – Presentation of ADB/GMS TA No 6440 - REG

PART 3 – Overview on the Proposed GMS Power Master Plan

PAR 4 – Recommendations and the Way Forward

ANNEX 1- GMS RPT Institutional Framework

ANNEX 2 - Recommendations and the Way Forward

ANNEX 3 – Proposed Capacity Building


- Finally, the **Main Conclusions and Recommendations** that the GMS RETA No 6440 – REG Team wanted to emphasize at the end of this project (Phase 1) consisted in the need for GMS Countries to urgently create an effective mechanism for:

Regional Electricity Cooperation and Integration

which requires the creation of a:

GMS Permanent Regional Electricity/Power Coordination Entity/Organization

involving all major Stakeholders of the Electric Power Industry of the GMS Countries (a starting point for Regional Integration);

- In line with RETA No 6440 recommendations, ADB decided to boost the process of creation of a GMS coordination entity and contracted at the beginning of 2011 a Consultant to initiate and guide the process of consultation between GMS Countries Stakeholders, aiming toward the creation of a permanent Regional Power Coordination Center (RPCC);
- More information concerning the process of discussion/negotiation between GMS Officials and Utilities Stakeholders is given in Annex 2 []

- **Discussions were initiated at the 10th Meeting of the RPTCC in Siem Reap, Cambodia on 25-27 May 2011, and continued at the occasion of the 11th Meeting of RPTCC in Ho Chi Minh City, Vietnam in November 2011, and further at the 12th Meeting of RPTCC in Vientiane, Lao PDR, 17-18 May 2012.**
- **At the 12th Meeting of RPTCC, the First Permanent Structure for the GMS Power Trade Organisation – RPCC – was discussed as follows:**
 - **THE INTER-GOVERNMENTAL MEMORANDUM OF UNDERSTANDING;**
 - **ARTICLES OF ASSOCIATION OF THE RPCC (DRAFT);**
 - **PROPOSED SELECTION CRITERIA FOR RPCC’S HEADQUARTERS;**
 - **REVISED TORs FOR WORKING GROUPS ON REGULATORY ISSUES” & “PERFORMANCE STANDARDS AND GRID CODE”;**
 - **PROPOSAL FOR CAPACITY BUILDING FOR THE GMS MEMBER COUNTRIES [].**
- **At the 13th Meeting of RPTCC to be held in December 2012, the Inter-Governmental Memorandum of Understanding for the Establishment of the Regional Power Coordination Centre in the GMS should finally be signed by the respective Energy Ministers of the GMS Countries.**

