

**Development of a Regional Power Market in the
Greater Mekong Sub-Region (GMS)**

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**Development of a Regional Power Market in the
Greater Mekong Sub-Region (GMS)
*Compatibility of Regulatory Systems and Pricing Principles
(Results of a survey conducted with the GMS countries)***
Consultant report prepared by Robert Vernstrom – Bangkok-Thailand

December 2001

Joint UNDP/World Bank Energy Sector Management Assistance Programme
(ESMAP)

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1

Introduction

A 1999 study by the World Bank¹ summarized the “unprecedented opportunity for economic and environmental benefits for individual countries and the entire Greater Mekong Sub-region (GMS)” associated with cross-border power trade. That report concluded that a full-trade scenario could yield savings on the order of US\$10 billion over the next two decades, even before quantifying substantial environmental benefits.

These potential savings would result from:

- postponed and/or reduced investment due to regional least-cost development of energy resources and shared generation reserves;
- lower operating costs due to economic power exchange and reduced spinning reserve costs;
- lower regional coincident peak requirements;
- increased system reliability; and
- reduced greenhouse gas emissions due to a shift away from thermal energy.

Every country in the region would like to take advantage of these benefits. To this end, bilateral trade projects have already been implemented, and many additional projects are being planned. Unfortunately, these uncoordinated developments are *not* necessarily the most efficient path for expanding trade across the region. More coordinated planning is needed if we are to evolve toward a regional structure suitable to the needs of all participants.

The Expert's Group on Power Interconnection and Trade (EGP) is committed to finding ways to enhance power trade within the region. This task is complicated by the fact that each member country is rapidly evolving its own power system to meet domestic requirements. Without a current awareness of these changes, it is very difficult to discuss the potential for – and suitability of – different models for enhanced regional trade.

¹ *Power Trade Strategy for the Greater Mekong Sub-region*, World Bank Report No. 19067-EAP, March 1999.

The World Bank therefore asked the Consultant to conduct a survey of GMS member countries, and to prepare a comparative report on the status of institutional/regulatory and commercial policies across the region to provide background information to the EGP Workshop held 7-8 December 2000 in Vientiane. The survey document is reproduced in the Appendix.

Specifically, the World Bank asked that the Consultant focus on:

- the compatibility of national regulatory systems, especially for wheeling;
- the compatibility of pricing principles at both production and transmission; and
- the potential barriers to enhanced trade which are revealed in this review.

EGP participants completed the survey for their respective countries in October, providing us with the most current information available on the status of these issues today and in the near-term future after on-going sector reforms are implemented.

Detailed survey questionnaire responses from each country are the basis for this study. In the report, however, responses have been very much simplified in order to facilitate regional comparisons. The Consultant apologizes for any errors due to misinterpretation.²

The report is organized as follows. Section 2 is a brief review of on-going reforms in member countries. Section 3 compares progress with respect to key regulatory and commercial issues (especially pricing) most critical to power trade, noting barriers to expanded power trade revealed through the country comparisons.

² In particular, it must be noted that the response from Vietnam has been delayed beyond our publication deadline; therefore information on Vietnam is based on the most current information available to the author regarding current conditions with respect to the Vietnam power system.

2

POWER SECTOR REFORM

Fast-paced reform is dramatically altering power sectors across the region. What was considered impossible only a few years ago is now accepted practice for efficient electricity delivery. Traditional state-owned monopolies are giving way to corporatization, private participation, and both vertical and horizontal separation of the market to foster increased competition.

Since this evolution directly affects the opportunities for power trade, we begin with a brief review. Table 1 (at the end of this section) provides a summary of the current situation and key restructuring plans within each sector. The following paragraphs outline the targets for each country.

Cambodia

Electricite du Cambodge (EDC) was corporatized in 1996, but remains 100% state-owned. The company is responsible for all electricity delivery in the largest cities and to a few provincial towns. It has 100 MW of its own, and purchases an additional 52 MW from IPPs. There is no transmission network. No decision has been made as to whether isolated systems throughout the country will be transferred to EDC. The Electricity Act, under development since 1996, was just passed by the National Assembly (November 6th). After Senate review and promulgation by the King, the legislation will create a separate, independent regulator (the Electricity Authority of Cambodia, EAC), establish a system of licensing which will allow the private sector to participate in all power sector activities, and establish a criteria for setting tariffs.

Increased private participation is currently being planned, including IPPs totaling 72 MW (mainly hydro), and a joint-venture with EDC to transmit Thai power for sale to EDC (110 km line at 115kV).

Lao PDR

Electricite du Laos (EdL) develops, owns, and operates the country's main generation, transmission, and distribution assets, and manages electricity imports to its grids and exports from its stations. It is a 100% state-owned corporation. Under GOL policy to date, EdL is the implementing agency for government power projects and has been the agency nominated by

GOL as its shareholder whenever GOL has participated in the ownership of IPP projects. Currently EDL has 261 MW of generating capacity, and represents the GOL in 360 MW of IPP projects, predominantly exporting to Thailand. The only transmission in the Lao PDR above 115 kV is associated with these IPP exports.

The Electricity Law of Lao PDR, adopted in 1997, is strongly committed to a policy of private sector participation and export promotion. The law strives to define a clear procedure for selecting projects, and includes an explicit State guarantee to protect the rights and interests of both foreign and domestic investors in electricity enterprises. The law also commits the GOL to the development of – and all participants to the use of – the National Electricity Transmission Grid – when it is developed in order to eliminate the current requirement for project-specific lines.

GOL is developing a policy guideline for the sector. Future reforms now under discussion would considerably alter current institutional arrangements. The Department of Electricity (under the Ministry of Industry and Handicrafts) would assume full responsibility for project planning, including IPPs. A suitable agency would be identified (or created) to assume responsibly for GOL's equity investments in IPPs. A Lao National Grid Company (LNGC) would be established to plan and implement the HV transmission network. EdL's primary focus of responsibility would be domestic electricity supply. The timing of this restructuring has not been specified.

Myanmar

Myanma Electric Power Enterprise (MEPE) is a 100% state-owned vertically-integrated utility serving all end-users in the country. IPPs have been legal in Myanmar since 1994. MEPE has been discussing private participation – in existing facilities and new power projects – with many investors; to date, none of these projects have been developed.

MEPE is regulated by the Department of Electric Power under policies set by the Ministry of Electric Power.

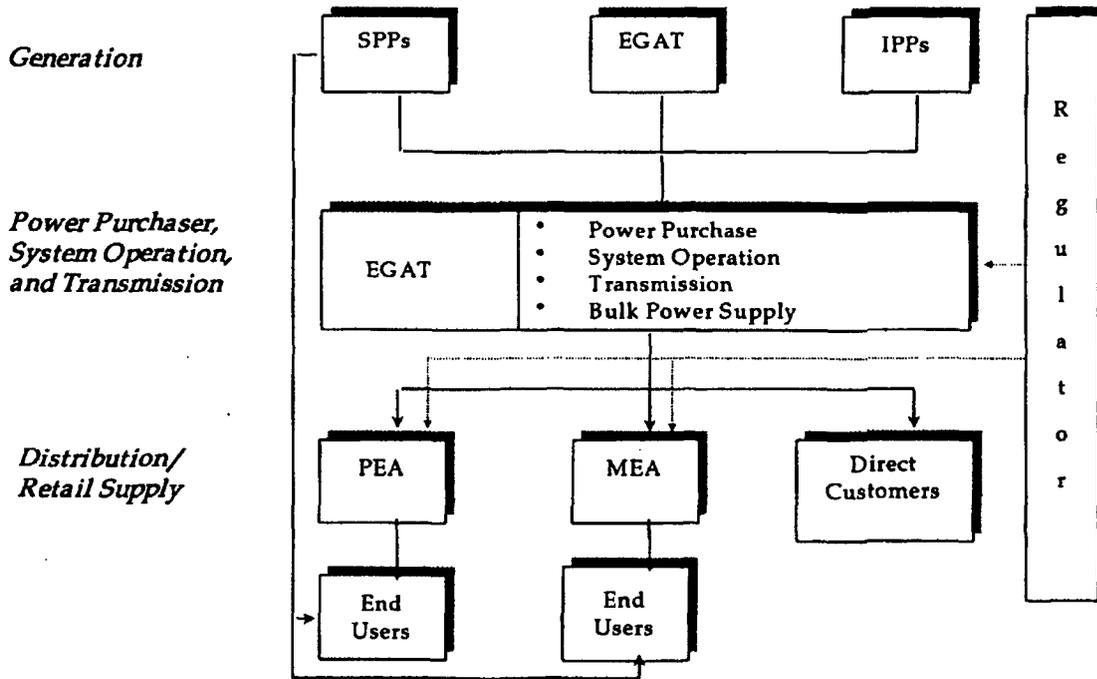
Thailand

From its inception, EGAT has been the dominant player in the Thai power sector, controlling generation and transmission, and selling directly to the two state-owned distribution companies (PEA and MEA).

