



Technical Assistance Report

Project Number: 39002
January 2006

Technical Assistance Developing the Greater Mekong Subregion Energy Sector Strategy

Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
GMS	–	Greater Mekong Subregion
TA	–	technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Targeting Classification	–	General intervention
Sector	–	Energy
Subsector	–	Energy sector development
Themes	–	Regional cooperation, sustainable economic growth, private sector development
Subthemes	–	Promoting economic efficiency and enabling markets; policy, institutional, legal, regulatory reforms; public-private partnerships

NOTE

In this report, "\$" refers to US dollars.

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I. INTRODUCTION

1. Within the span of a decade, the countries of the Greater Mekong Subregion (GMS) have seen, through the GMS Program,¹ the emergence of a more integrated regional market. Until recently, the GMS Program had focused on improving physical connectivity through a network of transport, power, and telecommunications facilities.² The new regional strategy for GMS 2004–2006 identifies the need to transform this historical focus on connectivity into an integrated approach to economic development, i.e., working together to reduce poverty and improve the quality of life of the poor.

2. Recognizing that access to modern energy services is critical for economic development and for improving the quality of life of the poor, the GMS countries have requested the Asian Development Bank (ADB) to initiate a comprehensive study to define a regional strategy until 2020 and identify the scope for future regional cooperation in all energy subsectors. Given the importance of the energy sector, the GMS Regional Cooperation Strategy and Program Update for 2006–2008 included this technical assistance (TA)³ in the work program. The TA design and monitoring framework is in Appendix 1.

3. The GMS countries have created several regional institutional arrangements. The focus of regional cooperation in the energy sector, one of the nine priority areas of the GMS Program, has so far been on power trading and interconnection of transmission networks, coordinated through the GMS Electric Power Forum. An Intergovernment Agreement on Regional Power Trade was signed by all six member countries at the first GMS Summit in 2002 and a Regional Power Trading Coordination Committee is now functioning. In the last meeting of the GMS Electric Forum, its coverage was expanded so as to include all energy subsectors under the upgraded GMS Energy Sector Forum.

4. The TA aims to develop a regional strategy to expand cooperation among the GMS countries. A regional strategy for the energy sector is considered necessary for four reasons. First, the geography of energy supply options does not correspond to national boundaries. Often, there are opportunities to reduce overall energy costs by exploring supply options beyond borders. Second, individual markets are at times too small to justify large-scale investments needed to achieve scale efficiency. Third, cross-border energy supply provides diversification of sources and this is vital for energy security. Finally, the energy sector has environmental implications beyond national boundaries, which need to be integrated in energy planning to achieve sustainable development.

II. ISSUES

5. As one of the major GMS activities in the early 1990s, a study on subregional energy sector cooperation was completed in 1995.⁴ The study provided an overview of energy sector developments, examined the scope of cooperation, and recommended specific projects and project concepts to promote subregional cooperation in the sector. A number of priority projects identified under the study, especially the provision of regional power generation and

¹ The GMS Program covers Cambodia, People's Republic of China (Yunnan Province and Guangxi Zhuang Autonomous Region), Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam.

² The Asian Development Bank (ADB) has provided three investment loans and seven technical assistance (TA) projects to promote regional cooperation in the energy sector.

³ The TA first appeared in the *ADB Business Opportunities* on 26 August 2005.

⁴ ADB.1995. *Subregional Energy Sector Study for the Greater Mekong Subregion*. Manila (Final Report).

transmission facilities, have been successfully implemented through financial and technical assistance provided by the governments of the GMS countries, ADB, and other development partners. This work needs to be updated now for several reasons. First, the region faces a number of new challenges. Second, vibrant economic growth and greater integration has opened up many opportunities for the energy sector. Finally, the original study did not prepare a regional least-cost plan which is considered essential to ensure efficiency gains from regional energy trade and investments. Some of the salient challenges and opportunities are identified in paragraphs 6–9.

