ADB

Technical Assistance Report

Project Number: 49208-001
Regional—Capacity Development Technical Assistance (R-CDTA)
November 2015

Integrated Resource Planning with Strategic Environmental Assessment for Sustainable Power Sector Development in the Greater Mekong Subregion

(Financed by Agence Française de Développement)

Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
AFD	–	Agence Française de Développement (French Development Agency)
DSM	–	demand-side management
GMS	–	Greater Mekong Subregion
GW	–	gigawatt
IRP	–	integrated resource planning
PDP	–	power development plan
RPTCC	–	Regional Power Trade Coordination Committee
SEA	–	strategic environmental assessment
TA	–	technical assistance

NOTE

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

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CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data — **Project Number:** 49208-001

Project Name	Integrated Resource Planning with Strategic Environmental Assessment for Sustainable Power Sector Development in the Greater Mekong Subregion	**Department /Division**	SERD/SEEN
Country	REG, CAM, PRC, LAO, MYA, THA, VIE	**Executing Agency**	Asian Development Bank

2. Sector	**Subsector(s)**	**Financing ($ million)**
✓ Energy	Energy sector development and institutional reform	1.10
	Total	**1.10**

3. Strategic Agenda	**Subcomponents**	**Climate Change Information**	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	Climate Change impact on the Project	Medium
Environmentally sustainable growth (ESG)	Environmental policy and legislation		
Regional integration (RCI)	Pillar 1: Cross-border infrastructure		

4. Drivers of Change	**Components**	**Gender Equity and Mainstreaming**	
Governance and capacity development (GCD)	Civil society participation Institutional development Organizational development	No gender elements (NGE)	✓
Knowledge solutions (KNS)	Knowledge sharing activities		
Partnerships (PAR)	Bilateral institutions (not client government) Official cofinancing		
Private sector development (PSD)	Conducive policy and institutional environment		

5. Poverty Targeting		**Location Impact**
Project directly targets poverty	No	Not Applicable

6. TA Category: B

7. Safeguard Categorization Not Applicable

8. Financing

Modality and Sources	**Amount ($ million)**
ADB	**0.00**
None	0.00
Cofinancing	**1.10**
Agence Francaise de Developpement	1.10
Counterpart	**0.10**
Government	0.10
Total	**1.20**

9. Effective Development Cooperation

Use of country procurement systems	No
Use of country public financial management systems	No

I. INTRODUCTION

1. Demand for energy across the Greater Mekong Subregion (GMS) has risen strongly, often at a rate outpacing economic growth in the region, and is expected to triple in the next 15–20 years.[1] In particular, the demand for electricity is growing rapidly, which will require a major expansion of the power system. According to the power development plans (PDPs) of the GMS countries, total regional installed capacity is projected to nearly double by 2025, mostly through increased hydro and coal-fired power generation capacity.[2] Therefore, associated environmental and social pressures are expected to intensify with increased climate change-related concerns.[3]

2. Balancing power sector development with environmental and social concerns can be addressed from the outset in the PDP planning process by internalizing environmental and social impacts through strategic environmental assessment (SEA)[4] and by examining all supply- and demand-side options to select an integrated set of least-cost resources that meet the forecasted electricity demand through integrated resource planning (IRP).[5] This technical assistance (TA) is designed to (i) enhance the capacity of GMS countries to use IRP and SEAs in their PDPs; and (ii) as necessary, and as validated through the IRP (a) improve regulations, policies, programs, and/or targets for renewable energy and energy efficiency; and (b) support cross-border interconnections. This will enable the GMS countries to achieve greater sustainability in power sector development.[6] This TA is aligned with the GMS regional cooperation operation business plan (2013–2014), the GMS economic cooperation program strategic framework (2012–2022), and the GMS regional investment framework 2013-2022.[7] The design and monitoring framework is in Appendix 1.[8]

II. ISSUES

3. The Asian Development Bank (ADB) has assisted the GMS countries since 2012 to apply SEA in the regional PDP through the regional TA.[9] In this TA, three main scenarios were used to compare impacts and benefits: the current PDP scenario, renewable energy scenario,

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[1] It includes Cambodia, Yunnan Province and Guangxi Zhuang Autonomous Region of the People's Republic of China, the Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam.

[2] ADB. 2010. *Technical Assistance for Ensuring Sustainability of Greater Mekong Subregion Regional Power Development*. Manila. The technical assistance (TA) projected an increase in total installed capacity from 120 gigawatts (GW) in 2012 to 210 GW by 2025. Coal-fired generation capacity will double to more than 50 GW. Gas-fired generation capacity will increase to 24 GW. Large hydropower plants will dominate the energy mix with approximately 111 GW. Renewable sources, such as solar and wind, would triple from the current level of 3.5 GW.