Thailand is embarking on the most dramatic power sector reform in the region. EGAT is being unbundled, and competition is being introduced at all levels. Reforms are to take place in three stages as summarized below and illustrated in the accompanying diagrams:

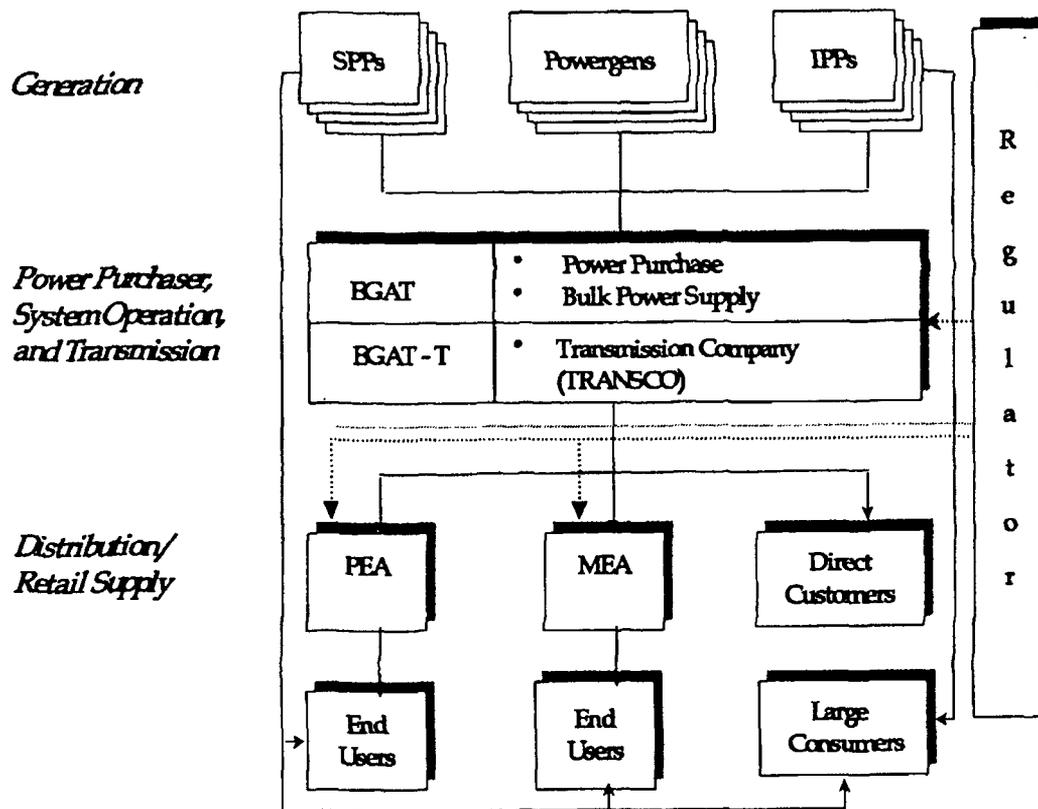
- *Stage I: EGAT as primary power purchaser/provider.* During this on-going phase, EGAT maintains its pre-eminent position in the bulk purchase and supply of power, and the distribution companies keep their franchise base (except that SPPs are permitted to sell directly to end-users). Transmission remains under EGAT control. Central long-term planning remains with EGAT. Additional EGAT generating plants are being privatized (e.g., Ratchaburi Plant in Fall 2000). An independent regulatory regime is being developed.

Figure 1: Thai Reform Stage 1 (1998–2001)



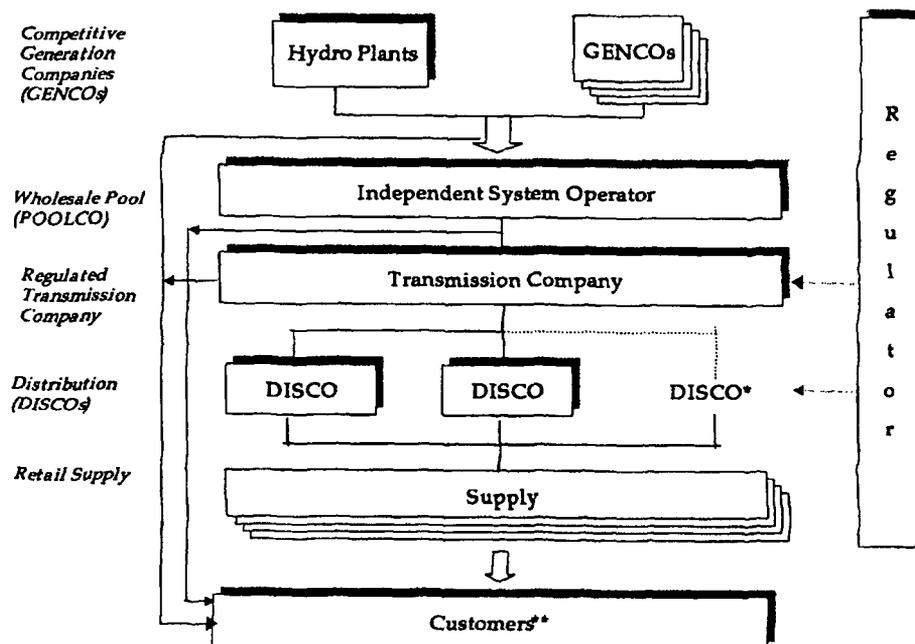
- *Stage II: EGAT remains the central supplier of power, with gradual introduction of wheeling.* In this phase, EGAT will face increased competition in bulk purchase and supply of power; generators will be permitted to sell directly to large customers. Increased investment in former EGAT-owned power generation will increase. An independent regulator will implement an incentive-based regulatory regime.

Figure 2: Thai Reform Stage 1I (2001–03)



- *Stage III: Establishment of competitive wholesale power pool.* A pool will be developed to facilitate wholesale power trading. An Independent System Operator (ISO) will be responsible for merit order dispatch and financial settlement of bulk power purchases. In this phase, retailers will have non-discriminatory access to the transmission and distribution network. Initially, only large customers will be given access to the competitive market, with distribution companies maintaining their franchise base; franchises will be gradually unwound as the market matures. EGAT will remain a holding company, including Transco (the transmission company), hydro plants, plus minority interest in some Gencos. Market signals are to replace central planning.

Figure 3: Thai Reform Stage III (2003 and after)



Vietnam

Electricity of Vietnam (EVN) was established as a state corporation in 1995, consolidating all power entities under a holding company structure. EVN manages generation and transmission. Distribution is managed by five subsidiary companies with independent accounting but still functionally reporting to EVN.

According to our most recent information, reform plans call for EVN to remain the dominant buyer of electricity and directly responsible for transmission. However, private participation in generation will increase, and transmission may be separated as a profit center and possibly regulated by an independent agency.

An electricity law is being drafted. We understand that it seeks to create a more level playing field for public and private participation. Large end-users will have the right to buy power

directly from generators, and the transmission entity will have the obligation to transmit unless the Ministry of Industry certifies that it is unable to do so. State management of electricity activities and power sector regulation are to remain under the Ministry of Industry.