**THANK YOU VERY MUCH FOR
YOUR ATTENTION**



PRESENTATION OUTLINE

PART 1 – The GMS Road Map for Expanded Energy Cooperation

PART 2 – Presentation of ADB/GMS TA No 6440 - REG

PART 3 – Overview on the Proposed GMS Power Master Plan

PAR 4 – Recommendations and the Way Forward

ANNEX 1- GMS RPT Institutional Framework

ANNEX 2 - Recommendations and the Way Forward

ANNEX 3 – Proposed Capacity Building

BACKGROUND – OBJECTIVES



MYANMAR



PR CHINA



LAO PDR



VIETNAM



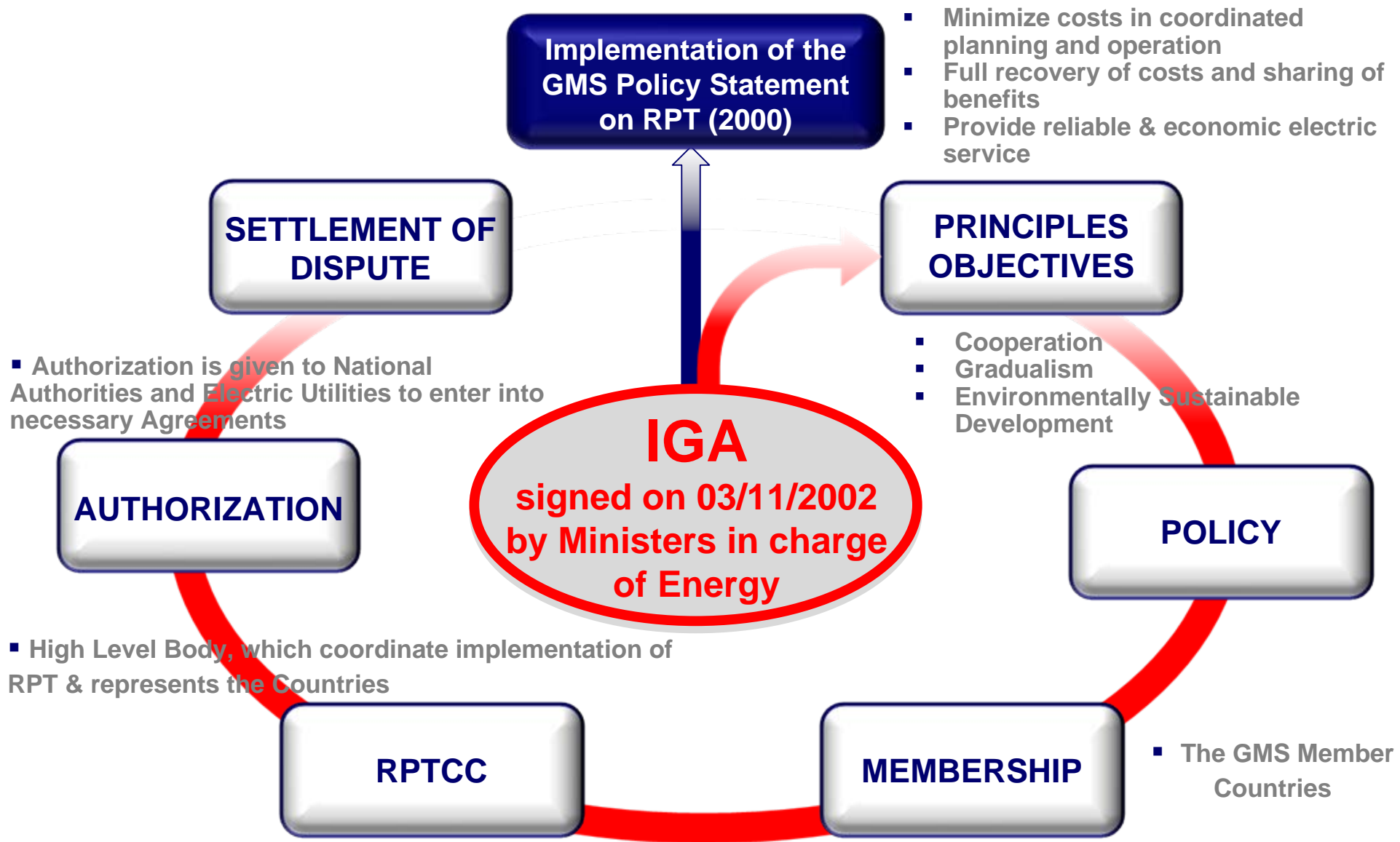
THAILAND



CAMBODIA

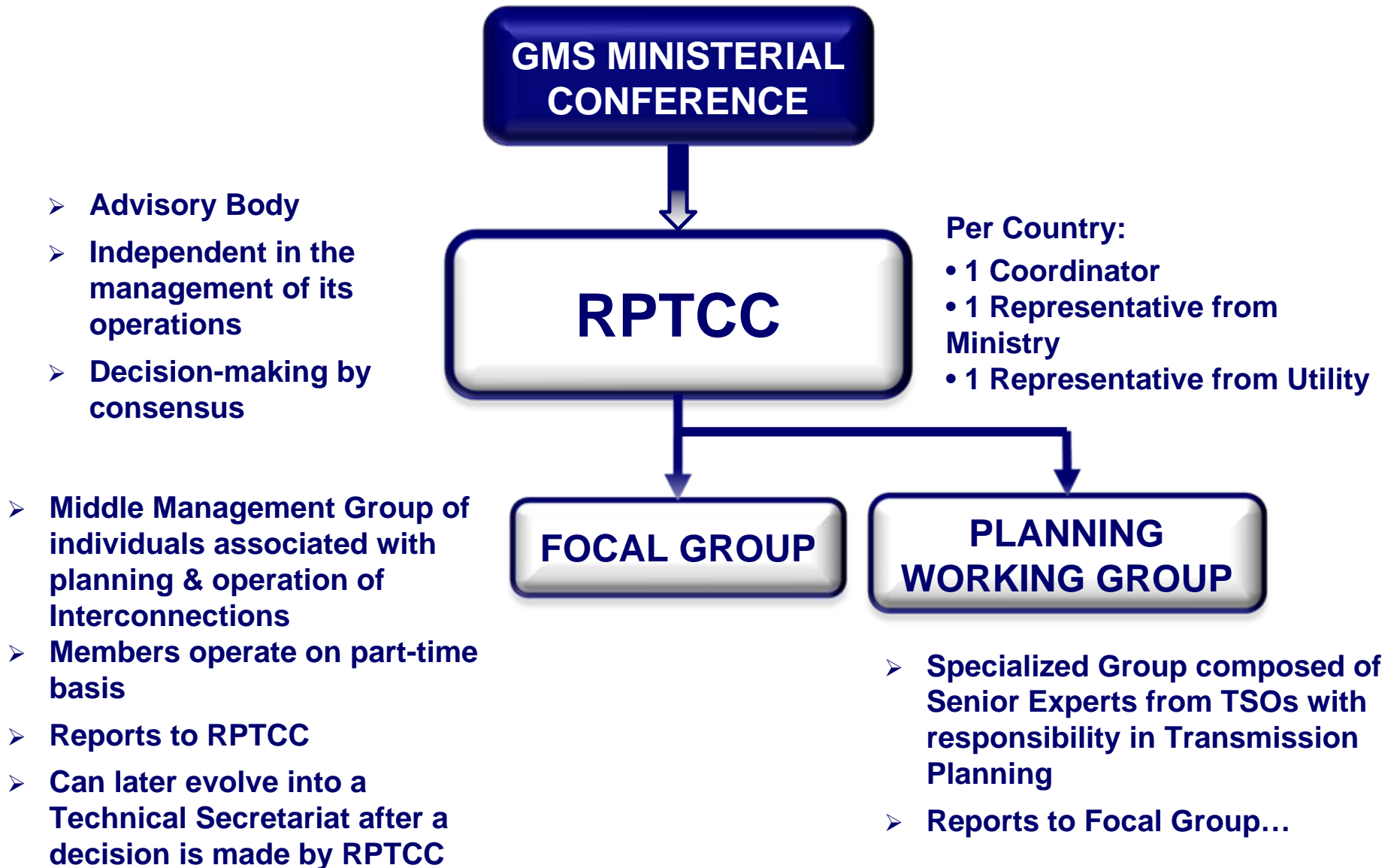


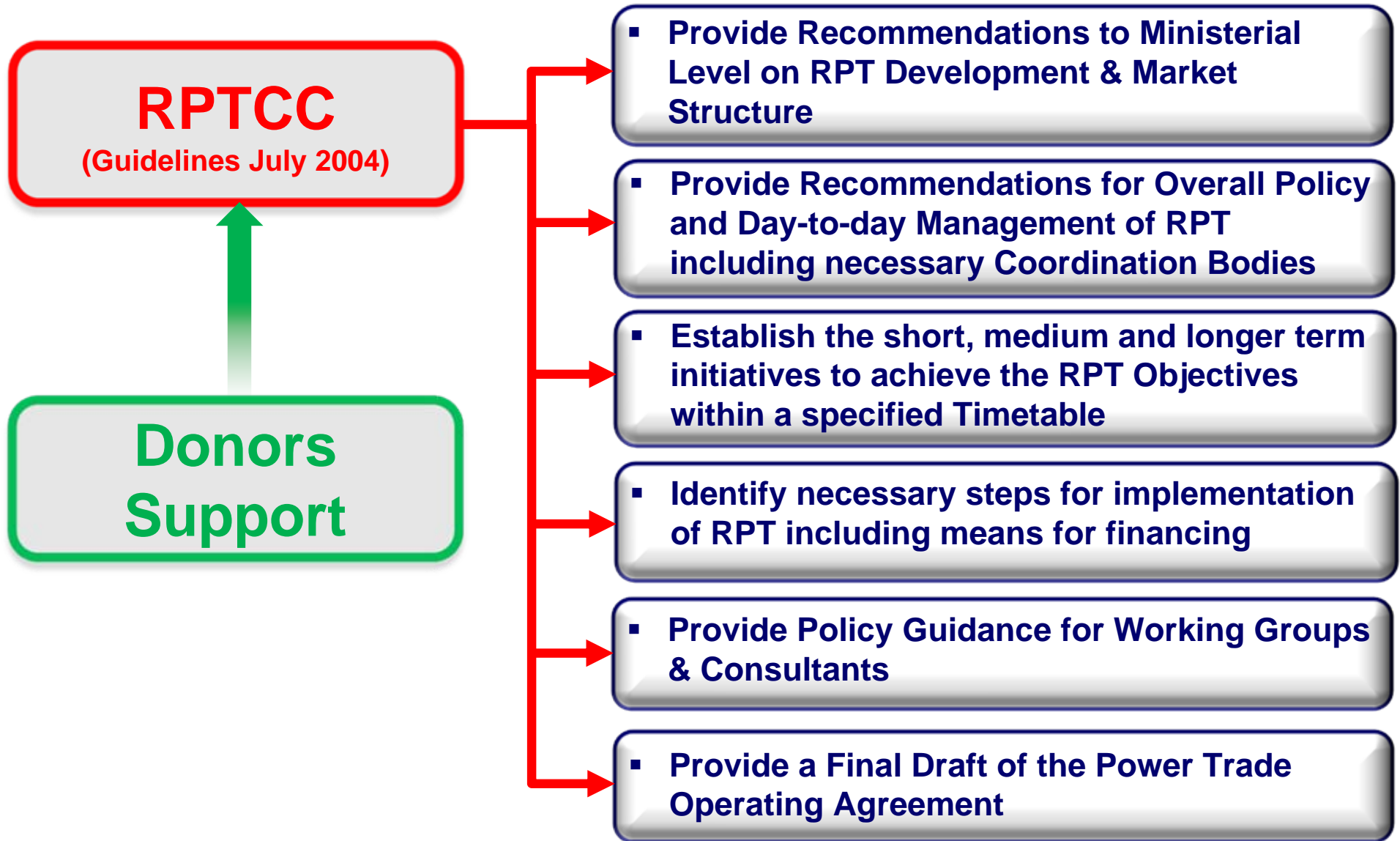
Annex 1 - GMS RPT Institutional Framework Inter-Governmental Agreement – IGA & RPTCC