[3] The environmental cost of energy consumption in the GMS is estimated to be $320 billion, and carbon dioxide emissions are projected to increase by 1,177 million tons by 2025.

[4] According to the Organisation for Economic Co-operation and Development, SEA refers to a range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans, and programs, and evaluate how they link to economic and social considerations.

[5] Compared to the traditional least-cost planning that considers only limited supply options, IRP can achieve lower overall costs, more fuel savings, and less negative environmental and social impacts.

[6] The World Commission on Environment and Development in 1987 defined sustainability as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In this document, sustainability means economic, environmental, and social sustainability.

[7] ADB. 2012. *Regional Cooperation Operations Business Plan: Greater Mekong Subregion: 2013–2014.* Manila; ADB. 2011. *Greater Mekong Subregion Economic Cooperation Program Strategic Framework, 2012–2022.* Manila; ADB. 2014. *Greater Mekong Subregion Economic Cooperation Program: Regional Investment Framework Pipeline of Potential Projects (2013–2022).* Manila.

[8] The TA first appeared in the business opportunities section of ADB's website on 16 September 2015.

[9] The TA (footnote 2) was approved in 2010 in the amount of 1,000,000 euros ($1,350,000 equivalent at the time) from the Agence Française de Développement (AFD).

and energy efficiency scenario. These indicated the alternative renewable energy and energy efficiency scenarios resulted in greater benefits and enhanced the sustainability of the PDP. For sustainable power sector development, therefore, the study recommended that: (i) responsible agencies should ensure demand forecasts are accurate and realistic; (ii) governments should strengthen policies, programs, and targets to increase energy efficiency throughout the economy; and (iii) in future PDPs, governments should increase the contribution made by renewable energy in the power generation mix.

4. In parallel, ADB has assisted the GMS countries to understand and promote the potential of renewable energy and energy efficiency in the region through the regional TA.[10] This TA study revealed a significant potential for solar and wind power development and energy savings in the GMS; exploiting these will reduce the dependence of the GMS countries on imported fuels and enhance their development of green economies. Increased use of renewable energy can reduce dependence on imported fuels, lower carbon dioxide emissions, and increase options for distributed grid development in remote areas (in contrast to a centralized, large-scale power system). Improved energy efficiency and demand-side management (DSM) can lower power demand by shifting and flattening peak loads, thereby increasing energy savings. Despite the potential of renewable energy and energy efficiency, however, their use in the GMS has been limited, due in part to the limitations of the conventional PDP process, the technical features of the modeling software, and/or lack of pertinent data to incorporate technical characteristics of distributed generation and DSM measures. It is evident that it is easier to model a few larger power plants than to model hundreds of smaller, intermittent renewable energy power plants and/or energy-efficiency and DSM measures.

5. ADB has also helped the GMS countries to develop a common vision of integrated grid operations and regional power market development. The Regional Power Trade Coordination Committee (RPTCC) was established in 2002, and consists of representatives from the energy ministries and power utilities in each GMS country. An intergovernmental memorandum of understanding to establish the Regional Power Coordination Center was signed in 2012. Cross-border interconnections (i) enable the optimal use of generation sources through lower combined reserve requirements, and reduction of peak generation capacity; and (ii) improve electricity reliability by enabling more flexible responses to unpredictable events, such as power outages. Expansion of power availability through interconnections can also absorb additional intermittent generation, mitigating the risk of frequency and voltage control problems, and significantly lowering backup capacity costs. However, the benefits of increased cross-border interconnections are not fully evaluated and considered in the existing PDPs of GMS countries.

6. The outcomes of these TA projects indicate that the PDP process can be further improved by introducing IRP, which (i) evaluates all options of the supply side (conventional power systems, distributed and grid-connected renewable energy systems, and cross-border interconnection) and demand side (energy efficiency, DSM, and demand-side response measures); while (ii) applying the SEA to internalize environmental and social impacts. In this regard, IRP and SEA need to be fully integrated in a consultative PDP process, with relevant ministries, agencies, and other stakeholders involved in developing and evaluating alternatives.

