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**The World Commission on Dams**  
5th floor, Hycastle House  
58 Loop Street  
PO Box 16002  
Vlaeberg  
Cape Town  
SOUTH AFRICA

**Telephone:** +27 21 426 4000  
**Fax:** +27 21 426 0036

**Website:** <http://www.dams.org>

**Email:** [info@dams.org](mailto:info@dams.org)

## **Michael Bristol**

Asian Development Bank, Philippines

*The Developing Power Sector In the Greater Mekong Sub-Region*

### **THE DEVELOPING POWER SECTOR IN THE GMS REGION**

#### **A. Introduction**

1. Changes in electricity demand, availability of fuel and finance, and changes in technology, have led to a review of future developments of the power sector in the Greater Mekong subregion (GMS)<sup>1</sup> which have been reflected in a Policy Statement endorsed by the GMS Ministerial meeting held in Manila in January 2000. ADB has been a modest, but significant participant in power development in the region in the past decade, and was instrumental in preparing the draft Policy Statement. The Policy Statement is based on various principles and assumptions about the operation and ownership of the industry that are acceptable to each country, an assessment of the power sector today and the direction it should develop, and some steps and pre-requisites for moving in the agreed direction.

#### **B. Power Sector Update**

##### **1. Power Markets**

2. The Thai power market constitutes the major market in the subregion. During the economic crisis, the demand for power in this market fell but growth has now resumed, with the demand for energy reported to have returned to its pre-crisis level.

3. Viet Nam has experienced steady growth in power demand since the early 1980s. Although growth is slowing at present, partly because of a downturn in foreign direct investment, it is expected that the demand for power will increase significantly in the medium term. Viet Nam is, therefore, expected to be a potential power importer in the medium term although its richness in natural resources, including recent discoveries of offshore natural gas, may change the energy balance and alter this situation.

4. By comparison, Lao PDR has only a small, but growing, domestic power market. Cambodia has only recently emerged from a long period of internal disorder and its efforts to date have been concentrated mainly on the re-establishment of the national electricity utility, Electricité du Cambodge (EdC) and the reconstruction of its network in Phnom Penh and other important towns. Suppressed demand will be released in Phnom Penh but Cambodia is not expected to present significant power import or export opportunities in the near future in comparison with its neighbors. Likewise, Myanmar is not expected to be a significant power importer in the short-to-medium term.

5. The power grid in Yunnan Province in China PRC is presently being expanded to meet industrial and other demands, particularly around the city of Kunming. There are interconnections from the Yunnan system to load centers in Guandong Province in Eastern China but, Yunnan Province is assumed to be an exporter of power to the GMS.

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<sup>1</sup> GMS consists of Cambodia, China (Yunnan Province), Lao PDR, Myanmar, Thailand, and United Nations.

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6. In summary, Thailand is expected to maintain its plans to import power in the medium term and it is possible that Viet Nam could also be an importer in the medium term. Lao PDR and Yunnan Province in China PRC and, later, Cambodia will be power exporters.

## **2. Generation**

7. Thailand has relatively modern and efficient generating plant on its system, reflecting recent years of rapid expansion and its access to natural gas as a fuel for power generation. Plant types include hydropower, pumped storage, lignite-fired steam plant and CCGT plant. A feature of the Thai power system is its advanced program of private sector participation in generation. The country has a relatively high level of electrification and a mature power market with a growing industrial base.

8. Development of Vietnamese power generation has been constrained by various factors, including restrictions on the availability of foreign direct investment in recent years. The power system is the subject of considerable study at present with various options being investigated, including possible private sector participation in hydropower development and other forms of generation.<sup>2</sup>

9. Generation in Lao PDR is predominantly by hydropower which has been one of the country's major export earners. Its bilateral power sale and exchange agreement with Thailand is of long standing and there is an agreement between the parties to increase power exports significantly in the medium term. Private sector involvement in hydropower has been a policy of the Lao government but the support of international agencies has proven to be a necessary ingredient to date.

10. Yunnan Province in China PRC plans to develop the Jinghong hydropower scheme in the southern part of the province for export to Thailand. Generation in Cambodia is mainly confined to the city of Phnom Penh and provincial towns and is by a mixture of plant, mainly diesel fuelled. One IPP installation is operating in Phnom Penh. Myanmar generates its power in the main from a mixture of hydropower and gas turbine plant.