Yunnan Province (China)

Yunnan Electric Power Group (YEPG) is a solely owned subsidiary of the State Power Corporation of China (SP). It has installed capacity of 3781 MW (17 power plants) and 10 distribution companies. An additional 1060 MW of IPP capacity is sold to YEPG under long-term contract. We understand that most of these units have been developed by public corporations, rather than through limited recourse project financing. There is already some cross-border exchange with Guangdong; SP applies a separate wheeling tariff these sales.

According to YEPG, power sector reforms are aiming toward vertical and horizontal separation of the power sector into separation generation, transmission, and distribution companies. Government functions such as planning are to be moved to the provincial economic and trade commission.

Table 1: Summary of Power Sector Reforms

Current Situation	Near-term Plan
Cambodia	
<ul style="list-style-type: none"> ▶ Electricite du Cambodge (EDC), is the dominant player, serving major cities and some provincial towns. ▶ EDC currently generates 100 MW. ▶ I PPs (3) provide 52 MW using imported fuel ▶ Many isolated systems in provincial towns. ▶ No transmission grid 	<ul style="list-style-type: none"> ▶ Generation and distribution to be further unbundled ▶ New I PPs (2) to provide 72 MW, hydro and imported fuel ▶ Transmission line planned to facilitate purchases from Vietnam and IPPs ▶ Public/private J V in West to purchase electricity from Thailand to transmit to state-owned single-buyer.
Lao PDR	
<ul style="list-style-type: none"> ▶ Electricite du Laos (EDL), a vertically integrated state monopoly in charge of all domestic supply, generates 261 MW. Service limited to Vientiane and provincial towns. ▶ I PPs generating 360 MW, partially owned by GOL, sell most production to EGAT, some to EDL ▶ I PP rights and trade authorized by 	<ul style="list-style-type: none"> ▶ Expansion under similar structure ▶ Largest project would be 900+MW Nam Theun 2 hydro project with associated 500 kV transmission line (to be privately constructed)

Current Situation	Near-term Plan
<p>contract</p> <ul style="list-style-type: none"> ▶ Limited transmission except for Thailand exports (115 and 230kV) 	
Myanmar	
<ul style="list-style-type: none"> ▶ Myanmar Electric Power Enterprise (MEPE), a state-owned vertically-integrated utility responsible for all phases of national electric service. ▶ Installed capacity 1167 MW, including 134 MW isolated systems. ▶ Transmission grid includes 230 kV (1086 km) and 115 kV (1675 km) 	<ul style="list-style-type: none"> ▶ No reform or restructuring program currently planned
Thailand	
<ul style="list-style-type: none"> ▶ Three government-owned utilities: <ul style="list-style-type: none"> - EGAT (bulk supply) - MEA (Bangkok distribution) - PEA (provincial supply) ▶ EGAT is the single-buyer of electricity from IPPs, SPPs, neighboring countries ▶ SPPs have right to sell directly to large users ▶ Capacity in 2001 <25,000 MW <ul style="list-style-type: none"> - EGAT hydro 3,384 MW - EGAT thermal 16,217 MW - EGCO IPP (EGAT minority shareholder) 2,056 MW - Other IPPs 1,400 MW - SPPs (50 PPAs) 1,807 MW - Laos/Malaysia trade 613 MW ▶ EGAT transmission grid includes 500 kV (2243 km), 230 kV (11,034 km), and 115 kV (13,096 km) 	<ul style="list-style-type: none"> ▶ Stage I (to 2001) <ul style="list-style-type: none"> - EGAT purchases power, operates system and transmission, bulk supplier - SPPs can sell directly to large users - EGAT continues to own generation ▶ Stage II (2001-03) <ul style="list-style-type: none"> - Separate generating companies takeover EGAT generation - EGAT continues function as power purchaser and bulk supplier. - EGAT-T, separate but closely associated company, operates transmission system ▶ Stage III (from 2003) <ul style="list-style-type: none"> - Separate system operator (ISO) created to operate power pool - Regulated transmission company completely independent - Hydro plants also separated - Multiple distribution companies (DISCOs) created to buy from system operator

Current Situation	Near-term Plan
Vietnam	<ul style="list-style-type: none"> - All generators permitted to sell to customers directly ▶ Capacity in 2006 <28,000 MW <ul style="list-style-type: none"> - EGAT hydro 3,384 MW - EGAT thermal 15,797 MW - EGCO IPP 2,056 MW - Other IPPs 4,597 MW - SPPs 2,097 MW - Laos/Malaysia trade 613 MW ▶ Grid Company to include 500 kV (3450 km), 230 kV (11,646 km), and 115 kV (13,707 km)
<ul style="list-style-type: none"> ▶ Electricity of Vietnam (EVN) is state holding company managing generation and transmission ▶ Five subsidiary distribution companies; separate accounts but report to EVN. 	<ul style="list-style-type: none"> ▶ Electricity law being drafted <i>[following details are preliminary and unofficial]</i> ▶ Increased private sector participation ▶ Generators may be permitted to sell directly to large customers ▶ Open access to transmission if available
Yunnan Province (China)	<ul style="list-style-type: none"> ▶ Power sector reform to include vertical and horizontal restructuring: <ul style="list-style-type: none"> - Generating companies - Transmission company (single buyer) - Distribution companies ▶ Additional IPP generation of 2040 MW (by 2005) ▶ 500 kV interconnection to the south China power grid (2001).
<ul style="list-style-type: none"> ▶ Yunnan Electric Power Group (YEPG) is a vertically-integrated utility, a wholly-owned subsidiary of the State Power Corp of China. ▶ YEPG has 17 generating plants; 3781 MW ▶ IPPs in the province generate 1060 MW; all owned by State entities. ▶ Local power companies generate an additional 2517 MW, mostly small hydro. ▶ Some of this generation is sold to other southern provinces ▶ Almost all transmission is owned and operated by YEPG – 500 kV (440 km), 220 kV (3117 km) and 110 kV (6310 km). 	

3

Potential Constraints to Power Trade

The objective of this chapter is to provide a comparative “snapshot” of the situation in each of the six GMS member states with respect to key institutional and commercial issues impacting cross-border power trade. We consider four the following four topics:

- (1) Compatibility of national structures for the power sector,
- (2) Compatibility of regulatory systems,
- (3) Potential for Third-party access to the grid, and
- (4) Compatibility and transparency of commercial systems.

As demonstrated in the previous section, each country is restructuring its power sector at a different pace, depending on its own unique circumstances and objectives. It must be noted, however, that international experience in many corners of the world has demonstrated the direction of sector development which is likely to achieve the maximum benefits of power trade:

- The optimal *structure* for cross-border trade is the full unbundling of generation, transmission, and distribution – both vertically and horizontally – in order to permit wholesale consumers (distributors and large loads) to buy electricity wherever they wish.
- The most suitable *regulatory system* is an independent one; its goal is to equitably apply a clear set of rules to the entire sector in a transparent and non-politicized manner.
- *Third-party access* (“wheeling”) makes trade possible: It allows buyers and sellers to meet in a power market unfettered by constraints imposed by integrated transmission companies.
- *Transparent commercial systems* establish the pricing rules under which power can be traded most efficiently across the interconnected network.

Each country must make its own decisions regarding these issues. We focus on whether country-specific solutions are compatible with enhanced power trade.

Compatibility of Structures

Power sector reform in most countries is a gradual process typically involving several of the following steps:

- Introduce competition [and desirable private sector investment] at generation by allowing independent power producers (IPPs); all generation is sold go to a single purchaser, usually the yet-unreformed integrated national utility;
- Introduce more competition into the single buyer model through increased separation – vertical (generation, transmission, distribution) and/or horizontal (multiple players where possible);
- Establish open access to the transmission system (“wheeling”) to permit generators to deliver power to non-contiguous distributors and large customers;
- Form national and, ultimately, regional power pools or other wholesale markets to bring buyers and sellers together.