7. While there is an advantage in applying various tools, such as IRP and SEA, in the PDP process, their application requires that a country's power sector have the following attributes: (i)

[10] ADB. 2010. *Technical Assistance for Promoting Renewable Energy, Clean Fuels, and Energy Efficiency in the Greater Mekong Subregion*. Manila.

a strong grid system that can accommodate an increased share of renewable energy; (ii) a modernized distribution system with smart-grid applications, such as demand-side aggregators, smart meters, and real-time pricing; (iii) a policy and regulatory environment that has environmental and social safeguards, national targets for renewable energy and energy efficiency, and climate change mitigation measures; and (iv) a clear road map to make tariffs cost-reflective and introduce a time-of-use tariff system. Among the GMS countries, Viet Nam is moving in this direction, especially through its power sector reforms, and was the only country able to apply the SEA in its PDP at the country level during implementation of the previous regional TA because of the extensive data requirements. Viet Nam has expressed the need to further enhance its SEA capacity.

8. ADB has been a lead development agency on GMS energy cooperation, and has supported key GMS regional studies on the energy sector,[11] regional interconnection,[12] a regional master plan,[13] and an energy sector assessment;[14] and institutional development for regional power trade since 1992.[15] Other development partners have also made significant contributions. The World Bank has financed several studies concerning interconnected power market infrastructure, such as regional studies on power trade strategy,[16] and GMS power trade market structure.[17] The Swedish International Development Cooperation Agency provided $5 million to cofinance ADB TA projects to support studies on the regional master plan for interconnection. Agence Française de Développement (AFD) provided cofinancing of $1,200,000 to develop the GMS energy sector strategy in 2006. Thereafter, AFD and ADB signed a cofinancing agreement on 14 December 2011, which committed €2,000,000 for SEA support separated into two phases. The proposed TA is the second phase of SEA assistance agreed to by ADB and AFD.

III. THE CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE

A. Impact and Outcome

9. The TA impact will be a more economically, environmentally, and socially sustainable power sector developed for greater mitigation of climate change impacts in the GMS. The TA outcome will be strengthened power sector planning in GMS countries using IRP and SEA.

B. Methodology and Key Activities

10. The TA will primarily focus on Viet Nam's PDP process by applying IRP with SEA, and capturing the progress and lessons from Viet Nam as a knowledge product to share with other countries to enhance their PDP processes. Some GMS countries have good experiences in tackling the technical and regulatory challenges associated with increasing renewable energy and implementing energy efficiency, which can be shared across the region.[18] The TA activities

[11] ADB. 1995. *Technical Assistance for Subregional Energy Sector Study for the Greater Mekong Subregion*. Manila.
[12] ADB. 2000. *Regional Indicative Master Plan on Power Interconnection in the Greater Mekong Subregion*. Manila (TA 5920).
[13] ADB. 2010. *Update of the GMS Regional Master Plan—Main Report*. Manila.
[14] ADB. 2013. *Assessment of the Greater Mekong Subregion Energy Sector Development: Progress, Prospects and Regional Investment Priorities*. Manila.
[15] ADB. 2012. *Greater Mekong Subregion Power Trade and Interconnection: 2 Decades of Cooperation*. Manila.
[16] World Bank. 1999. *Power Trade Strategy for the Greater Mekong Sub-Region*. Washington, DC
[17] World Bank. 2006. Greater Mekong Sub-region. *Options for the Structure of the GMS Power Trade Market: A First Overview of Issues and Possible Options.* Washington, DC (ESMAP Technical Paper 108/06).
[18] For example, Thailand expressed the need to examine the impact of integrating a higher share of renewable energy in transmission system development and operation, as envisaged by its PDP. The People's Republic of

will be closely coordinated with the GMS Environment Operations Center's Core Environment Program, which has provided assistance on the SEA for power development planning in Viet Nam.[19] The TA aims to deliver the following three outputs.

11. **Output 1: Viet Nam's integrated resource planning and strategic environmental assessment capacity enhanced.** This component will support updating or revising the Viet Nam PDP by applying IRP with SEA.[20] It will include (i) analyzing how to integrate substantially higher shares of intermittent renewable energy sources into the power generation mix while optimizing the predicting, balancing, and dispatching aspects; (ii) assessing how energy efficiency could be treated by power utilities as a virtual generation resource in the same way as new generating capacity, considering key energy-efficiency measures such as time-of-use tariffs, obligation of saving to the power utility, and/or aggregation and displacement of large consumers; (iii) evaluating the benefits of cross-border interconnection in terms of improved reliability, reduced reserve margin requirements, and optimized generation resources; (iv) validating policies, regulations, programs, and targets for renewable energy, energy efficiency, and cross-border interconnections under the IRP with SEA as appropriate, and developing recommendations to strengthen these; and (v) training key government officials for them to become proficient in applying IRP and SEA and building related institutional capacity.