6. Energy Demand, Access, and Quality of Supplies. The gross domestic product of the region more than doubled between 1992 and 2002 as a result of impressive growth in economic activities, trade, and investment. Such rapid growth is fueling a significant rise in energy demand. A major challenge facing the GMS countries such as People's Republic of China, Thailand, and Viet Nam is keeping up with the expected demand growth due to rapid industrialization, and maintaining competitiveness through reasonable and reliable energy supplies. Most energy forecasts at national levels see the demand for energy continue to rise between 7% per annum to 16% per annum, at rates much faster than that of economic activities in the next decade. Therefore, the medium-term regional energy strategy has to identify possible alternatives so that this rapidly rising demand does not become a barrier to economic development. Overall access to energy is also very uneven across the region. It is estimated that over 50 million people in the GMS lack access to electricity at present. These aggregate numbers, though large, do not fully reflect the rural energy challenges individual countries or local and isolated communities face. In Cambodia, for example, over 70% of the rural population do not have access to modern forms of energy and Cambodia's per capita electricity consumption is less than 10% of power consumption in Thailand. Finally, the quality of energy supplies remains low and unpredictable in large parts of the region. Poor quality of energy infrastructure imposes not only additional costs on the existing industrial production but also affects business environment negatively. Improving access and overall quality of energy infrastructure and services is thus an important challenge facing the region.

7. Energy Security. In the medium term, the region has to grapple with multiple concerns surrounding energy security. The region's rapid economic growth is fueling motorization and a vehicle boom in the region. As a result, the region's oil dependence is expected to increase dramatically in the next two decades. Poor production prospects, weak demand management, insignificant penetration rates for alternative energy sources, and high global oil prices make the region insecure and vulnerable. In addition, there are no institutional mechanisms to deal with energy disruptions arising out of emergency or supply shocks.⁵ The proposed strategy has to work on several tracks to enhance regional energy security.⁶ First, the GMS is well endowed with energy resources, but their geographic distribution is uneven. There are large areas with unexplored potential for oil and gas resources within the GMS and so an integrated approach beyond national boundaries to diversify energy base and supply options would enhance the security of energy supply. Second, the region is heavily dependent on imported fossil fuels; for example, Thailand, one of the largest energy consumers in the region has to import 50% of domestic energy needs whereas Cambodia and Lao People's Democratic Republic import all commercial fuels. A program to diversify the oil resource base within and outside the region can help reduce vulnerability. Third, the cost of energy supply interruptions can have serious consequences on the growth and poverty reduction agenda. The proposed strategy will have to

⁵ Except the commercial stock requirements.

⁶ The concept of energy security has been broadened to include external (geopolitical), internal (operation and maintenance), and temporal aspects of ensuring energy supplies at affordable prices.

explore alternative institutional arrangements to deal with an energy emergency. Fourth, energy security is an issue from the point of view of system reliability and efficiency, and cross-border energy infrastructure connections will help reduce its costs. Finally, in addition to physical security, affordability is an important aspect of energy security and so gains from efficiency through regional connectivity of infrastructure will be necessary. Given the low access rates and the importance of energy in promoting growth and poverty reduction, energy security is a regional public good and thus needs to be addressed comprehensively under the proposed regional energy strategy.

8. **Expanding Private Participation.** The GMS' various energy subsectors are dominated by public ownership at present though there have been some regional private projects such as Nam Theun 2. The huge energy investments needed for the region in the medium term would require much more active private sector participation to mobilize financial and other resources, and in mitigating risks, promoting competition, and providing incentives for efficiency. It is possible to mobilize local finance through innovative public-private partnerships. At present, countries are pursuing private sector participation in the energy sector at the national level. Most countries have a number of independent power projects; however, the overall requirements are much higher than what is readily feasible at country level. A strategy at the regional level to attract private participation in strengthening energy trade and infrastructure connectivity will help reduce overall risks. Greater private participation in the energy sector is needed not only at the project level, but also to enhance overall use efficiency. Energy efficiency is low even at the sector level: energy losses in the power systems are high in some parts of the region. Cost recovery and reform programs need to be examined to identify structural and other barriers to energy efficiency. Even at the consumer level, energy efficiency needs to be given adequate attention. The overall policy environment for the energy sector needs to be aligned to achieve energy efficiency through a medium-term action plan that encourages an expanded role for the private sector.