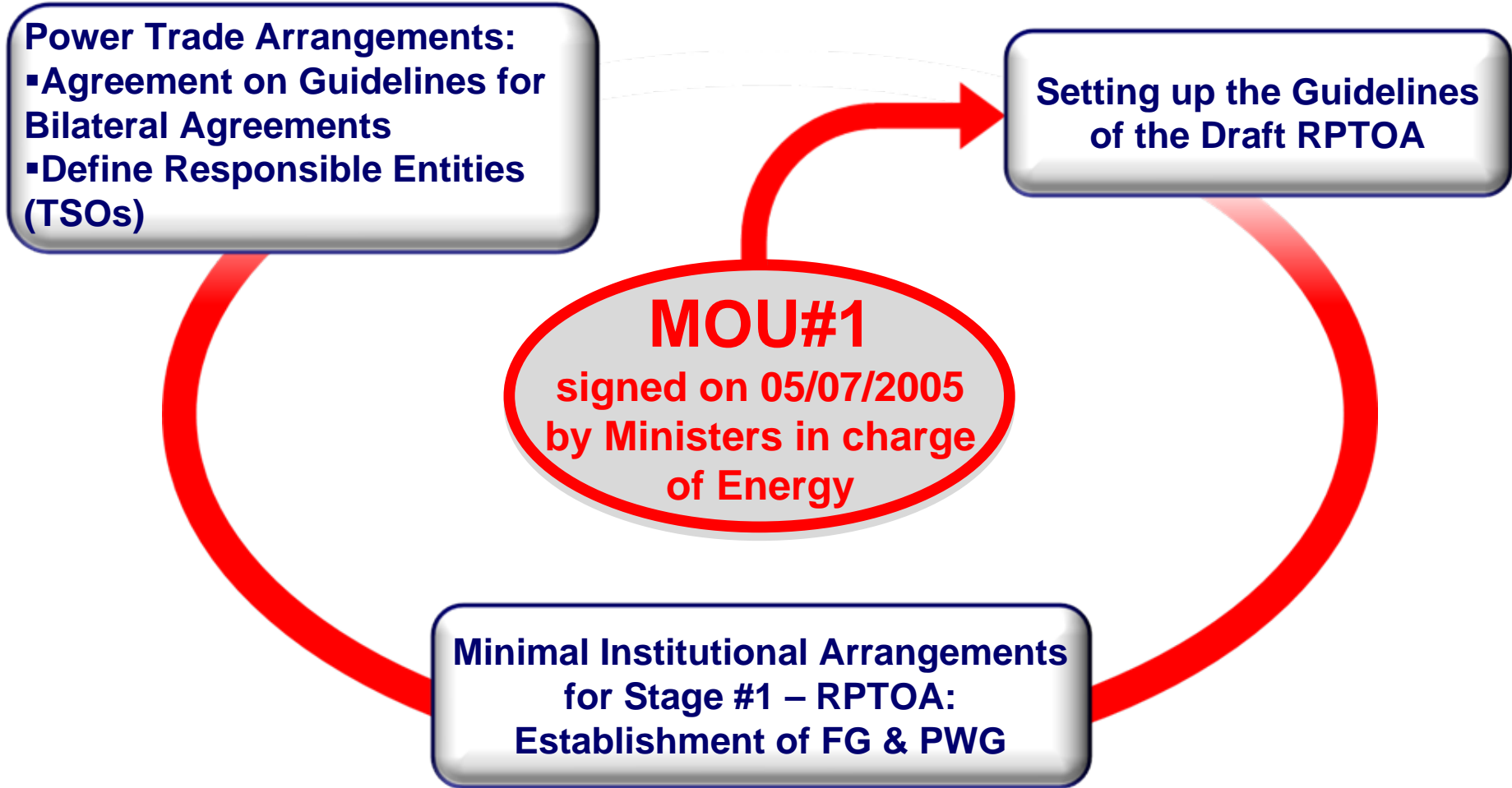


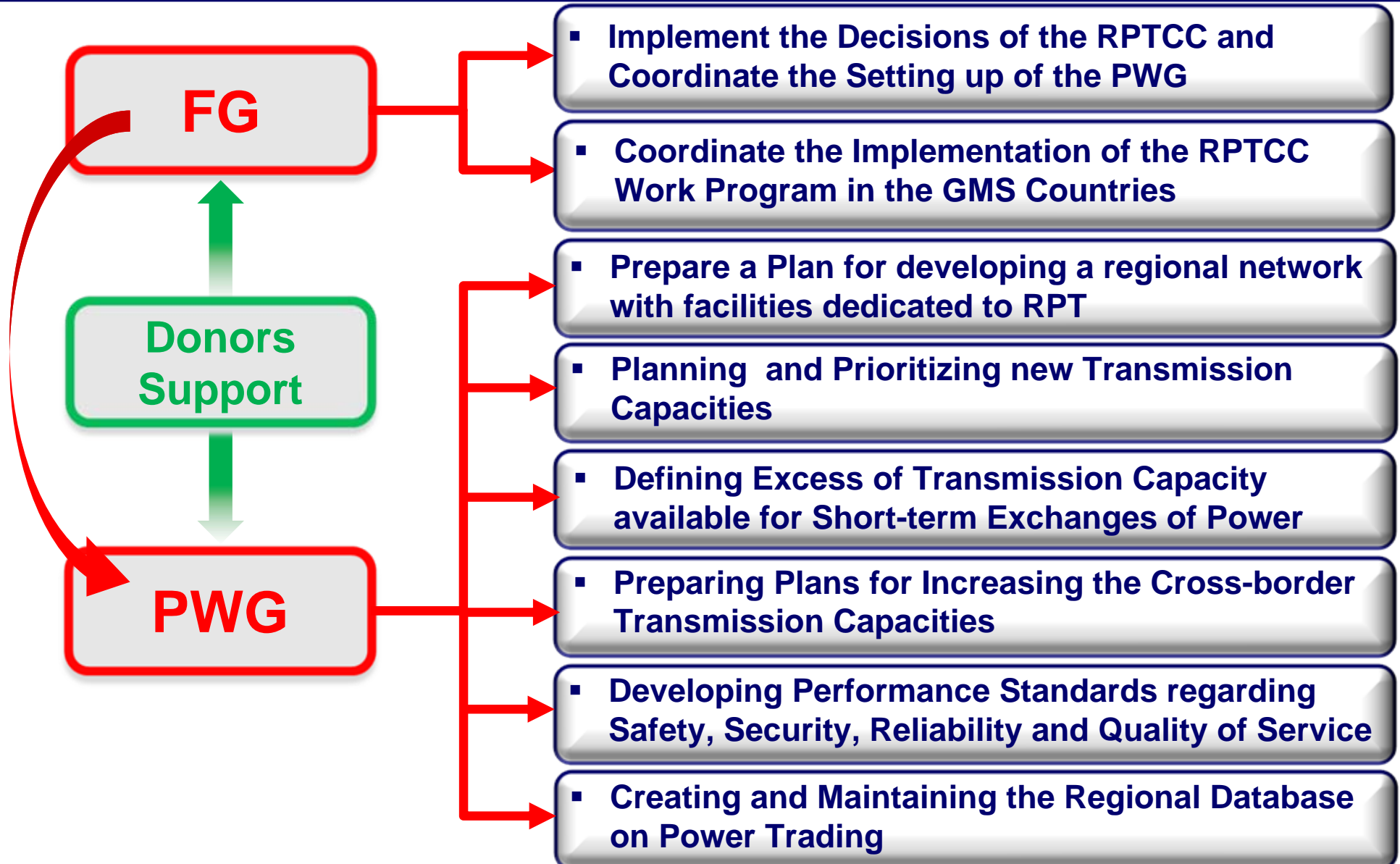
Annex 1 - GMS RPT Institutional Framework