12. **Output 2: Awareness among Greater Mekong Subregion countries increased.** This component will (i) identify (a) each GMS country's institutional capacity gaps and technical issues in applying IRP with SEA in their national PDP processes, and (b) training needs to enhance power sector planning and promote renewable energy, energy efficiency and cross-border interconnections in all GMS countries; (ii) tailor technical guidelines and briefing notes (in English and in selected national languages), focusing on the country–PDP process by applying IRP with SEA, and using Viet Nam's experience and assist other GMS countries in improving their PDP process using IRP with SEA;[21] (iii) organize country workshops and training programs on promoting renewable energy, energy efficiency, and cross-border interconnections, as well as improving PDP processes based on regional and international best practices for all GMS countries; and (iv) provide institution-to-institution or utility-to-utility twinning support to better understand institutional development challenges and facilitate the exchange of ideas between countries to improve the PDP process and promote renewable energy, energy efficiency, and cross-border interconnections.[22] Given the diverse level of power sector development in GMS countries and their readiness to apply IRP and SEA, capacity building for other GMS countries will be mainly focused on applying lessons from Viet Nam's application of the IRP and SEA.

China also expressed interest in sharing its experience in developing special grid codes for renewable energy integration with other GMS countries as needed.

[19] ADB. 2005. *Technical Assistance for the Core Environment Program and Biodiversity Conservation Corridors Initiative in the Greater Mekong Subregion.* Manila (TA 6289); ADB. 2011. *Technical Assistance for the Core Environment Program and Biodiversity Conservation Corridors Initiative in the Greater Mekong Subregion, Phase 2.* Manila (TA 7987).

[20] Viet Nam is using Strategist (developed by New Energy Associates) and Power Development Planning Assistant Tool II (developed by Tokyo Electric Power Company) for least-cost planning.

[21] Translation of the guidelines and briefing notes will be carried out selectively based on the needs of GMS countries as identified during country capacity building and training programs.

[22] Twinning is tied to specific outputs and outcomes and follows work programs agreed to between two institutions. This is a well-established, useful, and effective approach to institutional capacity development. It normally begins with profiling of possible recipient and expert utilities and/or institutions, evaluating their compatibility, and clearly defining their expectations in a practical work plan. The TA envisions three twinning programs and detailed plans will be developed in consultation with the countries during the TA implementation.

13. **Output 3: Knowledge products shared.** This component will support the design and packaging of various studies on selected topics and themes into quality knowledge products; studies will be chosen based on the needs and priorities of and challenges faced by GMS countries during TA implementation, and will include (i) Viet Nam's experiences in integrated PDP, and applying IRP with SEA; and (ii) country integrated PDP guidelines and briefing notes (in English and selected national languages). Quality assurance of knowledge products in local languages will be provided by the respective counterpart government and a national consultant.

C. Cost and Financing

14. The TA is estimated to cost $1,200,000, of which €1,000,000 (equivalent to $1,100,000) will be financed on a grant basis by AFD and will be administered by ADB.[23] The governments of GMS countries will provide in-kind contributions in the form of counterpart staff, office space, and support for local administration, knowledge generation, monitoring, and reporting services.

D. Implementation Arrangements

15. ADB will be the executing agency for the TA and the Southeast Asia Energy Division will oversee its implementation. Key counterparts to implement the TA are (i) each ministry or agency in the GMS responsible for the power sector, renewable energy, and energy efficiency; (ii) national electric power utilities; and (iii) environmental and social safeguard regulation agencies, which will be arranged and coordinated through RPTCC focal ministries and utilities in the GMS countries. RPTCC meetings, which have been organized twice per year under the GMS since 2002, will be used as the main platform for TA knowledge sharing and dissemination. The countries will each be responsible for providing necessary data and consultation in developing alternative PDP scenarios combining renewable energy, energy efficiency and cross-border interconnections, and identifying and bridging institutional capacity gaps.

16. The implementation of the TA will require 22 person-months of international consulting inputs and 27 person-months of national consulting inputs, which will be engaged by ADB in accordance with the Guidelines on the Use of Consultants (2013, as amended from time to time). Among these, 22 person-months of international consulting inputs and 21 person-months of national consulting inputs will be provided through an international consulting firm following the quality-and cost-based selection method (90% quality:10% cost). The remaining 6 person-months of national consulting services will be engaged individually (a manuscript editor based in Manila who will liaise with ADB's Department of External Relations). TA proceeds will be disbursed in line with the *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). The TA will be implemented from March 2016 to December 2018.