## **3. Transmission**

11. The highest transmission voltage in service in the subregion is 500 kV. It is in use in Thailand, China PRC and Viet Nam. Lower voltages are in use in each country but they are not of interest for major power transfers. The only existing international connections of any significance are those between Thailand and Lao PDR.

12. Current expectations are that bilateral connections between Thailand and Lao PDR will be expanded in the medium term as and when further hydropower prospects are developed in Laos. Connections from the Jinghong scheme, and/or between Lao PDR and Viet Nam for power export from Laos may be developed, subject to the satisfactory conclusion of project development and power sale agreements between the parties.

## **C. Factors Influencing Future Development**

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<sup>2</sup> Including an ADB study of financing options for Se San 3 Hydropower Project.

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## 1. Disparities between the Countries

13. There are considerable disparities between the countries in terms of the scale, condition, and operating environment of their power utilities and other relevant institutions. Furthermore, the countries have significantly different prospects in terms of power sector development and trade. This implies the need for a mix of policies in the GMS countries, ranging from more or less full reliance on private sector generation in Thailand, with its developed environment, to the need for ongoing governmental and international development agency support in other cases. Accordingly, a common policy statement for all GMS countries has been possible only up to a certain point and in respect of certain general principles.

## 2. The Role of the Private Sector

14. Not all GMS governments accept the need for, or desirability of, private sector involvement in their power sectors.<sup>3</sup> However, in some instances, notably Viet Nam, and Cambodia, there is a growing acceptance that the capital requirements to expand their systems to keep pace with demand are far beyond the resources of both governments and the Multilateral or Bilateral Financial Institutions who have traditionally provided the necessary finance. Under these circumstances, there are no sources of funds other than the private sector in one of its forms.

15. Private sector involvement on reasonable terms requires suitable long-term credit ratings for the power utilities concerned if quasi-governmental involvement is to be avoided. This in turn implies the existence of utilities with sound financial structures, profitable operations and good billing and collection performance, combined with a suitable enabling environment with its characteristic features of predictability and stability. Not all GMS governments, however, are willing or able to bring about such conditions at the present time.

16. Many governments are struggling to find the optimum framework for private hydropower development. There is a growing recognition that the regulatory framework for hydropower cannot be the same as for thermal projects. Also, most hydropower concessions have been directly negotiated – a reflection of the conflict between bankability through guaranteed sales on the one hand and the perceived efficiencies of a free market on the other. These factors are significant in the context of trade between GMS countries because of the abundance of hydropower resources in the sub-region.<sup>4</sup>

17. To a greater or lesser extent, power utilities are still viewed in the GMS and elsewhere as quasi-government entities that have a strategic role to play in the social and economic development of their countries.

## 3. Impact of Technological Development

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<sup>3</sup> There are exceptions. Thailand, for example, is in favor and Lao PDR and China PRC have active private sector participation.

<sup>4</sup> A World Bank-financed study is presently underway in Viet Nam to identify a suitable mechanism for private sector participation in hydropower development.

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18. Technological development is already having two significant effects on power trade, firstly by reducing the ceiling price for hydropower generation i.e. making hydropower less competitive and, secondly, by reducing the need for power transfer and transmission grid augmentation.

19. Significant improvements in the fuel efficiency of combined cycle gas turbine (CCGT) generating plant, the ready availability of natural gas and difficulties in securing new transmission rights-of-way have combined with the desire of private sector participants for projects with short construction times. This has led to significant changes in the likely configuration and location of generating units. It is now much more likely that generating units will be of the order of 100-200 MW in size and be sited close to load centers than a decade ago, when the trend was for bigger units, typically of 500-600 MW, in central locations. This is having an impact on transmission system development worldwide and instances can be cited of reduced or deferred plans for grid augmentation as a result. It may be mentioned that major transmission grid operators share a growing concern about the prospect of stranded assets and the impact of their write-down.

20. The influence of these factors has already been felt in Lao PDR through the introduction of CCGT generating plants in Thailand. It can also be expected to affect the prospects of power export to the Myanmar and Viet Nam markets, in view of the development of natural gas reserves in Myanmar and their possible availability in Viet Nam. To the extent that reliance on private sector participation is increased, the impact of these factors will be amplified.