9. **Energy and Environment.** With the growing energy demand, environmental sustainability issues will need to be integrated in the design at the planning stage to reduce the environmental costs of energy projects. The regional strategy can enhance efficiency of use of traditional sources such as forests and biomass, given the high dependence on these resources in some parts of the region. Second, the region is rich in hydropower potential and future development of this resource needs to integrate possible environmental costs in the plan itself. This is important because as the experience of the Nam Theun 2 project has shown, cross-border environmental externalities need to be integrated in the planning and design of large energy projects. There is also a need to enhance the institutional and policy framework to integrate environmental and social costs in energy projects at the regional level.

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

10. The TA aims to develop a regional strategy to expand cooperation among the member countries to meet rising energy needs and help develop a robust regional energy market. The TA will (i) help articulate the region's clear vision about GMS energy cooperation, (ii) prepare an action plan to meet the emerging energy challenges during 2006–2020, (iii) identify priority investment projects including private sector financing to enhance energy trade and investment in the region, and (iv) prepare an outline of institutional and other arrangements to enhance regional energy security.

11. The outputs of the study will include inception report, demand forecasts, resource assessments, economic and financial costing, environmental and social analyses, a regional least-cost energy plan, energy databases, an operating framework for regional collaboration, and a final regional energy strategy with a detailed action plan. The action plan will include profiles of regional and other projects, and institutional and other reforms to enhance private sector participation in energy trade and investments. Key outputs may be translated into selected GMS languages, depending on demand and need.

B. Methodology and Key Activities

12. The TA⁷ will be implemented in a fully participatory way and will include national and regional workshops and consultations with energy experts, government officials, civil society organizations, private sector, other aid agencies, and regional groups. It will use existing institutional arrangements such as the GMS Energy Sector Forum for consultation processes. The TA will maintain a website and other means of communications to generate wide ownership of the process of strategy preparation. It will build on the existing internal and external studies, national energy plans, and ongoing work by development partners and regional groups, including work being undertaken within ADB on the GMS power plan. The TA will examine how integrated energy networks have been developed in regional cooperation programs elsewhere (Africa, European Union, Latin America, etc.), and assess the possibility of adapting them to the GMS context. Key activities include (i) making a comprehensive assessment of past and current regional energy situation to identify energy challenges by country and by subsector, (ii) identifying constraints to greater energy cooperation and an action plan to reduce those barriers, (iii) constructing demand forecasts and a least-cost energy model for alternative scenarios, (iv) preparing priority projects and identifying resource needs, (v) analyzing regional energy vulnerability and preparing an action plan for enhanced regional energy security, (vi) identifying priority policy and institutional arrangements to promote cooperation, and (vii) identifying key barriers to greater private sector participation to regional energy markets and an action plan to address these barriers. The TA will identify series of actions at national and regional levels to make integrated regional energy market a reality in the GMS.

13. The TA will address equity and crosscutting issues, externalities such as increased pollution (e.g., acid rains and greenhouse gases), social equity (e.g., job creation, relocation of populations), deforestation, desertification, and natural disasters. It will assess the distribution of costs and benefits of energy cooperation and particularly of cross-border interconnections.

C. Cost and Financing

14. The total cost of the TA is estimated at \$1,000,000 equivalent. ADB will finance \$900,000 on a grant basis from its TA funding program. The GMS countries will contribute \$100,000 equivalent in kind by providing office staff and counterpart staff time. Detailed cost estimates are provided in Appendix 2.

