



## Scope of Work

# **Transmission Planning, Policy and Regulations Firm: Analysis of Power System Planning, Grid Codes, and Regulations to Support Transmission Stability and Reliability, Regional Power Trade and VRE Integration in Southeast Asia**

*USAID Clean Power Asia program, implemented by Abt Associates*

### **I. Introduction/Overview**

The primary objective of USAID Clean Power Asia is to work with Lower Mekong (LM) countries and other Association of Southeast Asian Nations (ASEAN) developing member states to encourage power sector investments in environmentally friendly, clean energy sources, specifically focusing on scaling up investment in grid-connected renewable power. USAID Clean Power Asia is a program funded by USAID and implemented by Abt Associates. When any reference is made to approvals or authorizations, it will be stipulated whether those decisions are contractually made by USAID or Abt Associates as implementer. As the client, any decisions made by USAID and communicated to Abt Associates are final.

### **II. Background**

USAID Clean Power Asia works to promote renewable energy (RE) in Lower Mekong countries and in all of Southeast Asia by collecting and documenting data, identifying tools, supporting RE analysis and planning, and increasing stakeholder's understanding of planning for higher levels of renewable energy. Promoting higher amounts of renewable energy requires the improved availability and quality of RE data and tools for analysis, including technical and economic potential, RE zones, and grid integration studies. The program supports the establishment and updating of national renewable energy targets and the integration of these targets into power development plans and integrated resource plans for the power sector. USAID Clean Power Asia works to rationalize the planning and development of renewable energy by linking it to the transmission planning process through supporting designation of renewable energy zones.

The Asian Development Bank (ADB) has been working with countries in the Lower Mekong plus southern China to support energy cooperation through the Greater Mekong Sub-region (GMS) Economic Cooperation Program since the early 1990s. The GMS regional power trade coordinating committee (RPTCC), launched in 2004, has been conducting joint planning and analysis focused on transmission planning and interconnections.<sup>1</sup>

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<sup>1</sup> The Greater Mekong sub-region (GMS) is a name coined by ADB with the launch of their economic cooperation program with this region includes Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam and Southern China, specifically [Yunnan Province](#) and the [Guangxi Zhuang Autonomous Region](#). The GMS has been coordinating on energy sector cooperation since the early 1990s, with the first meeting of the Regional Power Trade Coordination Committee (RPTCC) held in 2004. The RPTCC has been conducting joint planning and analysis of differences in regulations and grid codes, focused mainly on transmission



Thailand leads the Ayeyarwady-Chao Phraya-Mekong Economic Cooperation strategy (ACMECS), a cooperation framework among Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam to promote balanced development in the sub-region. Its MasterPlan issued in 2018 includes priorities for infrastructure development, including high priorities transmission lines to facilitate power trade.<sup>2</sup>

The Japan International Cooperation Agency (JICA) has completed a medium-term plan for several LM countries (Lao PDR, Myanmar, and others) including proposed interconnections. JICA has also been providing assistance to several LM countries on planning, operations, grid codes, and regulations focused on improving synchronicity between countries to facilitate bilateral trade.<sup>3</sup>

Abt Associates is supporting the Head of ASEAN Power Utilities/ Authorities (HAPUA) through ACE on the first step in moving towards a multilateral power market, through supporting the third ASEAN Interconnection Master Plan Study (AIMS). To complement this study, the International Energy Agency (IEA) conducted a feasibility study for developing a voluntary multilateral power market in Southeast Asia, and the Economic Research Institute for ASEAN and Southeast Asia (ERIA) conducted a study on institutional arrangements required for developing this market.

The purpose of AIMS III is to determine the combined generation and transmission needs for SE Asia, the opportunities for increasing bilateral and multilateral power trade, and the potential for increasing the amount of variable renewable energy (VRE) on the ASEAN power grid. This process includes three phases. Phase 1 includes an RE resource assessment, capacity expansion planning, production cost modeling, and a socio-economic-environmental assessment. A second phase to analyze the impact on the system's reliability is currently in process. The outcome will include identifying the transmission interconnections to be included in an updated ASEAN Power Grid (APG) plan.

The HAPUA Secretariat and ACE presented the results of the AIMS III study to the HAPUA council at the 36<sup>th</sup> meeting of the HAPUA Council, followed by presenting the results of the study to ASEAN preliminary decision-makers at the 38<sup>th</sup> Senior Official Meeting on Energy (SOME) in August, and the ASEAN Ministers of Energy Meeting (AMEM) in early November 2020.