RPTCC Governing Structure

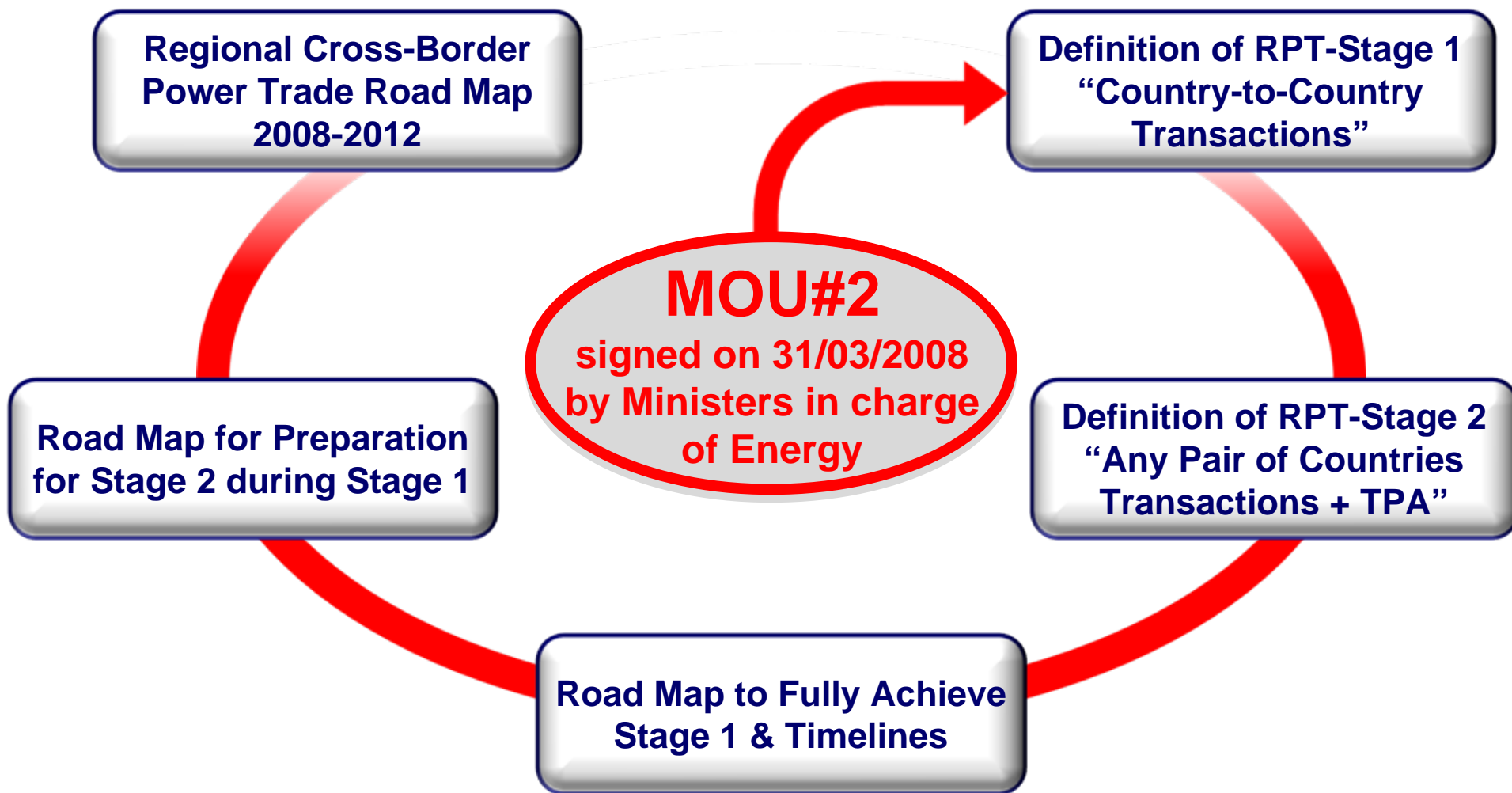




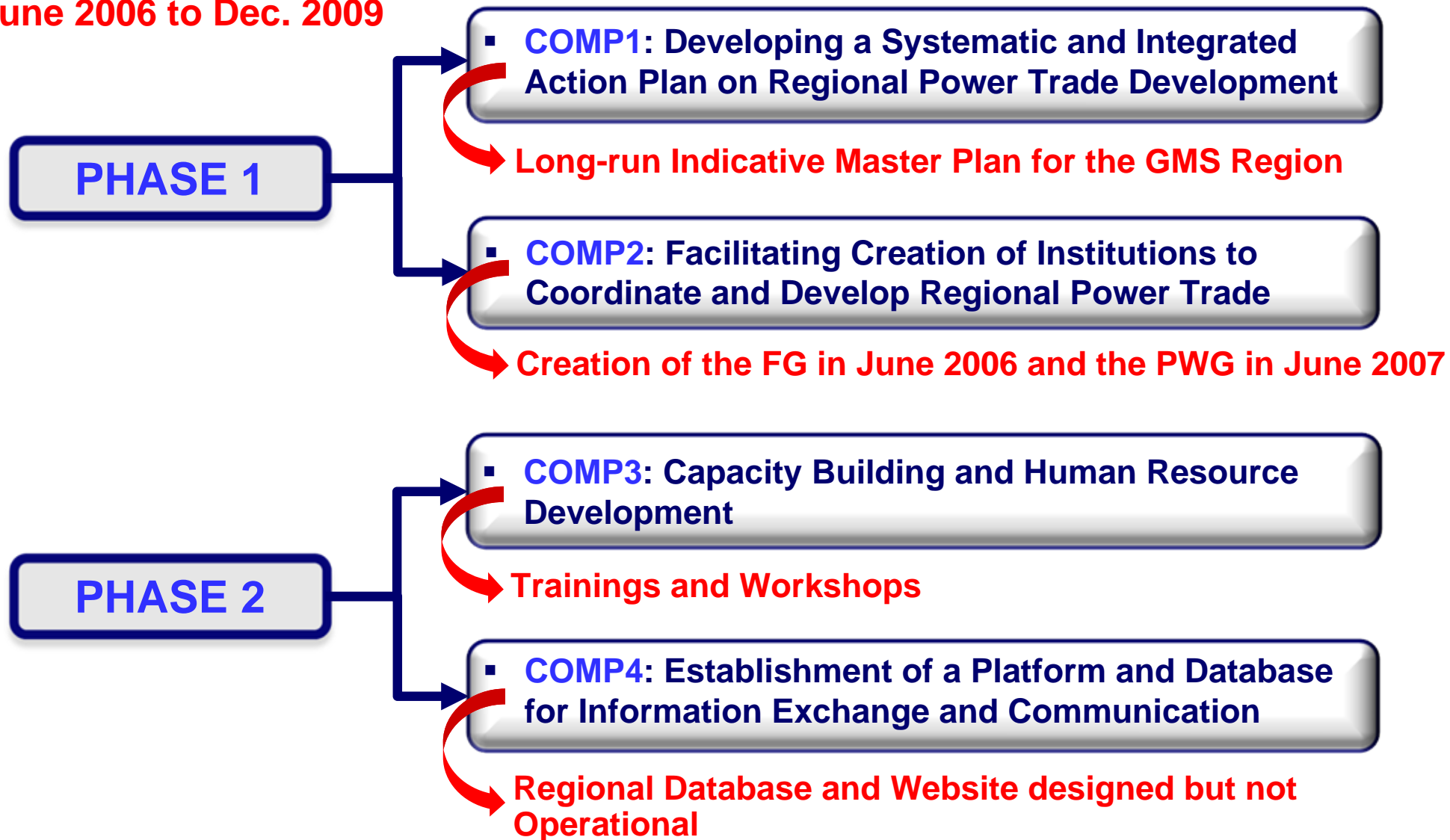




MEMORANDUM OF UNDERSTANDING #2



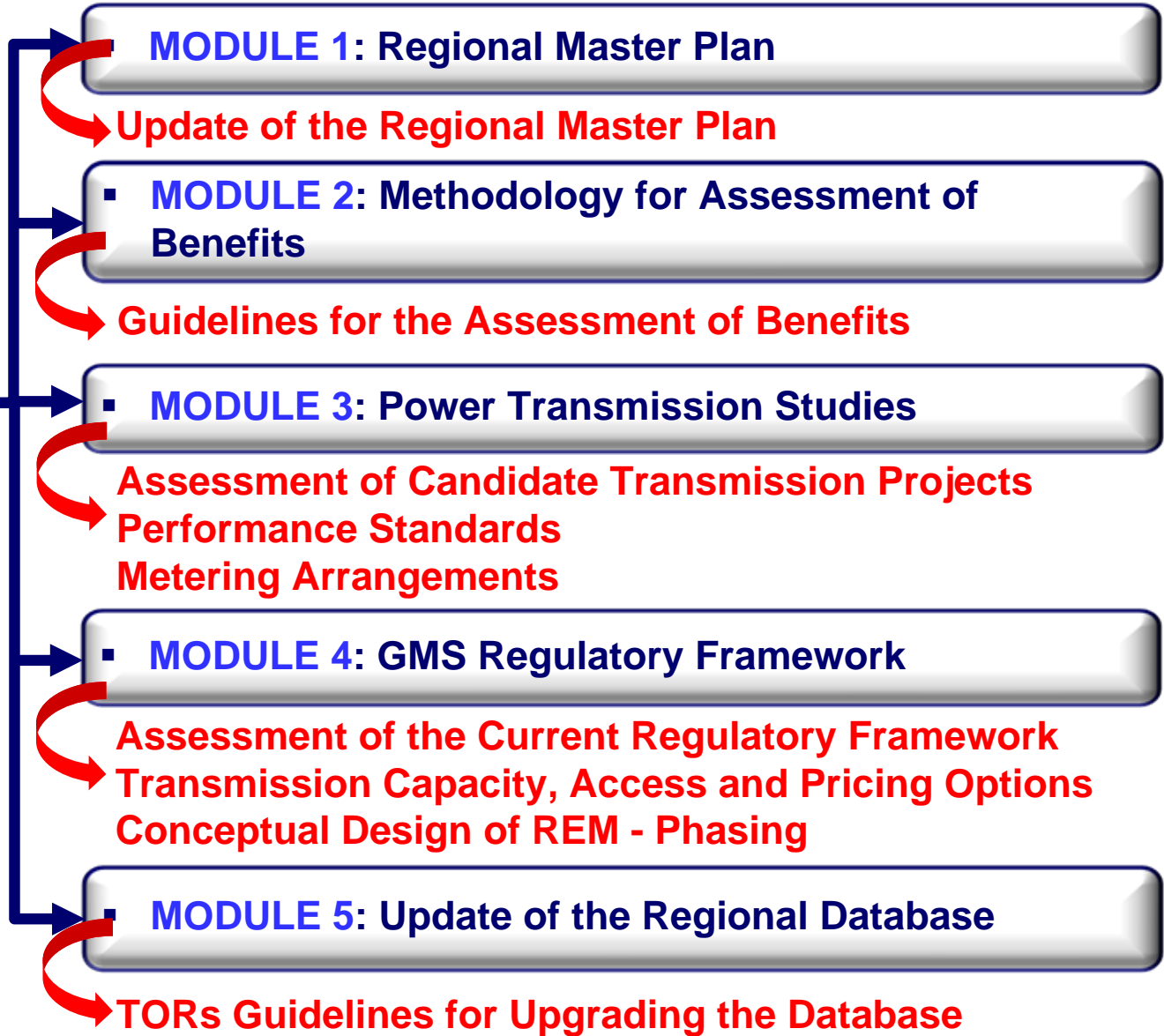
June 2006 to Dec. 2009



Sept. 2008 to Nov. 2010

COMPONENT 1

“Facilitation of
 Development of
 Regional Power
 Trade”