D. Implementation Arrangements

15. ADB will be the Executing Agency for the TA. The Office of the Director General, Mekong Department will take the lead in implementing the TA in collaboration and consultation with GMS countries. A steering committee under the aegis of the GMS Energy Sector Forum

⁷ The TA will cover all energy subsectors, i.e., coal, power, oil, gas, and renewable energy.

will be established to facilitate high level consultation with GMS governments. A small TA secretariat will be established in the Office of the Director General, Mekong Department to ensure smooth coordination of activities. The GMS countries will identify a focal point and a counterpart agency to liaise directly with the TA secretariat and consultants. The counterpart agency will provide the relevant national data and information for the study and facilitate consultation with national stakeholders and policy makers in each country to ensure that the TA findings and recommendations are relevant to the respective countries.

16. The TA will finance international and domestic consulting services, which will be provided by a consulting firm and a team of individual consultants. The consulting firm will be selected through simplified technical proposals. Individual consultants will be engaged either as individuals or through agencies to supplement the work of the firm (peer review, additional sector expertise, etc.). Total international consulting inputs are estimated to be 28 person-months and total domestic consulting inputs are estimated to be 80 person-months.

17. The consultants will be selected in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements acceptable to ADB for selecting and engaging domestic consultants. The TA will be implemented over approximately 18 months, from January 2006 to June 2007. The outline terms of reference for the consultants are in Appendix 3. A suggested outline of the final report is in Appendix 4.

18. There will be a planning meeting in February 2006 where all stakeholders will be invited. The first draft report containing the proposed strategy for GMS energy cooperation will be submitted to the GMS countries in July 2006. It will be discussed at a workshop of senior officials of GMS countries in September 2006, before submission and endorsement by high-level government authorities at the GMS Energy Sector Forum in December 2006. The final strategy will be published in the early part of 2007.

IV. THE PRESIDENT'S DECISION

19. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$900,000 on a grant basis for Developing the Greater Mekong Subregion Energy Sector Strategy, and hereby reports this action to the Board.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
Impact Enhanced economic cooperation in the energy sector among GMS countries in environmentally sustainable and socially inclusive manner to foster economic growth	Cross-border energy trading among GMS countries increased by 10% during 2006–2020 Cross-border investments in energy infrastructure among GMS countries increased by 10% during 2006–2020	GMS trade data GMS cross-border investment data	Assumption <ul style="list-style-type: none"> • GMS countries implement the energy sector cooperation strategy developed under the regional TA. Risk <ul style="list-style-type: none"> • Political and macroeconomic stability of GMS countries.
Outcome A comprehensive strategy to expand GMS energy sector cooperation with targeted policy interventions and investments is adopted by GMS countries	A GMS energy sector cooperation strategy adopted by GMS countries by December 2006 Priority policy interventions and targeted interventions agreed upon by GMS countries by December 2007	Proceedings of GMS Energy Sector Forum for 2006 Proceedings of GMS Energy Sector Forum for 2007	Assumption <ul style="list-style-type: none"> • GMS countries accept the findings and recommendations.
Outputs GMS energy strategy	Submission of the draft report by July 2006 Submission of final draft report to GMS Energy Sector Forum by December 2006 Printed GMS energy strategy by January 2007	Timely submission and peer review of the report Adoption of report by GMS countries	Assumptions <ul style="list-style-type: none"> • Sense of regional ownership exists. • GMS countries provide timely and quality feedback on the draft reports.
Activities with Milestones <ol style="list-style-type: none"> 1. Establish demand supply balance for each country and each energy subsector. 2. Establish resource base and estimate economic and financial costs of energy sources from these resources. 3. Prepare a regional least-cost energy plan and identify different scenarios for regional energy cooperation in the context of institutional, economic, political, and physical barriers. 4. Hold stakeholder consultations throughout preparation of GMS strategy. 5. Identify key institutional and policy barriers to regional energy trading and propose strategies to overcome the barriers. 6. Prepare an action plan for integrating the energy sector for the GMS including (i) institutional and policy reforms at national and regional levels to remove barriers to enhancing energy sector cooperation and trading, (ii) key regulatory aspects for regional energy markets, (iii) private sector risk perceptions and risk mitigating strategies including financial options, and (iv) project concepts and detailed profiles for priority investment projects in different energy subsectors that are critical for initiating and demonstrating the benefits of regional energy markets. 			Inputs <ul style="list-style-type: none"> • 28 person-months of international consultants and 80 person-months of domestic consultants. • \$900,000 of ADB TA funds and in-kind contribution from GMS countries estimated at \$100,000.