#### **4. Power Trading**

21. In the early 1990s, the long term vision of the power sector was of a series of relatively large (500-1000MW) hydro projects located in Yunnan, Lao PDR and Viet Nam, serving national needs but with considerable export of power, to the predominate market in Thailand i.e. multilateral power trading was seen as inevitable. Under this scenario, an interconnected regional transmission grid would offer the advantages of reduced reserve capacity and an increased regional load factor due to a staggering of peak demand in the different time zones. It was therefore felt that steps should be taken soon to plan an integrated system, and commence construction of certain strategic components, including establishing a National Transmission Company of Lao, which, being centrally located would be a key player. This scenario and requirement may yet develop, but probably at a slower rate.

22. In the light of this background, bilateral trade with governmental support is considered the most likely and appropriate mechanism for power exchange in the region for some years yet, rather than multilateral or free market trade.<sup>5</sup> Of importance, this implies that a widely interconnected network, with its accompanying power market, will be formed only in the long term.

#### **D. Proposed Subregional Initiatives by the MFIs**

23. On the basis that subregional initiatives and support should focus on achievable short to medium term goals, whilst at the same time promoting longer term awareness-building of new concepts, the following has been considered.

##### **1. Long-Term Power System Master Planning**

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<sup>5</sup> A variation may comprise bilateral arrangements with sale into a pool in Thailand.

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24. Even if trade is largely bilateral in nature, it is still considered appropriate to have available a long-term subregional power system master plan. The object of the plan would be to identify the least cost long-term power system development options, based on such supporting studies as are presently available.

25. Should the future introduction of a power pool and electricity market be contemplated, it will need to be accompanied by a heavy investment in modern system control facilities. Where such markets have been introduced in other countries, a considerable amount of time has been needed for this purpose. It is therefore important that plans be made for such steps at an appropriate time so that preparations are well in hand when needed.

## **2. Technical Coordination**

26. Support will be needed to help ensure that new transmission facilities are technically compatible with long-term interconnection in mind. Matters to be covered will include but not necessarily be limited to:

- system design parameters
- connection issues
- protection and communication matters
- system control and generation dispatch
- the handling of system emergencies
- dispute resolution

Such matters are commonly included in a document such as a Grid Code.

## **3. Institutional Support and Financial Restructuring of Power Utilities**

27. The need remains for financial strengthening of some of the power utilities in the subregion if private sector participation is to have any chance of success on reasonable terms. This includes the need for tariff reform in several cases and debt restructuring in others in order to put all the utilities onto a sound financial footing and keep them there. ADB support is tied even more strongly than in the past to these objectives.

28. ADB recognizes strongly the need for a commercially viable environment in the power sector. This implies the need for a commercial approach to the power sector on the part of all the GMS governments and their power utilities. Commercial in this context means, amongst other things, a realistic retail pricing environment for electricity and for fuel and a sound operating financial structure on the part of the utilities. There is also an ongoing need for the utilities to ensure their financial health by, amongst other things, setting appropriate tariffs and ensuring a high level of collections in order to be able to maintain a reasonable level of self-financing.

29. ADB has been providing assistance to promote general improvements in accounting systems throughout the subregion.<sup>6</sup> In addition to these specific points, the overlying need remains for competent management and reasonable autonomy in all utilities and Bank support and loan covenants should continue to be directed towards this goal.

#### **4. Improving the Enabling Environment**

30. Since the establishment of a sound enabling environment for private sector participation remains an important sector objective, it will be appropriate for ADB to provide ongoing support in several areas over time, matched to the developments taking place. Areas for assistance include the improvement of legal and regulatory frameworks<sup>7</sup> conducive to private sector participation and improvement in the handling of IPPs. The following best practice features are emphasized in this assistance:

- a. Energy sector policies formulated to create a stable framework for power sector development and to facilitate competition through options such as power sector reform and restructuring, and the separation of generation and transmission functions. Best practice features include:
  - (i) Established legislative framework
  - (ii) Clear energy sector policies and framework for policy-making
  - (iii) Separation between regulator and utility
  - (iv) Separation between generation and natural monopoly transmission functions
  - (v) Competitive market in electricity generation and energy supply
  - (vi) Complementary development of the transmission grid, including through private investment
  - (vii) Environmental and other public policy objectives incorporated and made transparent to electricity sector participants.
  