Each of these stages offers different options with respect to international power trade. In the early stages, with little or no competition, trade is limited to bilateral agreements; later, after vertical and horizontal unbundling, competitive markets make possible economically efficient cross-border trade.

As of today, most of the possibilities for sector evolution which could facilitate power trade have yet to be realized:

- The power sectors in three countries – Myanmar, Lao PDR, Yunnan (CN) – remain traditional vertically-integrated monopolies, with the state utility responsible for serving all customers. In Cambodia, although EDC is an integrated utility, the sector is not integrated due to the large number of isolated systems. In the other two countries – Thailand and Vietnam – distribution is separated, but remains the responsibility of state-owned companies.
- No country can be characterized as having a truly independent regulator. Ultimately, decisions on sector investment and power pricing, become political issues.
- Open access to the transmission network is national policy only in the Lao PDR. Since the country has a very limited transmission network, this GOL commitment has limited impact on current operations.
- True wholesale competition does not exist anywhere, although small power producers (SPP) in Thailand are permitted to sell power directly to large users rather than to the single-buyer.

There has been significant progress, however, toward more competitive power markets:

- Each GMS power sector permits private participation in the form of IPPs. With the exception of Myanmar, independent producers account for a significant share of total power generation.
- Thailand has made the greatest progress toward sector unbundling. In addition to several thousand MW of IPPs, state-owned power plants have been privatized (e.g., EGCO and Ratchaburi, although EGAT continues to hold significant minority shares). The Cambodia power system, too, is unbundled by default due to importance of IPPs and the large number of non-EDC isolated systems in provincial towns.

The commitment to IPPs in all six countries means that each has adopted (or intends to adopt) a form of a *single-buyer* market model, often considered a first-stage in sector reform since it does not require a dramatic restructuring from the traditional integrated power company. Under this model, a single entity within the country purchases by contract power produced by all other suppliers.

Unfortunately the single-buyer model has limitations with respect to cross-border transactions. Transactions are generally limited to long-term contract sales based on firm energy. IPP developments with associated transmission investments can lead to inefficiencies since these investments might not be components of a least-cost expansion plan nor coincide with an optimal operation of the power system.

Table 2 summarizes sector restructuring targets for the next five years.

- Many GMS power sectors will continue to be dominated by vertically integrated utilities; in particular, this trend will include smaller markets such as Cambodia and the Lao PDR, where sector disaggregation may not be feasible, and Myanmar.
- Private participation in the sector will expand throughout the region.
- There is a broad trend toward greater unbundling:
 - ▶ Cambodia plans joint-venture investment in transmission with the private sector in its Western region, and is already unbundled. Some new investments, however, appear to imply a move toward bundling.
 - ▶ In Lao PDR, a separate transmission company, the Lao National Grid Company, is under consideration, although it has not yet been formally established. (Following the Asian financial crisis of 1997/98, this option may no longer be a high priority on the GOL agenda.)
 - ▶ Thailand plans for a separate Independent System Operator (ISO) and a separate transmission company, as well as separate, privatized, and competing generation companies.
 - ▶ Vietnam will operate generation, transmission, and distribution as separate profit centers with greatly increased independence.

- ▶ Significant unbundling is also planned in Yunnan, with generation, transmission and distribution operating as separate functions; unfortunately, we do not have sufficient information to allow us to report on the degree of *horizontal* unbundling.
- Cambodia and Thailand expect to have completely independent regulators in place (see Section 3.2 for further detail).
- Lao PDR and Thailand are committed to open transmission access (see Section 3.3).
- The greatest changes are planned in Thailand, where the single-buyer model is to be gradually replaced with a power pool in which private generators will compete for sales to large users and distributors. The transmission system will not be a buyer of electricity, but simply a service, open to all participants in the power sector on a non-discriminatory basis.

Table 2: Planned Power Sector Structures

	Y INTEGRATE D	MONOPOLY PRIVATE PARTICIPATION (IPPS)?	DEGREE OF UNBUNDLING? G?	INDEPENDENT REGULATOR? R?	OPEN ACCESS?	WHOLESALE COMPETITION?
CAMBODIA		▶	Public/ Private JV	▶		
LAO PDR	▶	▶	Transco		▶	
MYANMAR	▶	▶	No plan			
THAILAND		▶	ISO, Gencos, Transco	▶	▶	▶ Pwr. Pool
VIETNAM	?	▶	G,T,&D profit ctrs			?
YUNNAN CN		▶	G,T & D cos.			

Laws, Contracts and Regulation

The Workshop sponsors requested a detailed comparison of laws and regulations applicable in each GMS member state. Unfortunately, the regional survey provided less information on regulation than we had hoped; we did not receive regulations from all countries.³ It may be that detailed local laws are not available in English. In addition, as noted in previous sections,

³ The complete list of documents received from each country appears in Appendix 2.

many laws are still pending approval, or are being revised. In Vietnam, the electricity law is only a draft. In Cambodia, the proposed new Electricity Law is currently being debated in the National Assembly.

In this section, we discuss potential barriers to power trade related to the following:

- (1) Laws and regulations (to the extent available),
- (2) Power purchase agreements (PPAs), and
- (3) Planned regulatory systems.

Laws and Regulations

We received the official "electricity law" of most countries. However, these laws tend to be general and give limited guidance as how the sector is actually governed. By way of illustration, consider the following excerpt quoted from one such law:

...Notwithstanding any permit for exploration, generation, transmission or distribution of electrical power that has been issued...when it has been decided that the State shall carry out such activities exclusively, the Minister...may revoke the said permits.

General statements such as this one can lead to misinterpretation. In all likelihood, codes and regulations state the clear circumstances under which such action would be appropriate, with the result that the law does not appear arbitrary. Unless regulations are very specific, however, such statements can act as a barrier to power trade. Trade can still take place, but if laws are subject to wide interpretation, every aspect of power trade must be specified by contract for each transaction. Bilateral projects are possible in this environment; short-term power exchange probably is not.

Following are comments on laws and/or regulations from five member countries.

- **Cambodia.** The Electricity Act⁴ creates a new legal and regulatory framework for the power sector. The law provides for:
 - ▶ *Creation of the Energy Authority of Cambodia (EAC)*, an independent regulatory body for the power sector. Thus, the law separates regulatory functions from the sector policy making, which will remain with the Ministry of Industry, Mines and Energy (MIME). The EAC will establish the principles for supply and pricing of electricity, and for regulation of sector activities through licensing of suppliers.

⁴ Planning for the Act commenced in 1996 with a Royal Decree. The Electricity Act was approved by the National assembly on 6 November 2000, and it will become law after review by the Senate and subsequent Royal promulgation (ca February 2001). A separate Sub-Decree will cover the detailed implementation of the law.

- ▶ *Promotion of private ownership of facilities* and the establishment of competition where feasible. Further, the legal and regulatory framework will allow private entities to provide a variety of services, particularly in generation and distribution.
- ▶ *Eventual creation of a national transmission company*, leaving flexible the decision as to whether this will be a separate license or a consolidated license for EDC.

EAC's main functions will be (i) reviewing and approving electricity prices, licensing power utilities, (ii) reviewing their planned investments, finances, and performance, and (iii) enforcing its regulations, rules and standards. It will also review finances of licensees, prescribe license fees, enforce performance standards, handle complaints, hold public hearings, and establish a uniform system of accounts.

In order for the EAC to function successfully, separate regulations will need to be issued in the next few months to codify policy with respect to critical operating procedures, such as those for (i) license application, (ii) capacity acquisition, (iii) tariff-setting, (iv) review and approval of licensee investment programs, (iv) establishing a uniform system of accounts, (v) revocation of licenses, etc.