After Phases 1 and 2, Phase 3 is planned which includes developing harmonized regulatory frameworks, grid codes, and technical standards among the ASEAN member states. As a first step in this process, Abt Associates intends to understand the gaps that need to be addressed for harmonizing

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interconnections. See <https://www.adb.org/sites/default/files/publication/29387/gms-ecp-overview-2015.pdf>

<sup>2</sup> The LM countries, led by Thailand developed a MasterPlan for Infrastructure development under the Ayeyarwady-Chao Phraya-Mekong Economic Cooperation strategy (ACMECS. The MasterPlan, issued in 2018, includes priorities for infrastructure development, including high priorities transmission lines to facilitate power trade. The official ACMECS MasterPlan can no longer be found on the official ACMECS website - <https://www.dft.go.th/acmeecs-wgtif/ABOUT>. However, an article by the Asia Foundation provides some insight into the plan at <https://asiafoundation.org/2019/10/23/making-sense-of-the-many-mekongs/>. A hard copy of the masterplan will be provided by Abt Associates to the selected consultant.



grid codes in Southeast Asia, followed by addressing the gaps, including a comparison to the grid code for the Greater Mekong Subregion through the support of the Asian Development Bank<sup>4</sup>. Though a GMS regional grid code report has recently been completed with an updated gap analysis, it has not yet been published. Experts familiar with ASEAN and the recommended GMS grid code have noted it is overly complicated for a minimum grid code.

To promote interconnections and power trade in the Lower Mekong and in Southeast Asia, Abt Associates seeks one or more Grid Code Specialist and one or more Power System Planner Experts/JICA Technical Liaison to conduct a desk study and to analyze several reports on grid codes, transmission plans and transmission lines in the region, including preparing presentations for meetings. The transmission planner will also work closely with JICA and other relevant partners to analyze reports and provide recommendations on transmission infrastructure required to facilitate improved stability and reliability, enhanced bilateral and multilateral trade, and increased integration of VRE in the Lower Mekong and throughout Southeast Asia.

### **III. Objectives**

#### *Power System Planning*

The main objective of this scope of work is to review, understand and evaluate transmission plans and how they will facilitate power trade, in particular interconnections between countries in Southeast Asia, with a focus on the Lower Mekong countries and specific pairs of countries within the Lower Mekong. Optional tasks are included which focus on standards and processes for transmission planning, operations and maintenance.

#### *Grid Codes and Regulations*

The objective of these tasks is to recommend a minimum grid code for Southeast Asian countries, to be adopted by ASEAN member states to 1) improve stability and reliability of the domestic grids and interconnections in SE Asia; 2) facilitate bilateral and multilateral power trade in the region, 2) increase the ability of the power grids in Southeast Asian countries to accommodate higher levels of VRE; compare the recommended grid code to the grid code adopted by the GMS; and analyze the gap between SE Asian countries' existing grid codes and the recommended grid code.

### **IV. Scope of Work**

#### *Power System Planning*

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<sup>4</sup> The Greater Mekong sub-region (GMS) is a name coined by ADB with the launch of their economic cooperation program with this region includes Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam and Southern China, specifically [Yunnan Province](#) and the [Guangxi Zhuang Autonomous Region](#). The GMS has been coordinating on energy sector cooperation since the early 1990's, with the first meeting of the Regional Power Trade Coordination Committee (RPTCC) held in 2004. The RPTCC has been conducting joint planning and analysis of differences in regulations and grid codes, focused mainly on transmission interconnections. See <https://www.adb.org/sites/default/files/publication/29387/gms-ecp-overview-2015.pdf>



Abt Associates aims to have an in-depth understanding of data, tools and approval processes for transmission planning in Lower Mekong countries. Abt Associates requires the Consultant to review transmission plans and interconnection analysis completed, especially those completed by JICA and in the ADB supported GMS studies. The Consultant will also analyze the studies that are the basis of the infrastructure plans in the ACMECS infrastructure Strategy and the USAID Clean Power Asia supported AIMS III study. S/he will compare and analyze the pros and cons of transmission infrastructure recommended by the JICA, GMS, ACMECS, AIMS III and other studies in terms of facilitating bilateral and multilateral trade. The consultant will analyze the existing and potential transmission lines identified in various studies in terms of their importance in facilitating power trade, the technical barriers to synchronizing country grid systems to enable power trade, and global best practices to overcome those barriers.