ADB = Asian Development Bank, GMS = Greater Mekong Subregion, TA = technical assistance.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Total Cost
A. Asian Development Bank (ADB) Financing^a	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants	500.0
ii. Domestic Consultants	75.0
b. International and Local Travel	50.0
c. Resource Persons	25.0
2. TA Secretariat at ADB	75.0
3. Seminars and Conferences	50.0
4. Report Preparation and Others	20.0
5. Contingencies	105.0
Subtotal (A)	900.0
B. Government Financing^b	
1. Office Accommodation	50.0
2. Remuneration and Per Diem of Counterpart Staff	50.0
Subtotal (B)	100.0
Total	1,000.0

^a Financed by ADB's technical assistance funding program.

^b Includes financing from Cambodia, People's Republic of China (Yunnan Province and Guangxi Zhuang Autonomous Region), Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam.

Source: ADB estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. Implementation of this regional technical assistance (TA) for the Greater Mekong Subregion (GMS) will require the services of a multidisciplinary team of energy sector experts, energy economists, energy planners and social and environmental experts. One firm and a team of experts will be engaged to provide the necessary services. In addition, a TA secretariat will be set up in the Mekong Department of the Asian Development Bank (ADB) to coordinate and support a consultative process designed for implementing the TA. The consulting firm will be selected on the basis of simplified technical proposals. Individual experts will be engaged by ADB either as individuals or through institutes/agencies to meet specific requirements (peer review, nonregional experience, etc.) and supplement specialized skills (financing, private sector project expertise, etc.) as the TA progresses.

2. The total international consulting inputs are estimated at 28 person-months (approximate person-months in parentheses): energy experts (12) to cover various subsectors such as oil, gas, power, and renewable energy; energy economists (4); energy planners (3); and private sector expert (1). The remaining 8 person-months will be used for peer review and quality control, policy and institutional analyses, environment and social analyses, depending on the overall need. Some flexibility is required given the complexity of the study. The total domestic consulting inputs are estimated at 80 person-months and will be provided by energy experts (12), energy economists (12), energy planners (10), private sector experts (2), environment experts (6), social experts (6), and the TA secretariat (32).

3. ADB will recruit the consultants in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for engaging domestic consultants.

A. Consulting Firm (international, 20 person-months; domestic, 48 person-months)

4. The responsibilities of the consulting firm will include the following:

- (i) Review all available data and national-level studies and other materials on energy sector plans and strategies.
- (ii) Prepare an analytical report on the current energy situation, articulating challenges the region faces and opportunities available, and summarizing available data and information.
- (iii) Suggest an appropriate methodology to carry out a least-cost regional plan for various scenarios, to underpin the regional energy strategy and action plan.
- (iv) Prepare for each country and the region the future energy demand for the period 2006–2020, broken down by subsector, end use, and energy form.
- (v) Prepare verified estimates of economic and financial costs of energy supply scenarios for each country, taking into account its respective energy resource endowment, technological progress, environmental protection policies, energy security requirement, and possibilities for cross-country energy trade.
- (vi) Examine and assess the social and environmental costs of different energy options and integrate such costs in the final energy plan.
- (vii) Establish regional least-cost supply scenarios with and without regional cooperation.
- (viii) Develop various scenarios for the sensitivity analysis comparing different levels of regional cooperation, energy demand and supply diversity, global uncertainty

with respect to oil prices, economic growth rates, macroeconomic and other constraints, etc.