- **Lao PDR.** The Electricity Law⁵ aims to define the roles of all participants in the sector. Many issues which have been raised as potential barriers to power trade are addressed in a positive way:
 - ▶ *Private investment* is encouraged; the law defines general procedures for concessionaires "who seek to operate an electricity enterprise relative to the production, transmission and distribution, export and import or development of electricity...".
 - ▶ *International power trade* is specifically encouraged; GOL commits itself to promoting "electricity as an export commodity...", and confirms that "electricity can be imported into the Lao PDR...."
 - ▶ *Transmission access* is confirmed for both public and private transmission lines. "The owner of an electricity transmission system who is requested transmission of electricity...does not have the right to refuse unless the transmission of electricity over the line cannot be technically guaranteed. Those who use...must pay a service fee."
 - ▶ All electricity sources are required to use the National Grid "...unless...there is yet no transmission grid," a significant exception given the nascent state of the current grid.

⁵ Adopted 12 April 1997. All comments are based on an *unofficial* translation.

All of these clauses demonstrate the commitment of the GOL to power trade. Many of these clauses come with the standard qualifier, "with the agreement of the Government." A potential barrier to developing trade is the lack of a clear regulatory procedure for obtaining this agreement. No matter how supportive the general direction of policy, ultimately, it is the final regulatory permission which determines whether trade can proceed.

Another potential barrier is a clause associated with the procedure for granting a concession. It states simply that, "The Government of the Lao PDR shall participate in the shareholding when there is a concession for an electricity enterprise." The requirement is not unreasonable, but the lack of a statement as to the level of this shareholding – or a procedure for establishing it – could become an impediment to expansion of trade from the Lao PDR.

- **Myanmar.** The Electricity Law⁶ is very general and somewhat dated. International power trade is not specifically mentioned. Most of the issues of concern for power trade are not addressed in the document. Broad discretionary rights granted to the Minister and the Council of Ministers would likely raise concerns among potential investors. Unless regulations are far more precise, power trade agreements will need to be based on detailed bilateral contracts rather than existing law.
- **Thailand.** Existing laws in Thailand are friendly to power trade. For example, the EGAT Act⁷
 - ▶ gives EGAT freedom to trade with neighboring countries, and "to undertake businesses concerning electric energy" by itself or in collaboration "with other entities whether internal or external entities of the private or of State or with international organizations...."

We have reviewed the most recent draft of a proposed Energy Industry Act. One objective of the Act is to "increase competition in the energy industry and prevent abusive use of power in the operation of energy-related activities as well as control and monitor the energy industry to ensure smooth transition to a competitive market." The draft Act includes a number of provisions which will facilitate power trade. For example,

- ▶ An *independent regulator*, the National Energy Regulatory Commission (NERC), is given broad regulatory powers. The commission is apolitical; commissioners cannot be elected officials, political officials, or civil servants, and after being appointed they cannot be removed except by a two-thirds vote of the Senate.

⁶ Adopted 22 October 1984.

⁷ Adopted 1968, and occasionally amended.

- ▶ *Network access* is addressed: "An energy network system licensee must allow other licensees to utilize his energy network system...in accordance with the criteria and conditions stipulated by the Commission." When a refusal is made, any applicant has the right to appeal to the Commission.
- ▶ *Potential market power* is constrained: "A licensee who is an energy producer, energy bulk seller, bulk purchaser or energy retailer, having market power, shall be prohibited...to establish conditions in an unfair manner that directly or indirectly compel other energy business operators or energy consumers to have constrained opportunities to utilize or provide services."
- ▶ The law establishes a *Power Pool* and a board to set the charges and market rules under which it will operate.

Interestingly, the draft law does not appear to have any specific provisions regarding international power trade, or the rights/obligations of regulators with respect to power trade.

➤ **Vietnam.** The electricity law is only an internal draft, so these comments may not reflect the final document. International power trade is not specifically mentioned, however competition is encouraged in the draft law in ways that will reduce barriers to power trade. Specifically, "the State shall...ensure that competition between electric utilities in their production and sales is lawful, transparent, and on an equal footing." To this end,

- ▶ *Large-capacity end-users* and *distribution utilities* have the right to buy electricity by contract directly from generating utilities.
- ▶ *Transmission utilities* and *distribution utilities* are obligated to provide transmission service to support these contracts unless "the Ministry of Industry certifies that such transmission utilities have used up all their capacity and are thus unable to transmit more loads.
- ▶ Each *generation utility* is to be allowed to manage no more than 15 percent of capacity on the national power system. This constraint will help increase competition so long as each generation utility is truly an independent operator.
- ▶ *Tariffs* are to be developed on a more transparent basis. "The Government shall specify the method and formula for electric power tariff establishment, standards and procedures for evaluating and approving the electric power tariff."

All of these steps are positive, and will help to promote power trade. One potential barrier is the continued dominant role of the State in managing the electricity sector. For example,

- ▶ Although the utilities and the Ministry review suggested tariffs, ultimately "the Government shall make a decision." No subsequent appeal process is defined.
- ▶ International cooperation is defined as a State management responsibility.

- ▶ Regulation is assigned to the Ministry of Industry, but its functions are advisory; the ultimate decision on regulatory matters rests with the State.

In each of these cases, the decision-making framework for State management is not specified. Such non-transparent, centralized decision-making may preclude some forms of international trade.

Power Purchase Agreements

We were not able to obtain all of the power purchase agreements controlling cross-border power sales within the region. We did review a number of these agreements, including several agreements involving existing power trade between Lao PDR and Thailand (i.e., Theun-Hinboun and Houay Ho hydroelectric projects). We also reviewed a model PPA developed by EGAT as the basis for negotiation with IPP bidders for a major capacity solicitation.

These documents – prepared as early as 1994 and as late as 1999 – are all unique. Except for the EGAT "Model PPA," each was developed as an *ad hoc* response to a specific project. This lack of a standard can be viewed as an opportunity: If the EGP were to put forth a set of key clauses which it would like to incorporate in all subsequent PPAs in order to facilitate future power trade, perhaps these clauses could be added to all future agreements in the region.

While it is beyond the scope of this brief report to identify subtle legal differences between these contracts, we have noted a few examples of potential barriers to increased power trade:

- *Assignment of output.* As has been observed in previous reports, many PPAs do not permit output purchased under the agreement to be reassigned. This type of clause will, of course, limit the scope for future competition.

To illustrate, in the PPA between Theun-Hinboun Power Company and EdL, "the Buyer [EdL] may not assign any of its rights or obligations under this Agreement to any other person." On the other hand, THPC may assign "all of its right, title, and interest in this Agreement" to the lenders. This disparity highlights the financial justification for such restrictive Assignment clauses. When seeking non-recourse project finance, the lender sets the terms, and is partial to a less flexible form if it reduces his risk.

The EGAT "Model PPA" uses language, which is less restrictive. It says, in part,

Neither Party shall assign any of its rights or obligations, in part or in whole, under this agreement without the prior written consent of the other Party, provided that such consent shall not be withheld or delayed if the Party wishing to assign has demonstrated to the reasonable satisfaction of the other Party that the proposed assignee has adequate legal, financial and technical status and ability to observe and perform the obligations of the assignor under this Agreement.

It is unlikely that lenders would accept more flexibility than proposed in this clause.

- *Sale and Purchase of Electricity.* Several PPAs limit the flexibility of both parties with clauses like the following:

The Generator shall deliver to the Connection Point and sell to EGAT, and EGAT shall purchase from the Generator, on the terms and conditions of this Agreement, the Net Output of each contracted Generating Unit.

Such a clause would obviously limit the development of competition, since buyers and sellers are not free to substitute energy sources when alternatives are available on more favorable terms.

- *Pricing.* Although commercial approaches including pricing are discussed in other parts of this report, it should be noted here that the pricing terms in many existing PPAs would be inappropriate for a competitive power market. Many are based on a one-part kWh tariff, without separate treatment of the capacity component of generation, or the cost of wheeling power. Absent these distinctions, it is not possible to dispatch a unit based on marginal cost, or to distinguish location-related delivery costs.
- *Other possible conflicts.* Not surprisingly, many of the terms and conditions in these power purchase agreements were *intentionally* written to be inflexible – e.g., the governing law, the arbitrator, the currency of exchange, etc. It is unlikely that a common standard could be adopted across the region. It might be possible, however, to agree upon a standard *applicable only in pre-defined circumstances where the output of the plant is sold under the umbrella of the Greater Mekong Sub-region power exchange.* Each country would specify terms and conditions applicable to the plant's expected primary buyer; for short-term power exchanges, however, this second set of terms – common for all such sales throughout the region – would apply.