The power system planner consultant(s) will review and summarize previous transmission planning studies and plans conducted for the LM countries and for Southeast Asia; regulations related to planning and O&M; and analyze pros and cons of interconnection projects identified. This will require reviewing JICA transmission studies and plans conducted in specific countries, the AIMS III study, and the underlying analysis of transmission lines identified in the ACMECS infrastructure plan (including interconnections identified in the ACMECS studies that have been prioritized by Thailand, in particular a proposed transmission line and power trade between Thailand and Myanmar). The planner(s) will also analyze the necessity and benefit of specific interconnection lines proposed between Lao PDR and Vietnam, and conduct specific research and analysis related to the interconnections proposed from China into Myanmar, Lao PDR and Vietnam (included in the GMS studies and other studies)..

#### *Grid Codes and Regulations*

The grid codes and regulations consultant(s) will conduct a desk study of various international reports, studies, and publications related to grid codes in Southeast Asia, focused on facilitating improved stability and reliability; interconnected systems and power trade; and integrating more variable renewable energy into the grid. Documents to review include, but are not limited to:

- Analyses of grid codes in the Lower Mekong prepared under the Asian Development Bank-ADB's GMS program<sup>5</sup>

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<sup>5</sup> 2012 a Performance Standards and grid code working group was established for the GMS. At the 20<sup>th</sup> RPTCC meeting in 2016, a consultant compared GMS countries' grid codes to the recommended standards of the European Network of Transmission System Operators for Electricity (ENTSO-E). Synchronization of grid codes was again discussed at RPTCC #24 in June 2018. Finally, at the RPTCC meeting #25 in March 2019, the summary notes mention that a report "Regional Grid Code – Gap Assessment Analysis" was completed, which presents the requirements of each Sub-code and the identified pre-conditions with an updated gap analysis. However, Abt Associates has not yet obtained a copy of the report. Though a GMS regional grid code report has recently been completed with an updated gap analysis, it has not yet been published. Note that experts familiar with ASEAN and the recommended GMS grid code have noted it is overly complicated for a minimum ASEAN grid code with the objective of facilitating power trade and integrating VRE.



- JICA reports on medium-term power plans and grid codes<sup>6</sup>
- Reports by the International Energy Agency (IEA)<sup>7</sup>
- A report conducted by German Corporation for International Cooperation GmbH (GIZ) on existing grid codes in select SE Asian countries and gap analyses<sup>8</sup>
- Other documents as determined by Abt Associates in consultation with the consultant(s)

The consultant(s) will synthesize the information; prepare a gap analysis of Southeast Asian grid codes in terms of improving grid stability and reliability, facilitating bilateral and multilateral power trade, and increasing the share of variable renewable energy in power production in each country; provide recommendations to Abt Associates on critical issues to be addressed; and make technical recommendations on grid code changes and institutional changes required to implement the recommendations. While the focus is on all Southeast Asian countries, particular attention should be paid to remaining gaps for the Lower Mekong countries.

S/he is also expected to provide a framework for improving grid codes to facilitate expanded bilateral power trade among Southeast Asian countries, i.e., developing a strategy for providing technical assistance to Southeast Asian countries and to ASEAN to improve grid codes and strengthen relevant institutions. The consultant will work with the power system planner(s) consultant(s) to coordinate with JICA and prepare presentations on the analysis. Lastly, s/he will write a scope for a firm to analyze all relevant technical and regulatory barriers to bilateral and multilateral trade.

## **V. Tasks, Services Sought & deliverables**

The winning firm will be required to implement various tasks as outlined below. A detailed list of tasks and deliverables will be incorporated into the firm's agreement with Abt Associates. The agreement is expected to be a fixed term, fixed deliverables, fixed price agreement with payment associated with the final list of deliverables.

### **Power System Planning Main Tasks**

#### ***1. Task A1: JICA technical liaison***

The planner will serve as a technical liaison with JICA to understand previous studies of transmission

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<sup>6</sup> The JICA study on the power network system masterplan for the Laos People's Democratic Republic is available at <https://libopac.jica.go.jp/images/report/P1000042609.html>. Reports on their work in Cambodia and Myanmar are not currently available. JICA's priorities for support of the ACMECS (Lower Mekong) MasterPlan may be found at <https://www.mofa.go.jp/files/000406737.pdf>.