Sept. 2008 to Nov. 2010



**THANK YOU VERY MUCH FOR
YOUR ATTENTION**



PRESENTATION OUTLINE

PART 1 – The GMS Road Map for Expanded Energy Cooperation

PART 2 – Presentation of ADB/GMS TA No 6440 - REG

PART 3 – Overview on the Proposed GMS Power Master Plan

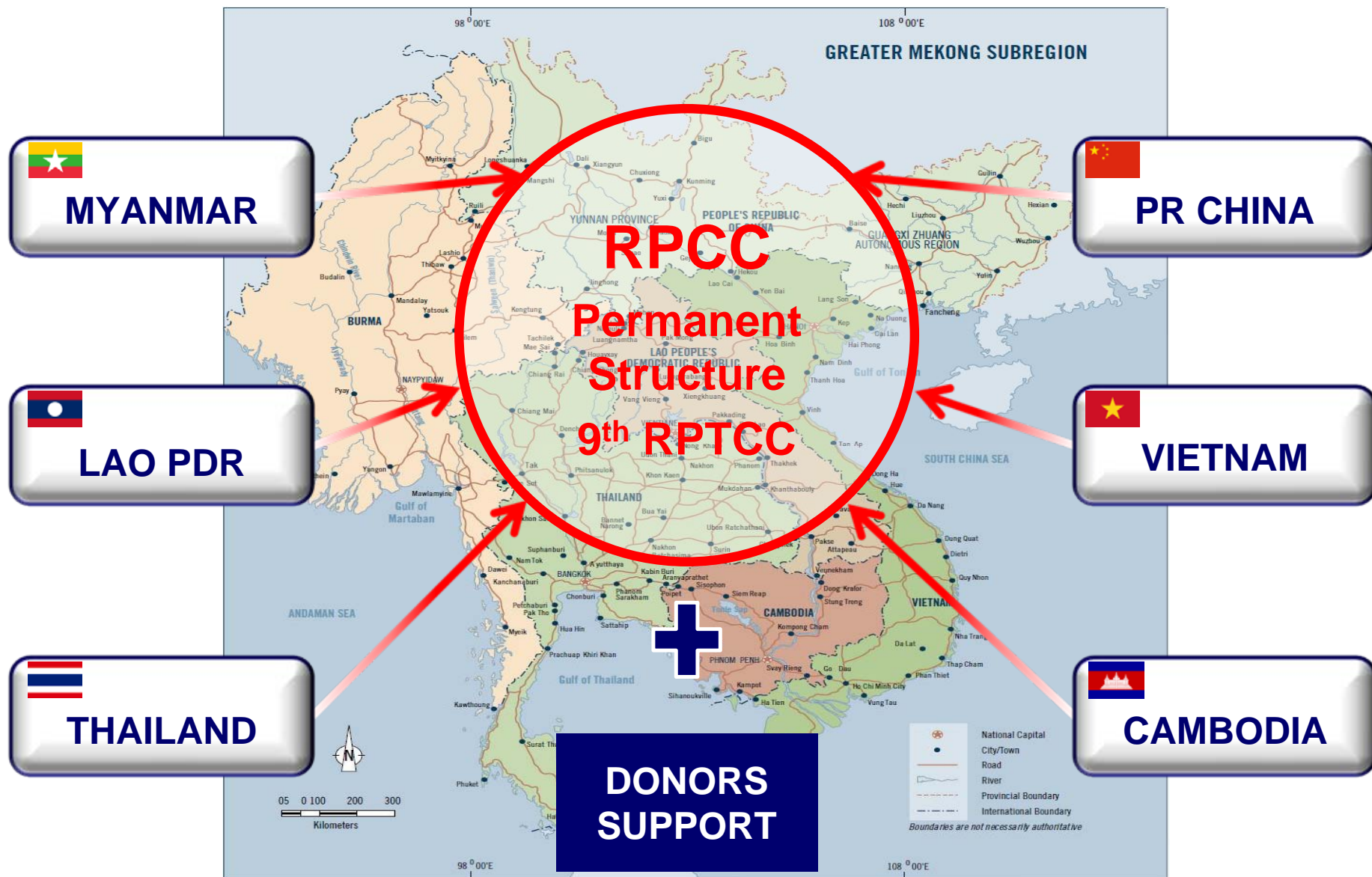
PAR 4 – Recommendations and the Way Forward

ANNEX 1- GMS RPT Institutional Framework

ANNEX 2 - Recommendations and the Way Forward

ANNEX 3 – Proposed Capacity Building

Annex 2 – Recommendations and the Way Forward *Rationale for a GMS Permanent Organization*



- **The initial consultation process proposes to adopt the following Design Criteria for the RPCC:**

1. RPCC shall be an International Non-Profit Association

2. RPCC shall be an Independent Legal Entity

3. Membership in RPCC shall include all Entities who are physically connected to GMS Power System, and have an impact on System Operation

- **In a first stage of RPT Development, Membership will be limited to the vertically integrated National Power Utilities or Public Services or, when already unbundled, to the Transmission System Operators (TSOs)**

- **In a second stage of RPT Development (Third Party Access – Regional Regulation – Full Liberalization), Membership will be limited to the TSOs of the GMS Countries as well as those of the interconnected neighboring Countries**

Annex 2 – Recommendations and the Way Forward

Proposed Design Criteria for RPCC

4. Decision Making and Enforcement:

- **RPCC's decision-making procedures should conform to international standards for transparency, documentation, and procedural integrity**
- **The process for developing and for changing RPCC's rules over the course of time should not be subject to domination or manipulation by any one entity or one group**

- **The Highest Decision-Making Body of the Regional Organization shall delegate most decision-making authority to the Executive Board.**

5. Operational Aspects:

- **Funding for RPCC's own administrative operations shall come from its Members.**
- **Assessment of membership fees should be done in such a way that no one entity is able to dominate the allocation of the power trade organization's administrative budget.**
- **RCC shall operate without any interference by the Governments.**

Annex 2 – Recommendations and the Way Forward

Proposed Design Criteria for RPCC

6. Regulation Aspect:

- **RPCC shall be subject to appropriate External Regulation to prevent the abuse of market power or monopoly control over essential facilities.**

7. Dispute Resolution:

- **Members shall be able to appeal, in a responsible manner, decisions made by RPCC's various internal bodies and to receive a timely response.**

- **An adequate Dispute Resolution Mechanism shall be developed , adopted and integrated in the RPCC's Agreement.**

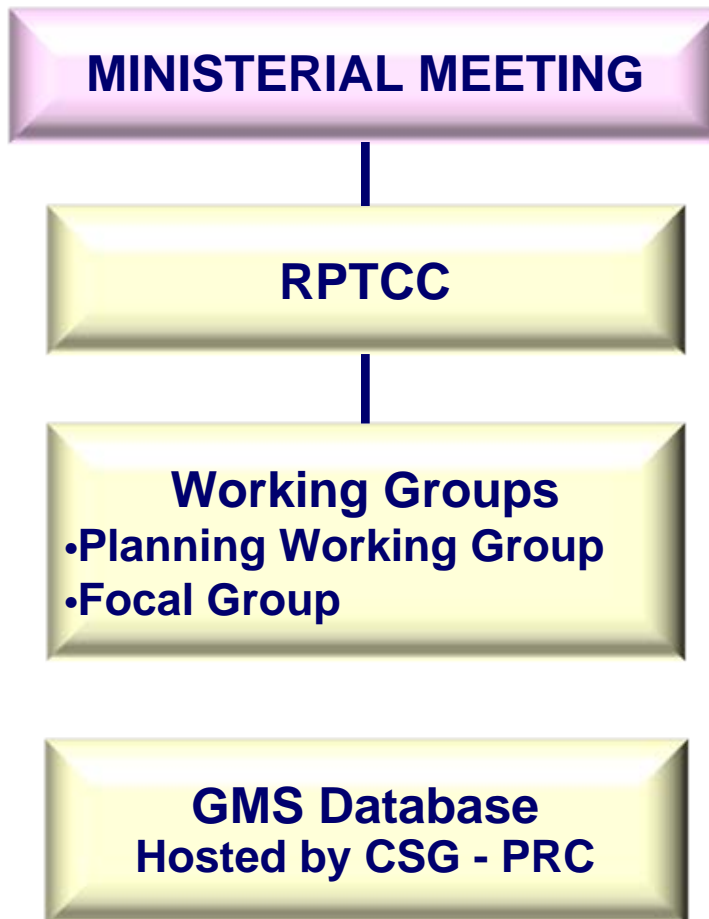
SEVEN (7) DESIGN CRITERIA... WHAT DECISION THE GMS COUNTRIES SHOULD MAKE?