Regulatory Systems

Regulatory independence can remove barriers to power trade. An independent regulator assures all participants in the sector that rules and regulations are fair and equitably applied. The function is important when there are only a few players (e.g., IPPs selling to an integrated utility); it assumes even greater importance when there are many participants (e.g., under full wholesale competition) so that market power does not give any participant an unfair advantage.

While every power sector has a regulator within the government, currently none of the GMS states have a truly independent regulator. The most common model is oversight by the government agency in charge of electric power, with review of major decisions by higher political authorities. This model can be found in Cambodia and Myanmar. Lao PDR has a more elaborate regulatory structure, but review authority ultimately resides in the Prime Minister's Office.

Thailand also has a multi-tiered regulatory process, but again ultimate authority rests with the National Energy Policy Council, a Cabinet-level body charged with recommending national energy policy to the Cabinet and setting rules and conditions for prescribing energy prices.

Yunnan Province describes its regulator as independent within the scope of its authority, but that agency – the State and Provincial Planning Committee – is a political body whose authority goes far beyond electric sector oversight.

As summarized in Table 3, at least two countries already have defined plans for an independent regulator:

- In Cambodia, the Electricity Authority of Cambodia (EAC) will operate as an independent regulator after the Electricity Act – just approved by the National Assembly – is enacted. (See the foregoing section on Laws and Regulation for a discussion of the Act.) The EAC's main functions will be to review and approve electricity prices, license utilities, and review utility investment plans, finances, and performance. The law grants the EAC considerable independence, but experience in other countries has shown that a very strong government policy commitment is needed to protect such an agency from informal political manipulation.
- In Thailand, legislation now circulating in draft (the Energy Industry Act) calls for the creation of a National Energy Regulatory Commission (NERC), politically appointed, but otherwise entirely independent. NERC will be charged with regulating the entire energy industry including, among other tasks, licensing business operations, regulating tariffs, and determining “measures to promote competition and prevent the abusive use of monopoly power.”

Table 3: Existing and Planned Regulators

	CURRENT REGULATOR	INDEPENDENT T?	PLANNED REGULATOR	INDEPENDENT T?
CAMBODIA	Ministry (MIME), GOC		Electricity Authority of Cambodia (EAC)	▶
LAO PDR	Ministry, PM's Office		? (under study)	
MYANMAR	Ministry (MEP), GOM		Ministry (MEP), GOM	
THAILAND	Nat. Energy Policy Council		Nat. Energy Regulator	▶
VIETNAM	Ministry (MOI), GOV		Ministry (MOI), GOV	
YUNNAN CN	State/Prov. Committees, Bureau of Prices		State/Prov. Committees, Bureau of Prices.	

Table 4 compares existing and planned laws and regulation in the GMS.

Table 4: Comparison of Laws and Regulation

Current Situation	Near-term Plan
Cambodia	
<ul style="list-style-type: none"> ▶ Electric Power is regulated by the GOC – Ministry of Industry, Mines and Energy ▶ The regulator is NOT independent, as the government must approve all trade and pricing ▶ Sector is bound by long-term PPAs 	<ul style="list-style-type: none"> ▶ Electricity Act (approved by the National Assembly in November 2000) will create an independent regulator – Electricity Authority of Cambodia (ECA) with broad licensing and tariff authority.
Lao PDR	
<ul style="list-style-type: none"> ▶ A chain of regulation within GOL; ultimately regulated by Prime Minister's Office ▶ GOL is committed to cross-border trade, but any producer must receive a concession from GOL under conditions set forth in the Electricity Law. ▶ Sector is bound by long-term contracts between EDL and IPPs. 	<ul style="list-style-type: none"> ▶ Independent regulator does not exist; under study.
Myanmar	
<ul style="list-style-type: none"> ▶ Electric Power is regulated by the GOM – Department of Electric Power under policies of the Ministry of Electric Power (MEP). ▶ MEP has the right to review and adjust tariffs ▶ No PPAs or other contractual agreements currently exist. 	<ul style="list-style-type: none"> ▶ No reform planned.
Thailand	
<ul style="list-style-type: none"> ▶ A chain of regulation within GOT; National Energy Policy Office (NEPO) regulates, but 	<ul style="list-style-type: none"> ▶ Independent National Energy Regulatory Commission to be established with broad oversight

Current Situation	Near-term Plan
<p>investment and tariff setting reviewed by National Energy Policy Council (NEPC), a political body.</p> <ul style="list-style-type: none"> ▶ EGAT and PEA have authority to trade power without GOT approval (see EGAT Act) 	<p>powers for the entire energy sector.</p> <ul style="list-style-type: none"> ▶ No one who serving as a government or political party official can be a commissioner.
Vietnam	
<ul style="list-style-type: none"> ▶ GOV regulation of all sector decisions. 	<ul style="list-style-type: none"> ▶ We understand that the Ministry of Industry will serve as the regulator, but its "regulatory" function is to provide information needed for government review and approval.
Yunnan Province (China)	
<ul style="list-style-type: none"> ▶ Electric sector governed by GOC Electric Power Law ▶ State and Provincial Planning Committee approve investments and pricing ▶ State Economic and Trade Committee must authorize cross-border power trade; domestic trade does not require GOC approval. 	<ul style="list-style-type: none"> ▶ Yunnan Provincial Economic and Trade Committee to assume some YEPG functions (e.g., planning).

Network Access and Network Ownership

Open access to the transmission network ("wheeling") is an essential component of any truly competitive electricity market. Within a country, assuring that access is non-discriminatory requires the separation of production from transmission. At the international level, in order to build a truly competitive electricity market, any buyer must be able to obtain supplies from any producer within the interconnected system. Electricity transmission becomes a service to be purchased rather than the controlling link in the chain of supply.

Currently transmission access is government policy only in the Lao PDR. The electricity law explicitly provides that,

...The owner of an electricity transmission line...does not have the right to refuse unless the transmission of electricity over that transmission line cannot be technically guaranteed. [Article 28, unofficial translation]

...All electricity production sources must send electricity into the National Electricity Transmission Grid unless...there is yet no national transmission grid. [Article 29, unofficial translation]

The transmission of electricity through the Lao PDR is also permitted with GOL agreement; however this transit must be conducted via the National Electricity Transmission Grid unless the grid is unable to supply that need. In that case, the countries can be authorized to construct their own line subject to the following conditions: (i) must limit environmental impact, (ii) must pay fees to traverse Lao territory, and (iii) must permit Lao use of the line if required.

The draft Energy Industry Act for Thailand includes the following commitments to open access:

An energy network system licensee must allow other licensees to utilize his energy network system...in accordance with the criteria and conditions stipulated by the Commission. Refusals to allow access to others or to connect with another energy network system are permitted only for cases specified...by the Commission. [Section 73]

When a refusal to allow access to an energy network system occurs, the person who has been refused has the right to submit a petition to the Commission, in accordance with the consideration criteria and procedures established by the Commission. [Section 75]

An energy network system licensee must disclose the contracts, agreements, conditions and tariffs for the utilization or connection to his energy network system according to the procedures of the Commission. [Section 77]

It should be noted, however, that these open access policies make no reference to cross-border power trade.

As mentioned previously, draft legislation being discussed in Vietnam would also guarantee wheeling rights between generating utilities and large users except in cases where capacity is unavailable. To be meaningful, these rights must be committed long-term, without the possibility of being rescinded due to subsequent network capacity constraints.