IV. THE PRESIDENT'S DECISION

17. The President, acting under the authority delegated by the Board, has approved ADB administering a portion of technical assistance not exceeding the equivalent of €1,000,000 to be financed on a grant basis by the Agence Française de Développement for Integrated Resource Planning with Strategic Environmental Assessment for Sustainable Power Sector Development in the Greater Mekong Subregion, and hereby reports this action to the Board.

[23] The remaining AFD funding contribution (para. 8) totals €1 million, or approximately $1,100,000 as of October 2015.

DESIGN AND MONITORING FRAMEWORK

Impacts of the TA is aligned with: A more economically, environmentally, and socially sustainable power sector developed for greater mitigation of climate change impacts in the Greater Mekong Subregion			
Results Chain	**Performance Indicators with Targets and Baselines**	**Data Sources and Reporting Mechanisms**	**Risks**
Outcome Power sector planning in GMS countries using IRP and SEA strengthened	By 2019: IRP and SEA used in the PDP in Viet Nam and partially in other GMS countries (2015 baseline: 0)	Government PDPs and energy sector reports	Governments lack understanding and fail to prioritize the undertaking of IRP and SEA to improve their PDP development process.
Outputs 1. Viet Nam's IRP and SEA capacity enhanced	By 2018: 1a. At least 20 key government officials become proficient in applying IRP and SEA (2015 baseline: 0)	1a. Government PDP and energy sector reports; studies of preliminary and final results; consultant inception, interim and final reports; consultant progress reports; and TA review missions	1–2. Lack of GMS member country cooperation to make timely and relevant contributions to the in-country data gathering and regional consultation processes.
2. Awareness among GMS countries increased	By 2018: 2a. At least one power sector planning related capacity-building event conducted for each GMS country (2015 baseline: 0) 2b. Three twinning cooperation activities undertaken between GMS countries (2015 baseline: 0)	2a–b. Studies of preliminary and final results; national workshops; consultant inception, interim and final reports; and consultant progress reports	
3. Knowledge products shared	By 2018: 3a. Knowledge product on Viet Nam's experiences with the integrated PDP approach (applying IRP with SEA) produced (2015 baseline: 0) 3b. Produce country integrated PDP guidelines and briefing notes produced	3a–b. Studies of preliminary and final results; national workshops; consultant inception, interim and final reports; and consultant progress reports	

	(in English and selected national languages) (2015 baseline: 0)		

Key Activities with Milestones

1. Viet Nam's IRP and SEA Capacity Enhanced

1.1 Apply IRP with SEA in the process of revising or updating Viet Nam's PDP, considering the potential of renewable energy, energy efficiency, and cross-border interconnections (March 2016–February 2017)

1.2 Validate policies, regulations, programs and targets on renewable energy, energy efficiency and cross-border interconnections under the IRP with SEA as appropriate, and develop recommendations to strengthen these (March 2016–December 2017)

1.3 Train key government officials from Viet Nam for them to become proficient in applying IRP and SEA and build related institutional capacity (July 2016–December 2017)

2. Awareness Among GMS Countries Increased

2.1 Identify each GMS country's institutional capacity gap and technical capacity in applying IRP with SEA in the national PDP process, and the country's training needs in improving PDP processes as well as promoting renewable energy, energy efficiency, and cross-border interconnections (March 2016–December 2016)

2.2 Tailor technical guidelines and briefing notes (in English and in selected national languages) on the country PDP process by applying IRP with SEA, and using Viet Nam's experiences and assist other GMS countries in improving their PDP process using IRP with SEA (January 2017–June 2017)

2.3 Organize country training programs and workshops as well as twinning activities to share knowledge on the GMS and international best practices in promoting renewable energy, energy efficiency, and cross-border interconnections, and improving the PDP process (January 2017–June 2018)

3. Knowledge Products Shared

3.1 Assess the needs and preferences of GMS countries for knowledge products in consultation with them and based on reviews of available resources from different organizations (March 2016–December 2016)

3.2 Select topics and themes (including the following), and package and design knowledge products in consultation with GMS countries; disclose publication through the ADB website (January 2017–December 2018)

(i) Viet Nam's experiences with the integrated PDP approach: applying IRP with SEA

(ii) Country integrated PDP technical guidelines and briefing notes (in English and selected national languages)

Inputs

Agence Française de Développement: $1,100,000

Governments: $100,000 (in-kind contributions)

Note:

The governments of the GMS countries will provide counterpart support through the existing RPTCC coordinators in the form of staff, office space and other in-kind contributions, such as local administration, knowledge generation, monitoring and reporting.

Assumptions for Partner Financing
Not applicable.