- (ix) Identify physical, institutional, policy, and regulatory barriers to greater energy cooperation, estimate costs of these barriers through the least-cost regional energy plan and suggest an action plan to remove those barriers.
 - (x) Identify and justify the list of priority investment projects considering the results of economic, social, and environmental analyses.
 - (xi) Assess the energy efficiency potential at each level and build viable and feasible options into the energy plan.
 - (xii) Assess the renewable energy potential and build into the plan the role of renewables.
 - (xiii) Prepare institutional building measures to sustain the regional energy strategic framework and identify the role of national energy sector regulators in promoting regional energy trading, and propose regulatory mechanisms for regional energy markets.
5. As part of the preparation of the regional energy strategy, the firm will do the following:
- (i) Carry out a detailed assessment of the current status of private sector participation in investments in the energy sector in each member country.
 - (ii) Analyze the country as well as the regional perspective of private sector investment, and public-private partnership in energy development and cooperation in the GMS.
 - (iii) Evaluate from the private sector perspective the benefit/profit and potential risk in different energy subsectors and in different countries through consultation with potential private investors and private lenders to regional energy projects and suggest a mechanism to mitigate those risks.
 - (iv) Identify priority investment projects (i.e., at least five) in different energy subsectors that are critical for initiating and demonstrating the benefits of a regional energy strategy.
 - (v) Assess the technical, financial, and economic viability of those projects for the country and for the region, using a regional framework for economic analysis.

B. Individual Experts (international, 8 person-months)

6. **Energy Experts** (4 person-months). Given the scope and scale of the work, individual independent energy experts will be engaged either as individuals or through institutes/agencies (such as an international energy agency) to supplement the work of the firm. The experts are expected to be renowned and respected in the energy community and to be familiar with the developing country challenges. Their responsibilities will include the following:

- (i) Review the overall quality of the underlying energy planning model.
- (ii) Review assumptions regarding financial and economic costs.
- (iii) Check technical consistency.
- (iv) Provide ADB with feedback on an ongoing real-time basis.
- (v) Review the feasibility of various action plans.
- (vi) Bring nonregional experience and lessons from other regions such as Africa, European Union, and Latin America.
- (vii) Participate as resource speakers in the various consultative workshops depending on the need.

7. **Environment and Social Experts** (2 person-months). Given the local and international civil society interest in the region, it is important to engage environment and social experts to provide ADB with feedback on real-time basis. The experts should be well regarded by the civil society groups and have the respect of the regional governments. Familiarity with the region will be an added advantage. The responsibilities of the experts will include the following:

- (i) Serve as independent reviewers and facilitator, taking into account the emerging challenges.
- (ii) Provide ADB with feedback on real-time basis.
- (iii) Assist ADB and other development partners during the process of strategy preparation in building a consensus on the need to expand energy access across the region.
- (iv) Advise ADB and governments on integrating environmental and social externalities in planning and designing the strategy.

8. **Energy Economists** (2 person-months). The regional energy strategy has to actively pursue efficient options to expand energy access and security of supplies. Economists with expertise in energy and policy analyses will be engaged. Their responsibilities will include the following:

- (i) Participate in peer review of ongoing work on a real-time basis.
- (ii) Serve as resource persons in workshops (if needed).
- (iii) Conduct economic analysis of options.
- (iv) Provide feedback and advice to ADB and the governments on the strategy preparation.

C. TA Secretariat (domestic, 32 person-months)

9. The design of the TA adopts an open and participative approach in preparing the regional energy strategy. It is proposed that a small secretariat comprising domestic consultants be engaged to facilitate the consultative process throughout implementation. The consultants should be familiar with the energy sector. Their responsibilities will include the following:

- (i) Coordinate the TA implementation activities.
- (ii) Organize workshops and logistics.
- (iii) Document and disseminate materials including through the web.
- (iv) Help keep the consultative process effective and inclusive both within ADB and with external stakeholder groups such as governments, civil society organizations, the private sector, and development partners.

SUGGESTED OUTLINE OF REPORT

	Executive Summary
Chapter 1	Energy Situation: Current Opportunities and Challenges
Chapter 2	Energy Demand Forecasts
Chapter 3	Energy Supply Options
Chapter 4	The Way Forward 2006–2020
Chapter 5	Project Profiles
Chapter 6	Policy and Institutional Arrangements
Appendix 1	Detailed Energy Analyses
Appendix 2	Lessons from other Regions
Appendix 3	Reports of Workshops and Others