Of course none of these types of open access is possible without transparent and fair transmission pricing. (See Section 3.4)

Table 5 summarizes plans within the GMS sub-region with respect to guaranteeing legal access to the network. Several countries (Lao PDR, Thailand, Vietnam) intend to permit IPP sales direct to bulk consumers. Most countries have also expressed commitment to cross-

border sales and transiting power between other countries. (Of the laws we reviewed, only Lao PDR specified these commitments.) Lao PDR was also unique in requiring access to privately built lines. As previously noted, laws in the region often include phrases such as "with the approval of the Government," leaving the reader unclear as to whether access will be as "open" as the survey responses suggest.

Network Ownership

There is anecdotal evidence to support the claim of many IPP developers that they have had problems in identifying which agency is responsible for constructing and operating transmission assets within some countries. To cite just one example, there was a great deal of uncertainty surrounding the transmission lines required in the Nam Ngum basin to accommodate two IPP developments. It was not clear (i) who would make the investment (i.e., whether to use public or private funds) and (ii) who would make critical planning decisions in order to avoid duplication of investment and/or inefficient design.

If this experience is widespread, it could become a serious constraint to increasing power trade. Private developers need to have contracts in place for associated transmission facilities before they can proceed with a generation project. Whether transmission is to be developed by a public utility or the developer alone, unclear lines of authority will delay or prevent project implementation.

Interestingly, survey responses indicate that national power sector agencies do not perceive this problem. As shown in Table 5, each questionnaire categorically identified the agency currently in charge of transmission construction and ownership/management, as well as the agency which is expected to be in charge after power sector restructuring.

Table 5: Planned Transmission Access

	RESPONSIBLE AGENCY		OPEN ACCESS ("WHEELING") PLANNED			
	TODAY	FUTURE	IPP TO BULK USER?	FROM/TO ANOTHER COUNTRY ?	THROUGH TO 3 RD COUNTRY ?	VIA PRIV. IPP LINE?
CAMBODIA	No transmission	EDC		▶	▶	
LAO PDR	EdL	Lao Nat. Grid Co.	▶	▶	▶	▶
MYANMAR	MEPE	MEPE				
THAILAND	EGAT	Transco	▶	▶	▶	?
VIETNAM	EVN	Separate company?	▶	?	?	?
YUNNAN CN	YEPG	Separate company?	▶	▶	▶	

We can suggest some possible explanations for this apparent inconsistency. Laws and regulations might have been very clear about the traditional role of national power utilities with respect to transmission; these lines are probably less clear during the transition phases of restructuring. Experience from other countries suggests that utilities are unlikely to surrender traditional responsibilities unless regulations precisely limit their new role. Further, traditional utilities lack expertise in working with private developers; they would rather continue to design and construct systems as they have in the past. Thus, there is somewhat of a vacuum during the transition period. The survey indicates (Table 5) that five of the regional power sectors are developing a new institution to address transmission in the restructured sector.

Compatibility of Commercial Principles

Many potential barriers to power trade relate to the commercial terms of trade. In this section we consider five specific issues:

- (1) Pricing principles
- (2) Generation tariffs
- (3) Transmission tariffs
- (4) Taxes and royalties
- (5) Commercial and accounting policies.

Pricing Principles

Only two of the GMS states – Thailand and Yunnan Province – currently have a formal methodology for calculating tariffs, although these methods are not defined in law or regulation. While all countries consider that their tariffs are related to cost structure, only Thailand considers its methods transparent. Further, none of the countries calculate separate transmission and generation tariffs. (Cambodia and Lao PDR feel that these are not yet relevant to their systems.)

Standardized methods are under consideration in other countries, but have not yet been selected. Cambodia and Thailand expect to develop formal methodologies to be defined in regulation after the establishment of their independent regulators; Yunnan, too, expects that tariff-setting methods will be defined in regulation. While price-setting mechanisms and procedures have yet to be codified, several countries are defining basic principles on which tariffs are to be based. Table 6 summarizes these principles for Thailand and Cambodia [based on draft legislation].

All countries now have some form of *administered price* regulation. Thailand has concrete plans to migrate to a power pool based on *market-clearing prices*. Yunnan expects to move toward a *revenue cap* regulatory regime, but administered prices and price controls are still expected to play a role. Cambodia also expects a new pricing regime to be developed after EAC is in place (ca mid-2001), but there is yet no indication of what type of price regulation might be adopted.

Table 6: Illustrative Basic Tariff Principles**Cambodia** (from an earlier draft of the new Electricity Act)

- ▶ Tariffs should reflect the cost of supply by time of day, season, and type of service for each class of customer;
- ▶ Performance-based tariffs may be used if it is in the interests of the licensees and consumers;
- ▶ Financial returns of licensees will be allowed to increase if costs are reduced, provided quality of service is maintained;
- ▶ Lower rates can be set for poor residential and rural customers;
- ▶ Consumers will be protected against monopolistic prices;
- ▶ Economic efficiency will be encouraged by using marginal costs to structure tariff rates;
- ▶ Account will be taken of costs of supply to each class of customer, subject to any subsidies provided by the Government.

Thailand (from the draft Electricity Industry Act)

- ▶ Fairness is shared by both service consumers and service providers;
- ▶ There shall be no unjust discrimination against service consumers or those who wish to use the services;
- ▶ The tariffs should reflect the actual costs of efficient business operation;
- ▶ Guidelines on the tariff determination must be inductive to efficiency improvement in the business operation;
- ▶ The tariffs should be at the levels of enhancing efficient and adequate energy supply to satisfy the domestic demand;
- ▶ Consideration should be given on assistance to the underprivileged or decentralization of development to provincial areas;
- ▶ There must be an announcement and dissemination of the accountable and transparent tariffs;
- ▶ The calculation from which the tariffs are derived must be explicit.

Generation Tariffs

Generation tariffs, including those established in power purchase agreements, should be constructed as two-part tariffs, with both (i) a *capacity payment* based on fixed costs of generation plant, and (ii) an *energy payment* reflecting the actual variable cost of production. The former payment is made based upon unit availability, while the latter payment is based on the actual incremental cost of production. A two-part tariff provides proper signals to generators and allows for the most efficient dispatch of available units.

Table 7 reports the current and planned use of two-part generation tariffs in the GMS states. In general, they have been adopted for sales to large end-users. Cambodia and Thailand use two-part tariffs for purchases from IPPs. Lao PDR also reports the use of two-part generation tariffs for these purchases, but we were not able to verify this fact based on PPAs which we

reviewed. Based on the survey, most countries anticipate applying two-part generation tariffs in the future.

If two-part generation tariffs are available, it is possible to dispatch units based on variable cost of production. If GMS countries were to agree on the method for calculating tariffs,⁸ pooled dispatch might be possible at some date in the future.⁹ Without this sort of agreement, only a pricing system based on bidding would be viable since bidding would not require publication and verification of detailed cost information between countries.

Table 7: Current Use of Two-Part Generation Tariffs

	CURRENT		PLANNED	
	IPPS TO GRID	GRID TO LG.USERS	IPPS TO GRID	GRID TO LG.USERS
CAMBODIA	▶	▶	▶	▶
LAO PDR			▶	▶
MYANMAR	N/a	▶	▶	▶
THAILAND	▶	▶	▶	▶
VIETNAM	?	?	?	?
YUNNAN CN		▶	?	▶

Transmission Tariffs

Transmission tariffs play a key role in supporting power trade by de-coupling generation from the cost of power delivery, and by eliminating the uncertainty often associated with transmission costs.

According to our survey, none of the GMS states now prepare separate transmission tariffs. Typically, for IPP and cross-border sales, estimates of transmission costs are bundled with generation capacity and energy into a single one-part kWh charge.

⁸ For example, some formula based on principles of marginal cost, avoided cost, or profit-sharing.

⁹ Different types of pools are possible. In a *tight pool* such as found in some areas of the United States, a common dispatch center controls operations across the entire region. In a *loose pool* such as found in southern Africa, each country maintains its own dispatch center, but a common information center supplies each member with real time information about supply and demand as well as transmission constraints in order to facilitate more efficient bilateral trade.