<sup>7</sup> IEA's Thailand Renewable Energy Grid Assessment may be found at <https://www.iea.org/reports/partner-country-series-thailand-renewable-grid-integration-assessment> and their ASEAN Renewable Energy Grid Analysis may be found at <https://www.iea.org/reports/asean-renewable-energy-integration-analysis>. A study evaluating the opportunities for Thailand to trade power with 6 neighboring countries was recently completed but is not yet publicly available.

<sup>8</sup> Report on ASEAN Grid Code Comparison and Review may be found at <https://aseanenergy.org/report-on-asean-grid-code-comparison-review/>



plans and regulations related to planning and O&M and synchronizing grids (in particular between Laos and Vietnam/Cambodia/Myanmar), and to assist Abt Associates in drafting scopes of work, including expected outputs and next steps, for cooperation with JICA on projects focused on transmission planning, O&M and operations.

**Deliverables:**

1. A monthly report on activities related to JICA, including minutes of meetings and calls.
2. Scopes of work for cooperation with JICA on transmission planning and O&M, in format to be provided by Abt Associates.

***2. Task A2: Analyze interconnection projects identified in other studies***

The planner will analyze pros and cons for prioritized interconnection projects identified for the LM in various studies conducted by JICA, ADB-supported studies for the GMS (Lower Mekong countries and China), AIMS III (ASEAN) and ACMECS (Lower Mekong countries and China) in terms of their ability to facilitate bilateral trade among LM countries. Note whether the proposed lines are grid to grid or “gen-ties”, i.e. projects built in one country with a dedicated transmission line to another country and operated as part of the purchasing country’s grid rather than the exporting country’s grid. Note that the AIMS III study may prioritize projects identified in the study which will including transmission interconnections and associated power to be traded, as well as VRE generation to be built in each of the trading partner countries. If this is completed, Abt Associates will make it available to the consultant to review, evaluate and comment on these priorities.

**Deliverables**

1. A report analyzing the pros and cons for Lower Mekong identified by several different sources in terms of how they will facilitate more bilateral trade and which ones are highest priority for moving towards multilateral trade.
2. A presentation for meetings of LM countries under the umbrella of ACMECS or other venues, including the findings from the analysis and/or one of the studies, to be determined by Abt Associates in consultation with relevant donors.

***3. Task A3: Analysis of prioritized transmission projects in ACMECS strategy***

The planner will analyze transmission lines identified in the ACMECS infrastructure plan connecting Thailand with other LM countries. S/he will document why the transmission lines were identified as high priority lines for Thailand, identify who benefits and how, the barriers to realizing the planned infrastructure projects, and business models and opportunities for financing the transmission infrastructure, in particular the transmission line between Thailand and Myanmar.

**Deliverable**

A report on ACMECS transmission interconnections linking Thailand with other LM countries, the reason for their being selected as high priority, the beneficiaries, barriers to investment and opportunities to facilitate investment and construction of the planned infrastructure.



**4. Task A4: Review and analyze AIMS III study for LM countries and compare to ACMECS and GMS projects**

The planner will review the results of the capacity expansion plan in AIMS III (including the interim or draft final report and the list of prioritized projects, if available) and compare transmission projects identified to the projects identified in the ACMECS strategy and GMS studies in terms of how they facilitate cross-border trade, who are the beneficiaries, and how they benefit from the projects. The Consultant will also assist Abt Associates to share the analysis and recommendations with the LM countries, including through memos and presentations at ACMECS meetings and/or other venues.

**Deliverables**

1. Memo documenting the comparison of transmission projects between AIMS III, ACMECS and GMS studies including impacts on cross-border trade and beneficiaries.
2. A presentation for 1-2 meetings, including an ACMECS meeting or other venue.

**5. Task A5: Document and map planned interconnections and provide recommendations for overcoming barriers to investment**

The planner will document existing and planned interconnections between LM countries as determined by various studies and plans adopted by governments, including providing details about the planned infrastructure and creating a map that documents how much power trade can be facilitated by these interconnections and their current status in terms of approval, financing, construction, etc. S/he will also analyze the barriers to synchronizing the grids and make recommendations for overcoming the barriers.