1. RCC: Non-Profit Association	YES	/	NO
2. RCC: Independent Legal Entity	YES	/	NO
3. MEMBERS: National Utilities	YES	/	NO
4. DECISION-MAKING: at Appropriate Level	YES	/	NO
5. OPERATION: Fair Members' Funding	YES	/	NO
6. REGULATION: Efficient External Regulation	YES	/	NO
7. DISPUTE: Adequate Resolution Mechanism	YES	/	NO

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

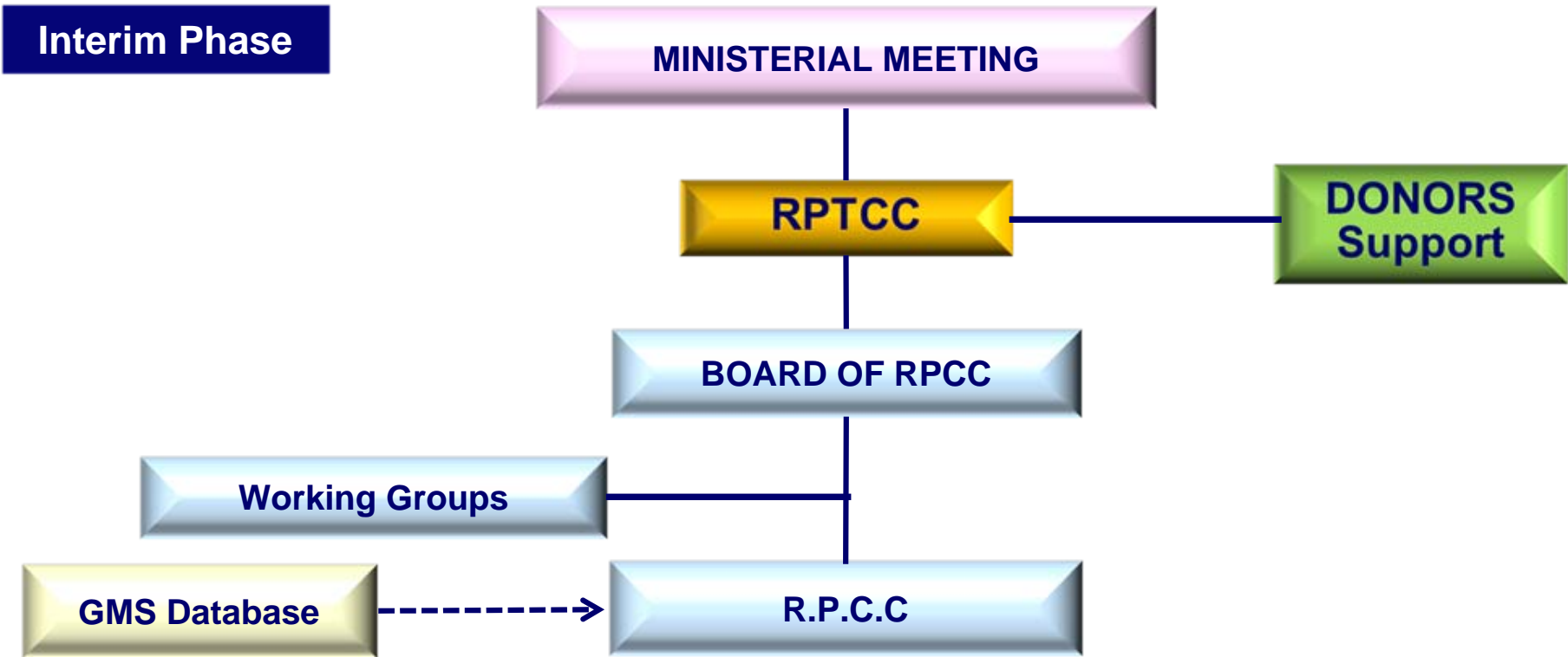
- **To increase cooperation in the development of regional plans and investment for expanding sustainable generation and transmission.**
- **To systematically internalize the environmental and social impacts in the preparation of the GMS Power Expansion Plans.**
- **To facilitate common understanding 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.**

Existing



Annex 2 – Recommendations and the Way Forward

Proposed Governance for The RPCC

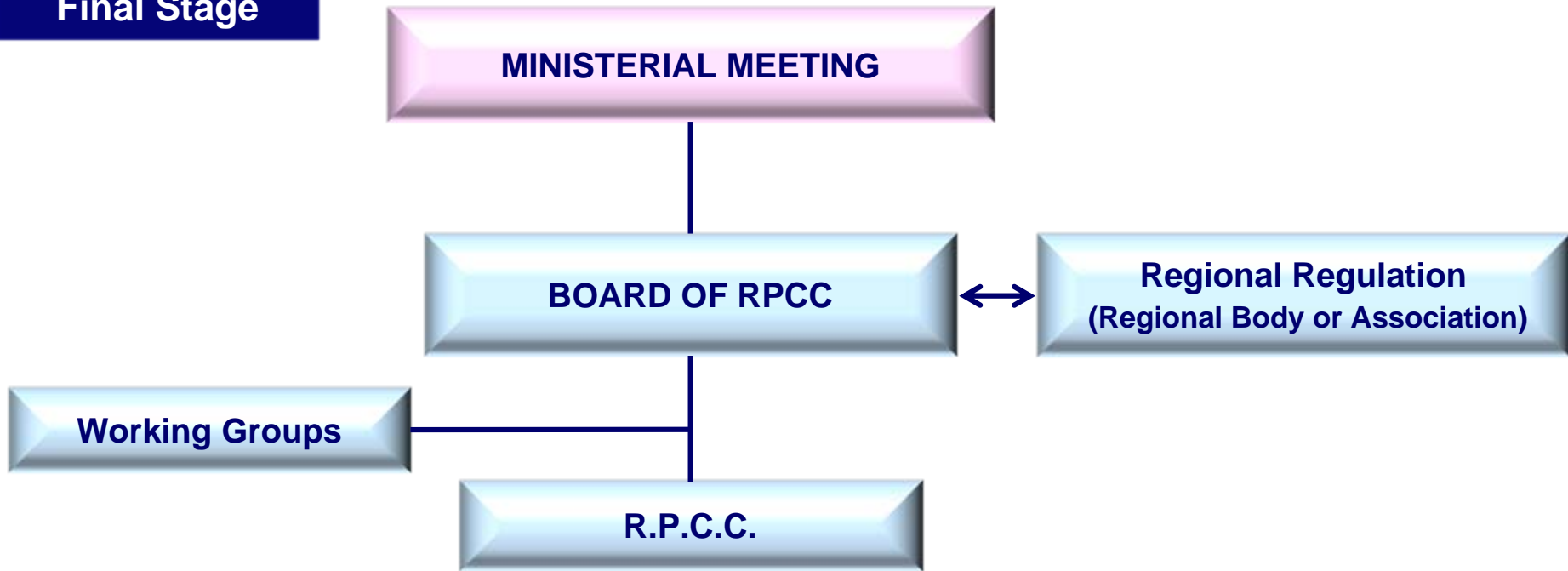


- Collect, maintain, update and administer the regional database
- Maintain and update the Regional Master Plan
- Undertake, support and coordinate regional economic, financial, technical and environmental studies
- Facilitate the development of technical norms and standards
- Support and monitor the technical performance of the electricity utilities
- Support the Working Groups

Annex 2 – Recommendations and the Way Forward

Proposed Governance for The RPCC

Final Stage



1st STAGE ACTIVITIES

- Collect, maintain, update and administer the regional database
- Maintain and update the Regional Master Plan
- Undertake, support and coordinate regional economic, financial, technical and environmental studies
- Facilitate the development of technical norms and standards
- Support and monitor the technical performance of the electricity utilities
- Support the Working Groups

2nd STAGE ACTIVITIES (Additional)

- Market Operations: managing BM & DAM
- System Operation Coordination: scheduling, monitoring
- Settlements: meter readings, billing, payments of transactions
- Market Administration: surveillance, monitoring, dispute management

Annex 2 – Recommendations and the Way Forward

Proposed Duties of the Ministerial Meeting

Ministerial Meeting

1. Approve the Common Regional Electrical Energy Policy
2. Sign and amend the Inter Governmental MOU related to the GMS RPT
3. Approve and sign agreements with other regional institutions and/or Power Trade Organizations
4. Approve the GMS Regional Power Master Plan
5. Provide strategic guidance and oversight to the Executive Committee
6. Approve the members of the Regional Regulatory Body
7. Approve the annual budget of the Regional Regulatory Body
8. Approve admission and withdrawal of new Parties

Annex 2 – Recommendations and the Way Forward

Proposed Duties of the Ministerial Meeting

Ministerial Meeting

9. Approve the first version or edition of the Regional Market Rules and Regional Interconnection Code
10. Initiate sanctions against defaulting members of the RPT
11. Approve the appointment of the RCC CEO
12. Monitor the progress and achievements of GMS's Regional Electricity Market

Annex 2 – Recommendations and the Way Forward

Proposed Duties of the RPCC Board

Board of RPCC

1. Define the Common Regional Electrical Energy Policy
2. Interpret the Ministerial Meeting's Policy into a Vision and Mission for the GMS RPT
3. Define and ensure the implementation of schemes related to the Regional Policy especially in terms of tariffs, planning and standardization policies
4. Propose to the Ministerial Meeting structural options to further develop the power systems in the GMS Region
5. Submit Periodic Progress and Operations Reports to the Ministerial Meeting
6. Recommend the appointment of the CEO of RPCC to the Ministerial Meeting
7. Ratify the appointment of the Heads of the Units or Departments of the RPCC as made by its CEO