Each country needs to develop separate transmission tariffs which can provide a firm basis for expansion of the network. This process is not easy. Setting tariffs for transmission is a complex pricing issue to which no one has thus far come up with a fully satisfactory answer. These tariffs need to provide (i) location components to reflect regional differences in cost, (ii) incentives to encourage investment where capacity is becoming constrained, (iii) pricing signals for optimum location of generation facilities. Generally, these tariffs must also be based on demand rather than energy charges to mirror the fixed-cost nature of transmission investments.

Since transmission is a natural monopoly, it must be regulated to assure that pricing signals are correct for both buyers and sellers. International buyers must, in particular, be assured that transmission pricing is transparent and that all users are treated equally.

Taxes and Royalties

Uncertainty about taxes and royalties to be charged for cross-border trade is itself a potential barrier to trade.

The survey revealed that the GMS states do not have clear laws or standard practices with respect to export taxes or export royalties. Cambodia, Myanmar, and Yunnan said that there is now no policy. Thailand noted that no VAT or royalty is applied, but officials were not aware of any written policy. Lao PDR reported that EdL is charged an export tax equal to 20% of revenue, but we have heard that this percentage may vary, and that exceptions such as tax holidays are also possible. Also, no policy apparently exists regarding royalties, as they are calculated differently for each project.

It appears as if each country sees these charges as tools to be used in negotiations rather than as fixed policies.

Commercial and Accounting Policies

Table 8 summarizes planned pricing principles by country. Most countries have plans to improve their basic pricing methods to facilitate power trade, but the need for independent regulation does not appear to have been accepted throughout the region. Export tax policy is also an issue that has yet not been standardized according to the documents which we have reviewed.

Beyond these basic pricing issues, certain practical matters of costing and accounting complicate power trade. For example, a uniform system of accounts based on generally accepted accounting standards, would greatly increase confidence of trading partners, particularly if international accounting and auditing standards were applied. Currently, however, some countries are still struggling to develop a consistent domestic system of accounts, and there has yet been no attempt to standardize accounting practices across the region.

Further, each country has its own currency, and several of these are not convertible on international markets. Potential power sellers (e.g., generating utilities) and purchasers (e.g.,

distribution utilities) have different levels of financial strength, and countries themselves are perceived to have different levels of risk by financial markets. These differences make it difficult to evaluate the "true" cost of power from a neighboring country.

Table 8: Planned Pricing Principles

	SEPARATE TRANSMISSION TARIFFS ?	2-PART GENERATION TARIFFS?	INDEPENDENT TARIFF REVIEW? TAX/ ROYALTY EXPORT POLICY?
CAMBODIA	▶	▶	▶
LAO PDR	▶	▶	Vary by project
MYANMAR		▶	
THAILAND	▶	▶	▶ No tax, no royalty
VIETNAM	?	?	
YUNNAN CN	▶	▶	

It has been argued that these differences operate as barriers to setting up any kind of a regional power market based on common methodologies which track investment and operating costs by generating plant. At least two alternatives are worthy of consideration

- *A power market based entirely on bidding.* This approach eliminates the need to identify or verify the costs of others. It is up to the buyer to bid and the seller to offer within a competitive market. Under this pricing approach, transmission capacity for cross-border trade might be developed jointly, but paid for as an "adder" on all cross-border power trade.
- *A loose power pool.* The pool would exist to provide information to all potential traders as to supply and demand throughout the region, and network availability. Actual trade would be implemented via bilateral contract between individual countries.

Appendix: Documents Reviewed

Cambodia

- ▶ *Cambodia Power Sector Strategy*, World Bank Report No. 19382-KH, June 1999.

Lao PDR

- ▶ Electricity Law (1997)
- ▶ Various policy documents, including: (1) sector organization chart, (2) sector reform objectives, (3) export policy, (4) legal and regulatory framework, (5) Articles of State Enterprise for EdL.
- ▶ Various PPAs between EdL, EGAT, and IPPs.

Myanmar

- ▶ Electricity Law (1984)
- ▶ Various supporting documents, including: (1) sector organization chart, (2) system installed capacity, (3) system transmission lines, (4) current tariffs.

Thailand

- ▶ EGAT Act (1968, as revised)
- ▶ Energy Industry Act (draft)
- ▶ National Energy Policy Council Act (1992)
- ▶ *Model Power Purchase Agreement and Request for Proposals for the years 1996-2002*, EGAT, 1994 Solicitation.
- ▶ *Thailand Power Pool and Electricity Supply Industry Reform Study*, Arthur Andersen Consortium, multiple volumes, March 2000. (Also, comments on report by Independent Review Committee.)
- ▶ Various supporting documents, including (1) sector organization chart, (2) system generation (EGAT, IPP, SPP), (3) GMS power purchase plans, (4) current tariffs, (5) automatic adjustment clause formula, (6) tariff-setting process.

Vietnam

- ▶ Electricity Law (draft under revision)
- ▶ *Fueling Vietnam's Development*, World Bank Report No. 19037-VN, December 1998.

Other Documents

- ▶ Asia Pacific Energy Research Center studies, including: (1) *Electricity Sector Deregulation*, (2) *Power Interconnection*, (3) *APEC Energy Pricing Practices*; March 2000.
- ▶ *Governance and Regulation of Power Pools and System Operators – An International Comparison*; James Barker, Jr., Bernard Tenenbaum, and Fiona Woolf. A study funded by the World Bank, September 1997.
- ▶ *Power Trade for the Greater Mekong Sub-Region*, World Bank Report No. 19067-EAP, March 1999.
- ▶ Various notes from the World Bank series *Public Policy for the Private Sector*, including: (1) *International Power Interconnections* (Note 42, March 1995), (2) *Developing International Power Markets in East Asia* (Note 143, May 1998), (3) *Promoting Regional Power Trade – The Southern African Power Pool* (Note 145, June 1998), 4) *International Power Trade – The Nordic Pool* (Note 171, January 1999).

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	Technology Assessment of Clean Coal Technologies for China Volume I—Electric Power Production	05/01	011/01
	Technology Assessment of Clean Coal Technologies for China Volume II—Environmental and Energy Efficiency Improvements for Non-power Uses of Coal	05/01	011/01
	Technology Assessment of Clean Coal Technologies for China Volume III—Environmental Compliance in the Energy Sector: Methodological Approach and Least-Cost Strategies	12/01	011/01
Thailand	DSM in Thailand: A Case Study	10/00	008/00
	Development of a Regional Power Market in the Greater Mekong Sub-Region (GMS)	12/01	015/01
Vietnam	Options for Renewable Energy in Vietnam	07/00	001/00
GLOBAL			
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	Mini-Grid Design Manual	09/00	007/00
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	Subsidies and Sustainable Rural Energy Services: Can we Create Incentives Without Distorting Markets?	12/00	010/00
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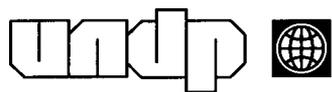
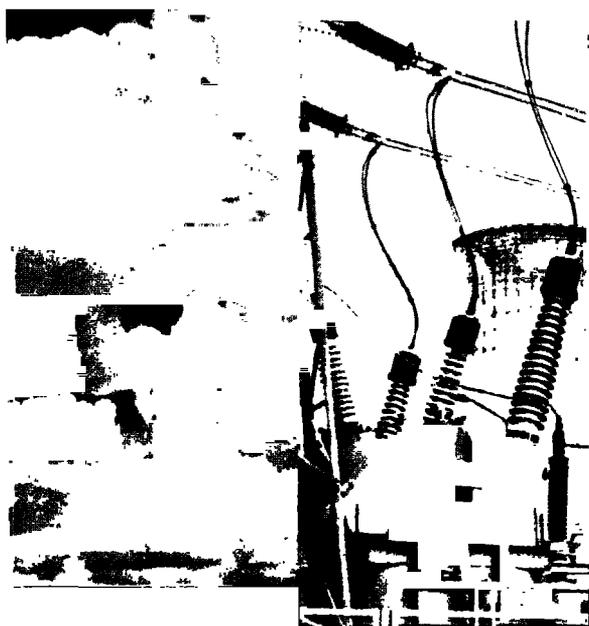
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