ADB = Asian Development Bank, IRP = integrated resource planning, GMS = Greater Mekong Subregion, PDP = power development plan, RPTCC = Regional Power Trade Coordination Committee, SEA = strategic environmental assessment, TA = technical assistance.
Source: ADB.

COST ESTIMATES AND FINANCING PLAN

($'000)

Item	Amount
Agence Française de Développement[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants (22 persons-months)	500.0
ii National consultant (27 persons-months)	114.0
b. International travel	120.0
c. Reports and translation	40.0
2. Workshops, training, meetings, seminars, and conferences[b]	150.0
3. Miscellaneous administration and support costs[c]	60.0
4. Contingencies	116.0
Total	**1,100.0**

Note: The technical assistance (TA) is estimated to cost $1,200,000, of which contributions from the Agence Française de Développement (AFD) are presented in the table above. The governments of the Greater Mekong Subregion countries will provide in-kind contributions in the form of counterpart salaries, office space, as well as support for local administration, knowledge generation, monitoring, and reporting services. The value of the GMS governments' in-kind contributions is estimated to account for 8.3% of the total TA cost.

[a] Administered by the Asian Development Bank (ADB). This amount also includes ADB's administration fee, audit costs, bank charges, and a provision for foreign exchange fluctuations (if any) to the extent that these items are not covered by the investment income earned on this grant, or any additional AFD funds.

[b] Twinning activities and country training workshops and meetings, as well as regional workshops for the Regional Power Trade Coordination Committee. It includes honorarium and travel costs for resource persons and facilitators, participants' travel costs, ADB staff travel costs acting as resource persons and/or speakers, as well as costs of representation during the events.

[c] These includes ADB's administration fee (5%), data support, communication, printing, and nontraining-related resource persons.

Source: ADB estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. Under the regional capacity development technical assistance (TA) on Integrated Resource Planning (IRP) with Strategic Environmental Assessment (SEA) for Sustainable Power Sector Development in the Greater Mekong Subregion (GMS), a combination of international consulting firm and individual national consultant will be engaged to deliver the TA outputs.

2. The consultants will be responsible for the quality and timely delivery of the assigned tasks, such as reports, procedures, and related knowledge development activities. A broad outline of the tasks and activities is provided below.

3. **Energy planner and team leader** (international, 6 person-months, intermittent; GMS country national, 18 persons-months, intermittent).The international energy planner and team leader should have extensive knowledge of and experience in power system planning, including IRP. The international consultant should also have strong project management, report writing, and organizational skills. The national consultants will be engaged from GMS countries and will assist the international specialists by collecting data, organizing workshops and training sessions, managing high-quality local language translation processes, communicating with the concerned ministries and institutes, and coordinating in-country project administration and implementation matters. The international consultant will do the following:

(i) based on a review of relevant existing studies, prepare a detailed project implementation plan, inception report, periodic progress reports, and final report;
(ii) in cooperation with the other international consultants, develop the integrated PDP approach using IRP and SEA, considering renewable energy, energy efficiency, and cross-border interconnections;
(iii) in cooperation with the other international consultants, apply IRP with SEA to revise or update Viet Nam's PDP;
(iv) introduce integrated energy modeling tools and PDP monitoring mechanisms in GMS countries, through Regional Power Trade Coordination Committee (RPTCC) meetings or country workshops and/or training programs;
(v) in cooperation with the other international consultants, design and conduct at least one country workshop and training program for each GMS country and prepare materials on how to enhance the PDP process by applying IRP and SEA and/or promoting renewable energy, energy efficiency, and cross-border interconnections using regional and international best practices in a country context for all GMS countries;
(vi) in consultation with GMS countries, and with the other international consultants, formulate and deliver three twinning programs among GMS countries in the areas of improving the sustainability of power sector development such as enhancing the PDP process with SEA, and promoting renewable energy, energy efficiency, and cross-border interconnections;
(vii) tailor guidelines and briefing notes (in English and in selected national languages) on the integrated PDP process using IRP with SEA in each GMS country and assist other GMS countries in improving their PDP process using IRP with SEA;
(viii) identify GMS and international best practices, which will be shared in a country context, and consolidate necessary knowledge products to be used for country training;
(ix) in cooperation with other international and national consultants, design and package various studies and reviews developed under the TA into quality

knowledge products; these will address selected topics and themes, based on the needs and preferences of GMS countries during project implementation, and will include (a) Viet Nam's experience with the integrated power development planning approach: applying IRP with SEA; and (b) country integrated PDP technical guidelines and briefing notes (in English and in selected national languages); and

(x) participate in regional and country meetings and workshops, and country consultation missions as required.