Annex 2 – Recommendations and the Way Forward

Proposed Duties of the RPCC Board

Board of RPCC

8. Provide strategic guidance to the RPCC
9. Approve the annual budget and financial accounts of the RCC
10. Approve the training program of staff involved in RPCC's operation
11. Set up ad hoc Technical Working Groups as the needs arises
12. Approve the admission of new RPT members
13. Invite RPT Members, representatives of the Regional Regulatory Body and other third parties to attend specific Executive Committee Meetings as observers with no voting rights
14. Monitor operations and progress of the RPT

Annex 2 – Recommendations and the Way Forward

The Proposed Governance for The RPCC

Regional Regulatory Body

1. **Regulate the relevant activities of the signatories of the Inter-Utility MOU**
2. **Propose the methodology or methodologies for calculating Regional Transmission Tariffs for approval by the Board of RPCC**
3. **Derive formulae for calculating the Regional Transmission Tariffs in the approved methodology or methodologies**
4. **Derive and propose any modifications to the financing formulae of the Regional Institutions (such as the RPCC)**
5. **Propose modifications to the subsequent versions of the Regional Market Rules, Regional Interconnection Code, standards, procedures and specifications to the Board of RPCC**

Annex 2 – Recommendations and the Way Forward

The Proposed Duties of the Regional Regulatory Body

Regional Regulatory Body

6. Recommend changes to GMS Country's domestic legislation to facilitate the development of the Regional Power Trade and the continued progress towards a competitive electricity market
7. Follow up the performance of the RPT, propose modifications to the Board of RPCC as necessary and present an annual performance report to the Ministerial Meeting
8. Settle any electricity cross-border or trading disputes which may arise between the members in the Regional Power Market
9. Monitor the Regional Market development

Annex 2 – Recommendations and the Way Forward

The Proposed Functions for the RPCC

RPCC

1. **Promote and initiate infrastructure projects emerging from the GMS Regional Master Plan including but not limited to:**
 - Initial project appraisals including environmental issues
 - Support for securing finance for pre-feasibility and feasibility studies
 - Support for securing project finance for the implementation of projects
2. **Maintain and enhance the GMS Regional Power Master Plan including but not limited to:**
 - Annual revisions and support to the Technical Working Group on Planning in the development of the GMS Regional Master Plan
 - Co-Chairing the Technical Working Groups
 - Monitoring all GMS regional projects under developments
 - Undertaking post-implementation reviews of live projects in order to assess actual project performances against ex ante projected performances

Annex 2 – Recommendations and the Way Forward

The Proposed Functions for the RPCC

RPCC

3. **Manage and update an electronic repository and retrieval system of data and information pertaining to the GMS Regional Power System**
4. **Collect, maintain and publicize on the website within the public domain data concerning market performance:**
 - Trading volumes
 - Pricing information
 - Balancing market performance
 - Any other non-confidential information that may be requested by the Board of RPCC from time to time
5. **Develop and advise on the use of the Operating Guidelines, Market rules and Environmental Guidelines**
6. **Evaluate and advise on the impact of future projects**
7. **Perform various operational planning studies and give advice on short-term and long-term operating problems**

Annex 2 – Recommendations and the Way Forward

The Proposed Functions for the RPCC

RPCC

8. **Monitor and report on the control performance criteria**
9. **Provide routine daily reports, data and information relevant to the operation of the RPT**
10. **Ensure the coordination of the working program of the Technical Working Groups**
11. **Seek ways and means to mobilize funds for common interest projects according to guidelines set by the Board of RPCC**
12. **Provide secretarial services to the Conference of Ministers, the Board of RPCC and the Technical Working Groups.**
13. **Submit to the Board of RPCC draft plans and program of action and related budgets**

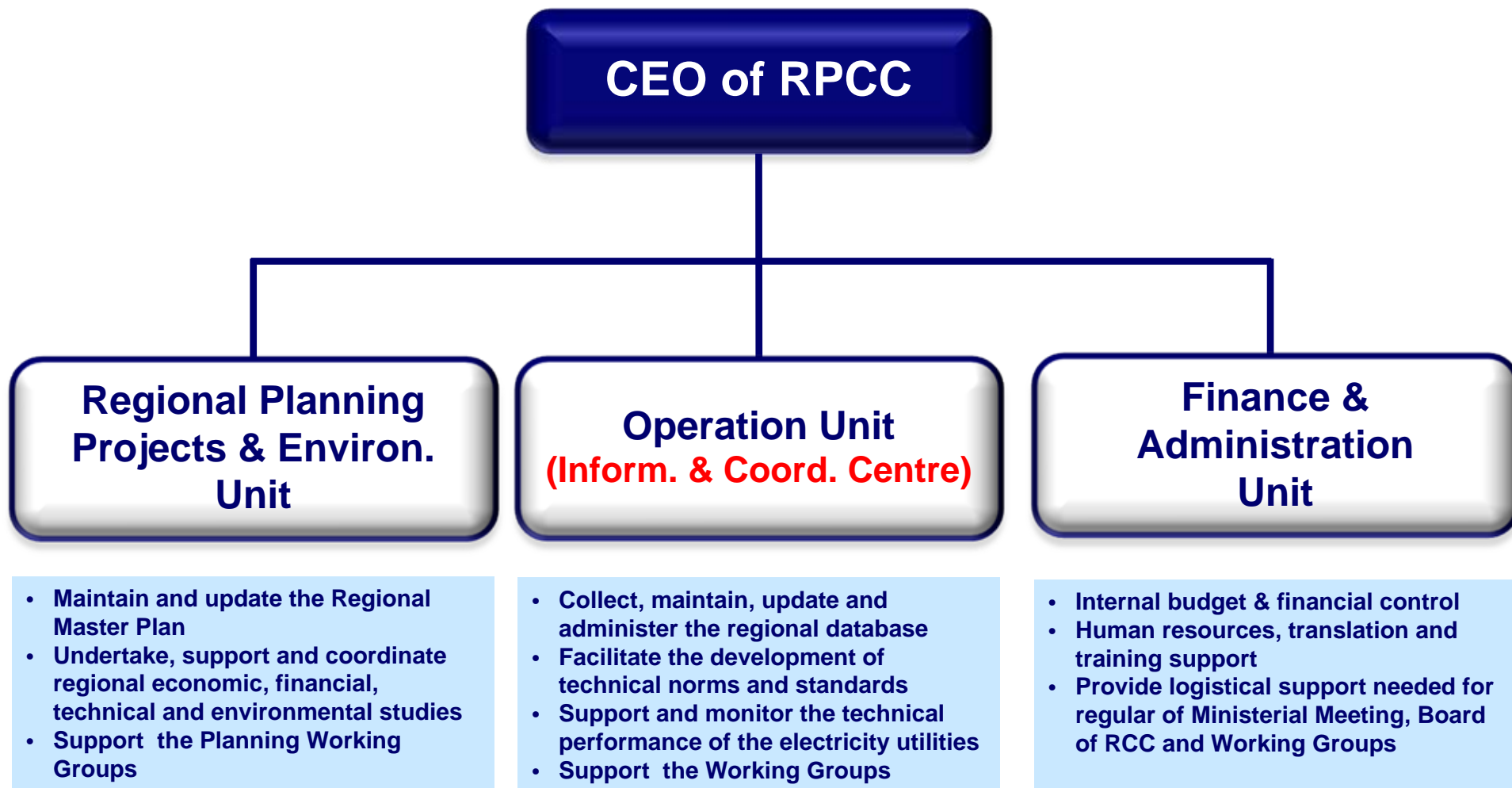


RPCC

- 14. **Foster cooperative relationships with Donors**
- 15. **Follow up the implementation of decisions of the board of RPCC**
- 16. **Capacity building in the GMS Region:**
 - **Prepare training programs for the staff involved in GMS RPT and for the RPCC Staff**
 - **Implement the training programs**
 - **Review the effectiveness of the training programs**
- 17. **Process applications for membership of the GMS RPT.**
- 18. **Prepare and submit a financial statement to the Board of RPCC**

Annex 2 – Recommendations and the Way Forward

The Proposed Structure For The GMS-RPCC





Annex 2 – Recommendations and the Way Forward

The Personnel of the RPCC

POSITIONS	Number
RPCC CEO's Office	
CEO of RPCC	1
Personal Assistant	1
Regional Planning, Projects & Environment Unit	
Director of Planning	1
Analyst	1
Operation Unit – Database & Information Unit	
Database Administrator	1
Analyst	1
Finance & Administration Unit	
Director of Finance & Administration	-
Admin & Accounting Assistant	1
TOTAL PROFESSIONAL STAFF	7
Contract Staff	
Messenger	1
Secretary	1
TOTAL	9



Annex 2 – Recommendations and the Way Forward

The Estimated Budget of the RPCC

Allowance for:
 -Accommodation
 -Furniture
 -School Fee, etc.