- b. Reforms which lead to electricity utilities functioning as commercially viable entities under a regulatory framework which ensures fair treatment between the utility and private sector participants. Best practice features include:
  - (i) A commercial environment with performance targets set for the publicly owned utilities, commercial tariff policies in place and a competitive and stable market in fuel supply
  - (ii) Laws enabling foreign ownership and control of IPPs
  
- c. Simplification of the approvals process for IPP projects and the underlying regulatory framework in order to reduce uncertainties and delays. Best practice features include:
  - (i) Consistent central and local government regulations and approval processes
  - (ii) Clear, published and transparent approvals process
  - (iii) Independent regulation

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<sup>6</sup> ADB funded technical assistance to Viet Nam, “Commercialization of Power Companies.”

<sup>7</sup> ADB funded technical assistance to Viet Nam, “Improvement of the Power Sector Regulatory Framework.”

31. In addition, the processes relating to IPPs themselves have been earmarked for improvement, especially in relation to tender/bid processes and evaluation criteria, power purchase agreements and associated tariff structures and, thirdly, financing and its implications.

## **5. ADB and Large dams**

32. In the large dams debate, ADB's position has been to give financial support when requested to do so by member governments within the GMS and elsewhere to projects which have been shown to be the least-cost means of providing power under the prevailing circumstances. ADB has neither a pro- or anti dams policy, but will judge each application for financial support on its merits. The Bank has moved with the times, although not as fast as some groups would like, in introducing increasingly stringent and wide ranging policies on the acceptable impacts of projects on the environment, resettlement, indigenous people, and distribution of costs and benefits amongst the various stakeholders.

33. As for implementing these policies, ADB is constantly trying to improve its record. ADB has never been a direct equity holder, much less the majority equity holder, in a hydropower project and is therefore not a party to construction contracts. Under these circumstances, and due to its relationship with governments (as laid down in its charter), ADB can not directly enforce its policy; it can only educate, advise, (or even withhold funding) and otherwise persuade project owners to abide by their commitments. In some cases, a balance has to be struck between the benefits gained from implementation of a less than perfect project compared to the benefits foregone by not proceeding with or canceling funding for a project due to less than full compliance with policy covenants. Nevertheless, ADB has some influence over government activity which it uses to improve project design and implementation. There is a growing realization that some deficiencies in social aspects such as resettlement might be remedied if ADB had a role in the project that continued into the initial operating phase. In order to evaluate its past performance, ADB recently concluded a study of the social and environment impacts of four dams which it had helped to finance<sup>8</sup> and ADB is conducting a study of broader scope<sup>9</sup> which is complimentary to the WCD's own, and is being reported on separately.

## **E. Conclusions**

34. The countries of the GMS are diverse in their size, level of development, and acceptance of private sector participation. Nevertheless, they recognize the benefits to be gained from regional cooperation and a Policy Statement for Regional Power Trade has recently been endorsed by the Ministers of the GMS countries.

35. Private sector participation is essential to bridge the funding gap between the total financial resources required to meet energy demand and the funds available from the government and MFIs. Necessary participation of the private sector will bring with it the generating and market arrangements that it prefers (albeit with strong controls and directives from National Regulators). Furthermore, increasing availability of natural gas and improvements in efficiency of CCGT plants of modest size located near load centers, may delay development of the regions hydropower potential, and the need for a regional power grid with multilateral power trading. Nevertheless, a

<sup>8</sup> Special Evaluation Study on the Social and Environmental Impacts of Selected Hydropower Projects.

<sup>9</sup> Regional Technical Assistance: Large Dams and Recommended Practices.

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master plan should be developed so that short-term bilateral connections do not prejudice optimal future expansion.

36. ADB has an open mind on large dam developments and will continue to consider, on their merits, each request by its member governments for financial support, based on its policies for economic, social and environmental standards. ADB uses its best efforts to ensure that governments carry out their commitments under loan covenants but has no power to intervene directly.

37. ADB is putting increasing emphasis on enhancing the management skills and institutional capacity of the regional utilities so that appropriate decisions on project planning are made by its borrowers.