**Deliverable**

A report describing the existing and planned interconnections, barriers and recommendations. 2. An annex to the report including a map of the lines with summarized status and transmission capacity (possibly in GIS or other format as agreed upon with Abt Associates).

**6. Task A6: Analysis of interconnection lines proposed between Lao PDR and Vietnam**

The planner will analyze the necessity and benefit of specific interconnection lines proposed between Laos and Vietnam, including but not limited to, a line proposed by a private developer, one proposed by the IFC, and potentially others included in the Lao medium-term plan and/or Vietnam PDP, based on existing studies.

**Deliverable**

A report summarizing the necessity and benefit of these interconnections in terms of facilitating bilateral trade between Lao PDR and Vietnam.

**7. Task A7: Research and compare transmission lines linking China and Thailand with Myanmar and impact of China's proposed lines on planned power trade between**



### ***Thailand and Myanmar***

China's utilities have proposed transmission lines connecting with Myanmar. At the same time both the ACMECS strategy and GMS studies, as well as JICA's transmission study for Myanmar, appear to have prioritized different transmission lines from China that may have an impact on Myanmar's system and ability to import from and export to Thailand. The planner will research planned interconnections from China and compare them to interconnections from China into Myanmar. S/he will also analyze the potential impact of the proposed China interconnections on Myanmar's system and ability to synchronize and trade power with Thailand. A brief summary of the planned transmission lines and China's plans will be provided by Abt Associates.

### **Deliverables**

1. Memo documenting the existing, and comparing planned, interconnections between Myanmar and both China and Thailand that are identified in ICA's medium term transmission plan for Myanmar, in the ACMECS strategy and and/or in GMS studies.
2. Technical report documenting the impact of China utilities' proposed projects on Thailand's ability to trade power with Myanmar.

### **Grid Codes and Regulations Tasks**

The consultant will conduct a desk study of various international reports, studies, and publications related to grid codes in Southeast Asia, focused on facilitating interconnected power systems and power trade as well as integrating more variable renewable energy into the grids of Southeast Asian countries. Documents to review include, but are not limited to:

- Analyses of grid codes in the Lower Mekong, and a recommended common grid code, prepared under the Asian Development Bank- ADB's GMS program<sup>9</sup>
- JICA reports on medium-term power plans and grid codes<sup>10</sup>

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<sup>9</sup> In 2012 a Performance Standards and grid code working group was established for the GMS. At the 20<sup>th</sup> RPTCC meeting in 2016, a consultant compared GMS countries' grid codes to the recommended standards of the European Network of Transmission System Operators for Electricity (ENTSO-E). Synchronization of grid codes was again discussed at RPTCC #24 in June 2018. Finally, at the RPTCC meeting #25 in March 2019, the summary notes mention that a report "Regional Grid Code – Gap Assessment Analysis" was completed, which presents the requirements of each Sub-code and the identified pre-conditions with an updated gap analysis. However, Abt Associates has not yet obtained a copy of the report. Though a GMS regional grid code report has recently been completed with an updated gap analysis, it has not yet been published. Note that experts familiar with ASEAN and the recommended GMS grid code have noted it is overly complicated for a minimum ASEAN grid code with the objective of facilitating power trade and integrating VRE.

<sup>10</sup> The JICA study on the power network system masterplan for the Laos People's Democratic Republic is available at <https://libopac.jica.go.jp/images/report/P1000042609.html>. Reports on their work in Cambodia and Myanmar are not currently available. The LM countries, led by Thailand, also developed a MasterPlan for Infrastructure development under the Ayeyarwady-Chao Phraya-Mekong Economic Cooperation strategy (ACMECS), a cooperation framework among Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam to promote balanced development in the sub-region. Its MasterPlan issued in 2018, includes priorities for infrastructure development, including high priorities transmission lines to facilitate power trade. The official ACMECS MasterPlan unveiled in 2018 can no longer be found on the official ACMECS website - <https://www.dft.go.th/acmeecs-wgtif/ABOUT>. However, an article by the Asia Foundation provides some insight into the plan at <https://asiafoundation.org/2019/10/23/making-sense-of-the-many-mekongs/>. A hard copy of the masterplan will be provided by Abt Associates to the selected consultant. JICA's priorities for support of the ACMECS (Lower Mekong) MasterPlan may be found at <https://www.mofa.go.jp/files/000406737.pdf>.