- Health, Pension Plans
 - Staff Training
 - Office Expenses
 - Utility Expenses
 - Vehicles Costs
 - Meetings
 - Travel Fees
 - Etc.

SALARIES PER PROFESSIONAL STAFF (6)	50,000 \$/YEAR
SALARIES PER GENERAL STAFF (1)	20,000 \$/YEAR
SALARIES PER CONTRACT STAFF (2)	2,500 \$/YEAR
ALLOWANCE PER PROFESSIONAL STAFF (6)	To be determined
ALLOWANCE PER GENERAL STAFF (1)	To be determined
OPERATING COSTS PER PROFESSIONAL & GENERAL STAFF (7)	Estimated to 30,000 \$/YEAR
TOTAL ESTIMATED SALARIES	325,000 \$/YEAR
TOTAL ESTIMATED ALLOWANCE	To be determined
TOTAL ESTIMATED OPERATING COSTS	210,000 \$/YEAR
TOTAL	535,000 \$/YEAR + Allowance

Note: Budget for Office & Computer Equipment including Software must be added.

Annex 2 – Recommendations and the Way Forward

The Proposed Duties of the Technical Working Group

Technical Working Groups

1. Deal with specific issues “on demand” relating to the operation and development of the RPT. At this stage four (4) Technical Working Groups could be envisaged namely:
 - TWG on Planning
 - TWG on Operations
 - TWG on Environment
 - TWG on Market Development and Monitoring
2. The TWG on Planning shall be the organ responsible for the coordination of the Regional Master Plan and the development programs of member utilities
3. The TWG on Operations shall be responsible for the definition, updating and revising of the operations part of the Regional Interconnection Code and any other relevant documents of the Regional Interconnectors and shall study and shall propose solutions to operating / technical problems that may arise in the operation of the interconnected systems

Annex 2 – Recommendations and the Way Forward

The Proposed Duties of the Technical Working Group

Technical Working Groups

4. The TWG on Operations shall take part in the preparation of the Regional Interconnection Code and any other relevant documents and shall propose any modifications to them required in the future. The members of the TWG on Operations shall promote the harmonization of operation and technical changes in their respective countries when necessary.
5. The TWG on Environment shall be responsible for the environmental impact assessment and mitigation on the electrical installations and Regional Projects within the GMS. It will also provide advice on the environmental aspects of the Regional Interconnection Code.
6. The TWG on Market Development and Monitoring shall be responsible for monitoring the development and operation of the Regional Market, participating in changes or modifications to the Regional Market Rules, and advising on and assessing the possibilities of further developments in the Regional Electricity Market.

**THANK YOU VERY MUCH FOR
YOUR ATTENTION**



PRESENTATION OUTLINE

PART 1 – The GMS Road Map for Expanded Energy Cooperation

PART 2 – Presentation of ADB/GMS TA No 6440 - REG

PART 3 – Overview on the Proposed GMS Power Master Plan

PAR 4 – Recommendations and the Way Forward

ANNEX 1- GMS RPT Institutional Framework

ANNEX 2 - Recommendations and the Way Forward

ANNEX 3 – Proposed Capacity Building for GMS Member Countries

A Capacity Building Program is proposed for consideration by the RPTCC Member following the implementation of RETA 6440.

The program is composed of 7 Modules as follows:

Module 1: “NETWORK RELIABILITY AND LOSS REDUCTION”

Module 2: “OPERATION OF THE INTERCONNECTED POWER SYSTEM”

Module 3: “INTEGRATED GENERATION TRANSMISSION PLANNING”

Module 4: “TRANSMISSION PLANNING”

Module 5: “ENVIRONMENTAL ISSUES”

**Module 6: “EUROPEAN EXPERIENCE IN COMMERCIAL
ARRANGEMENTS AND TRADE”**

**Module 7: “PLANNING, DESIGNING AND MANAGING
PPP PROJECTS”**

For each of the Modules:

- **an overview of its content is presented for understanding of the general and specific objectives; as well as**
- **a list of the segments that compose the module.**

In addition:

- **the number of participants for each training session;**
- **the duration of the sessions; and**
- **the number of necessary project resources**

to achieve satisfactorily the objectives of each of the training session are proposed.

Module 1: “NETWORK RELIABILITY AND LOSS REDUCTION”

Proposed Segments:

- **Part 1 - European Electricity Market & Security**
- **Part 2a - System Operation Normal Conditions**
- **Part 2b - Generation Dispatch & Transmission Control**
- **Part 3 - Transmission Operating Criteria**
- **Part 4 - Operating Reserves**
- **Part 5 - Transmission Outage Scheduling**
- **Part 6 - Emergency Operations**
- **Part 7 - System Operation Abnormal situation**
- **Part 8 - System Restoration & Communications**

Module 2: “OPERATION OF THE INTERCONNECTED POWER SYSTEM”

Proposed Segments:

- Part 1 - Performance Standards
- Part 2 - Assessment Codes
- Part 3 - Scheduling Accounting
- Part 4 - Transmission Pricing
- Part 5 - Metering Introduction
- Part 6 - Metering Engineering Principles
- Part 7 - Metering Challenges
- Part 8 - Metering & Communication Infrastructure
- Part 9 - Congestion Management

Module 3: “INTEGRATED GENERATION TRANSMISSION PLANNING”

Proposed Segments:

- **Part 1 - Introduction to Power System Planning**
- **Part 2 - Selected Topics in Macroeconomics**
- **Part 3 - Selected Topics in Microeconomics**
- **Part 4 - Introduction to Integrated Planning**
- **Part 5 - Decoupling**
- **Part 6 - LCGP – Formulation Process**
- **Part 7 - LCGP – Internal & External Input**
- **Part 8 - Technico-Economic Considerations**
- **Part 9 - System Modeling**
- **Part 10 - Models & Examples**
- **Part 11 - Fuel-price-projections**

Module 4: “TRANSMISSION PLANNING”

Proposed Segments:

- **Part 1 - Planning Perspectives - Performance Standards Criteria and Process**
- **Part 2 - Load Forecasting**
- **Part 3 - Economic Evaluation**
- **Part 4 - Optimization Techniques**
- **Part 5 - Automated Transmission Planning**
- **Part 6 - Example**

Module 5: “ENVIRONMENTAL ISSUES”

Proposed Segments:

- Part 1 - SEA-EIA in System Development
- Part 2 – Introduction to SEA
- Part 3 - Introduction to EIA
- Part 4 - Introduction to CIA, SIA, HIA and EMP
- Part 5 - Introduction to SEA Process
- Part 6 - Integrating SEA into PDP
- Part 7 - Linking SEA to Decision Making
- Part 8 - Scoping on Key Strategic Issues
- Part 9 - Introduction to Scenarios
- Part 10 - Assessing Social-Environmental Impact
- Part 11 - Approach to Weighting Assessments

- **Part 12 - SEA Recommendations & Reporting**
- **Part 13 - Review of EIA Process and Relationship to Project Development**
- **Part 14 - Integrating SIA & HIA into the EIA Process**
- **Part 15 - Introducing CIA in the EIA Process**
- **Part 16 - Introducing CIA Case Study of Nam Theun**
- **Part 17 - Social Issues**
- **Part 18 - Mitigation Measures and Options to Mitigate Environmental Impacts**

Module 6: “EUROPEAN EXPERIENCE IN COMMERCIAL ARRANGEMENTS AND TRADE”

Proposed Segments:

- **Part 1 - Interconnection and liberalization**
- **Part 2 - Structure of electricity markets**
- **Part 3 - Major issues**
- **Part 4 - Balancing markets and power exchanges**
- **Part 5 - Congestion management and cross-border trading**
- **Part 6 - TSO activities and network tariffs**
- **Part 7 - Examples**
- **Part 8 – Inter TSO Compensation Mechanism**

Module 7: “PLANNING, DESIGNING AND MANAGING PPP PROJECTS”

Proposed Segments:

- **Part 1 - PPP Introduction**
- **Part 2 - PPP Amman**
- **Part 3 - The Investor**
- **Part 4 - Investor Selection**
- **Part 5 - Risks Management**
- **Part 6 - Example Jorf Lasfar, Marocco**



Annex 3 – Proposed Capacity Building

MODULES	N° Participants	N° Days	N° Experts	Total m.d. (*)
Module #1	20	3	2	54
Module #2	20	3	2	54
Module #3	20	3	2	54
Module #4	20	3	2	54
Module #5	20	3	1	27
Module #6	20	2	1	18
Module #7	20	2	1	18
(*) Including preparation works, for 6 Countries			TOTAL	279

**THANK YOU VERY MUCH FOR
YOUR ATTENTION**