4. **Strategic environmental assessment specialist** (international, 3 person-months, intermittent; Viet Nam national, 3 person-months, intermittent). The international SEA specialist should have extensive knowledge of and experience in adopting SEA concepts in power sector development, and environment and climate change policies and regulations. The consultants will work closely with the international energy planner and team leader. The national consultant is required to understand the regulatory nuances in Viet Nam and must be able to conduct a thorough diagnostic study and recommend ways to strengthen SEA procedures and guidelines for the energy sector (including key parameters related to consultative procedures, screening, appraisal, and approval systems). The international consultant will do the following:

(i) in cooperation with the international energy planner and team leader, and in consultation with the government of Viet Nam and other stakeholders, review the latest Viet Nam PDP SEA and update it in the course of revising or updating Viet Nam's PDP;

(ii) analyze the greenhouse gas (GHG) emissions of the revised PDP and conduct a gap analysis to achieve the GHG emission voluntary target set by Viet Nam's National Green Growth Strategy and National Green Growth Action Plan, and develop policy instruments specific to the energy sector in Viet Nam;

(iii) identify GMS and international best practices, which will be shared in a country context, and consolidate necessary knowledge products to be used for country training;

(iv) work with the international energy planner and team leader to (a) develop an integrated PDP approach that uses IRP with SEA; (b) tailor guidelines and briefing notes on the integrated PDP process using IRP with SEA in each GMS country, in English and in selected national languages; (c) conduct country workshops and training programs; and (d) develop knowledge products; and

(v) provide inputs to the reports, and participate in regional and country meetings and workshops, and country consultation missions as required.

5. **Energy economist** (international, 3 person-months, intermittent). The international energy economist should have extensive knowledge of and experience in applying economic principles and conducting cost–benefit analyses of energy projects, and an advanced degree in energy economics, cost–benefit valuation, and energy policy. The consultant will work closely with the international energy planner and team leader. The consultant will do the following:

(i) review international experiences and best practices in quantifying the benefits and costs of supply and demand options, such as intermittency of renewable energy, various energy efficiency and demand-side management (DSM) measures, and cross-border interconnections as part of IRP;

(ii) develop a framework to integrate benefits and costs used in the conventional PDP with benefits and costs quantified from the IRP and SEA process, and apply it to improve Viet Nam's PDP process using IRP with SEA;

(iii) work with the international energy planner and team leader to (a) develop an integrated PDP approach using IRP with SEA, applying integrated cost–benefit analysis; (b) tailor guidelines and briefing notes on the integrated PDP process using IRP with SEA in each GMS country, in English and in selected national languages; (c) conduct country workshops and training programs; and (d) develop knowledge products; and

(iv) provide inputs to the reports, and participate in regional and country meetings and workshops, and country consultation missions as required.

6. **Renewable energy specialist (international, 3 person-months, intermittent).** The international renewable energy specialist should have extensive knowledge of and experience in power sector and renewable energy development. The expert will work closely with the international energy planner and team leader. The consultant will do the following:

(i) identify the renewable energy potential and project possible renewable energy sources for a long-term power generation expansion plan, in consultation with stakeholders in Viet Nam, and reflect these in revising or updating Viet Nam's PDP in cooperation with the international energy planner and team leader;

(ii) validate renewable energy policies, programs, and targets under the IRP with SEA as appropriate, and develop recommendations for key actions to be taken to strengthen those policies, programs, and targets in Viet Nam;

(iii) identify GMS and international best practices, which will be shared in a country context, and consolidate necessary knowledge products to be used for country training;

(iv) work with the international energy planner and team leader to (a) develop the integrated PDP approach using IRP with SEA, considering the potential of renewable energy resources; (b) tailor guidelines and briefing notes on the integrated PDP process using IRP with SEA in each GMS country, in English and in selected national languages; (c) conduct country workshops and training programs; and (d) develop knowledge products; and

(v) participate in regional and country meetings and workshops, and country consultation missions as required.

7. **Energy efficiency specialist** (international, 3 person-months, intermittent) The international energy efficiency specialist should have extensive knowledge of and experience in developing energy efficiency and DSM projects, and formulating and implementing various energy efficiency policy options. The consultant will work closely with the international energy planner and team leader. The consultant will do the following:

(i) identify the potential for energy efficiency and DSM, and develop projections of potential energy savings in the power sector in consultation with stakeholders in Viet Nam; reflect these in revising or updating Viet Nam's PDP in cooperation with the international energy planner and team leader;

(ii) validate policies, programs and targets on energy efficiency and DSM under the IRP with SEA as appropriate, and develop recommendations for key actions to be taken to strengthen those policies, programs, and targets in Viet Nam;

(iii) identify GMS and international best practices, which will be shared in a country context, and consolidate necessary knowledge products to be used for country training;

(iv) work with the international energy planner and team leader to (a) develop the integrated PDP approach using IRP with SEA, considering the potential of

energy efficiency resources; (b) tailor guidelines and briefing notes on the integrated PDP process using IRP with SEA in each GMS country, in English and in selected national languages; (c) conduct country workshops and training programs; and (d) develop knowledge products; and

(v) provide inputs to the reports, and participate in regional and country meetings and workshops, and country consultation missions as required.

8. **Transmission grid specialist** (international, 4 person-months, intermittent). The international transmission grid specialist should have extensive knowledge of and experience in (i) developing and operating a power transmission system; (ii) optimizing the prediction and dispatch of intermittent electricity supplies from various renewable energy power generation sources; and (iii) developing and operating cross-border interconnections. The consultant will work closely with the international energy planner and team leader, and will

(i) assess the experience of countries in receiving intermittent supplies from various renewable generation sources, and conduct case studies on GMS countries and countries from other regions, especially from integrated power markets with a high share of renewable energy;
(ii) present ways of overcoming technical barriers to increasing the share of renewable energy in the power generation mix, with consideration of how to apply this to the IRP in some GMS countries to increase energy diversification;
(iii) identify the potential for cross-border interconnection and estimate the benefits (in terms of improved reliability, reduced reserve margin requirements, and optimized generation sources), and reflect these in revising or updating Viet Nam's PDP in cooperation with the international energy planner and team leader;
(iv) validate policies, programs, and targets on cross-border interconnections under the IRP with SEA as appropriate, and develop recommendations for key actions to be taken to strengthen those policies, programs, and targets;
(v) identify GMS and international best practices, which will be shared in a country context, and consolidate necessary knowledge products to be used for country training;
(vi) work with the international energy planner and team leader to (a) develop an integrated PDP approach using IRP with SEA, considering the potential of cross-border interconnections; (b) tailor guidelines and briefing notes on the integrated PDP process using IRP with SEA in each GMS country, in English and in selected national languages; (c) conduct country workshops and training programs; and (d) develop knowledge products; and
(vii) provide inputs to the reports, and participate in regional and country meetings and workshops, and country consultation missions as required.

9. **Manuscript editor** (Philippine national, 6 person-months, intermittent). The manuscript editor should have at least a bachelor's degree, be fluent in English, and have at least 5 years of experience editing high-level knowledge products. The consultant should have a thorough understanding of the ADB *Handbook of Style and Usage*, and the ability to apply its rules and principles to a document under review. The consultant shall be paid based on prevailing ADB rates for fixed-rate editing contracts. The following guidelines will be followed by the manuscript editor:

(i) Editing should be mechanical in nature, with substantive edits limited to rephrasing to improve clarity and eliminate ambiguity. Any reorganization of

content should be done only in consultation with the Southeast Asia Energy Division and the ADB Department of External Relations.

(ii) Ensure that chapter titles are consistent with the text in spelling, hyphenation, and italics. Titles must be checked against the table of contents, and any discrepancies queried.

(iii) Check subheadings for uniformity of style, as well as consistency with the text in spelling, hyphenation, and italics.

(iv) Check all references to tables, figures, appendixes, bibliographies, or other parts of the work, with any discrepancies queried.

(v) Check each note against the text to ensure that the text reference is correct and correctly placed, and that terms are used in the same way in the text and notes.

(vi) Ensure that each entry in a bibliography or reference list conforms to the ADB Handbook of Style and Usage. Alphabetizing should be checked. In the case of a reference list, the editor must check all text citations against the list, and query or resolve any discrepancies.

(vii) Check tables not only for internal consistency but also for conformity with the text and other relevant tables in the same work. Column heads and stubs must match one another in style across a series of tables. Spelling, capitalization, punctuation, abbreviations, and symbols must likewise be standardized.

(viii) Check illustrations against references and captions to ensure they match and show what they say they do.

(ix) Prepare the front matter as necessary, including a title page, table of contents, and list of tables and figures. The copyright page text will be provided by the Department of External Relations.

(x) Prepare a list of running headings, clearly indicating which headings are to appear on verso and which on recto.

(xi) Prepare a completed style sheet highlighting an alphabetized list of words or terms to be capitalized, italicized, hyphenated, spelled, or otherwise treated in a way unique to the manuscript.

(xii) Upon the author’s check of the edited manuscript, insert any applicable query responses and edit any new text or changes made by the author.