- Reports by the International Energy Agency (IEA)<sup>11</sup>
- A Report by the German Corporation for International Cooperation GmbH (GIZ) on existing grid codes and gap analyses<sup>12</sup>
- Other documents as determined by Abt Associates in consultation with the consultant

The grid codes and regulations expert(s) will synthesize the information; prepare a gap analysis of Southeast Asian grid codes in terms of facilitating bilateral and multilateral power trade as well as increasing the share of variable renewable energy in power production in each country; provide recommendations to Abt Associates on critical issues to be addressed; and make technical recommendations on grid code changes and institutional changes required to implement the recommendations. While the focus is on all Southeast Asian countries, particular attention should be paid to remaining gaps for the Lower Mekong countries.

S/he is also expected to provide a framework for improving grid codes to facilitate expanded bilateral power trade among Southeast Asian countries, i.e. developing a strategy for providing technical assistance to Southeast Asian countries and to ASEAN to improve grid codes and strengthen relevant institutions. The grid codes and regulations expert(s) will work with the power system planner(s) to coordinate with JICA and prepare presentations on the analyses. Lastly, s/he will write a scope for a firm to conduct follow-on work to analyze all relevant technical and regulatory barriers to bilateral and multilateral trade.

- ***Task B1: Review and summarize donors supporting grid codes and regulations***

The Consultant will review programs of donors supporting SE Asian countries to upgrade grid codes and other regulations to support power trade and integration of variable renewable energy and summarize contact information and the focus of their assistance.

**Deliverable**

A donor analysis review and summary.

- ***Task B2: Desk Study on technical and institutional gaps of country-specific grid codes and regulations, and a recommendation for a common ASEAN-wide grid code***

- Reviewing grid codes in SE Asian countries from the perspective of improving or maintaining grid stability and reliability; promoting power trade by synchronizing grids across borders; and integrating increased variable renewable energy per the current or new adopted ASEAN VRE target and individual country VRE targets. For countries that have already been studied, the consultant is expected to summarize the findings. For any

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<sup>11</sup> IEA's Thailand Renewable Energy Grid Assessment may be found at <https://www.iea.org/reports/partner-country-series-thailand-renewable-grid-integration-assessment> and their ASEAN Renewable Energy Grid Analysis may be found at <https://www.iea.org/reports/asean-renewable-energy-integration-analysis>. A study evaluating the opportunities for Thailand to trade power with 6 neighboring countries was recently completed but is not yet publicly available.

<sup>12</sup> Report on ASEAN Grid Code Comparison and Review may be found at <https://aseanenergy.org/report-on-asean-grid-code-comparison-review/>



of these issues that have not yet been studied, or for countries where no analysis is available, the consultant will complete a full analysis and comparison of the codes and how they address reliability and stability, power trade, and VRE integration.

- Reviewing the proposed grid code for the GMS region as documented on the RPTCC web site, or obtained directly from ADB, and comparing the recommendation above to the GMS standard
- Comparing the recommendation above to European or U.S. standards (if not already completed in previous studies), and discussing the pros and cons of adopting the consultant's recommendation rather than the European or U.S. standards
- Analyzing institutions responsible for developing and enforcing grid codes in Southeast Asian countries, and identifying gaps, compared to advanced or developed countries in Europe, the U.S or other countries with international standards. S/he will provide recommendation to Abt Associates on critical issues to be addressed, recommendations on what needs to be improved in terms of institutional issues, what changes are required to improve grid stability and reliability, facilitate bilateral trade and increase VRE, and who/what institution will lead the change in each country and the region (LM and SE Asia).

**Deliverable:** A report on existing grid codes in LM and Southeast Asian countries, in comparison to the GMS adopted standard and international standards, and recommendations for improving grid codes to improve grid stability and reliability, and facilitate power trade and integration of VRE, including appropriate institution(s) to lead the change.

### ***3. Task B3: Develop a framework and strategy for future assistance on grid codes***

The grid codes and regulations expert(s) will develop a strategy to implement the grid code improvements in Southeast Asia to improve grid stability and reliability, facilitate power trade and increase VRE integration. The objective is to prioritize opportunities to support harmonizing codes to facilitate bilateral trade between Southeast Asian countries. The strategy should include criteria for screening/grouping the countries where the USG could provide support, as well as evaluating the readiness of pairs of countries for increasing or enabling power trade, in particular grid to grid vs gen-ties, and make recommendations on which pairs of countries are highest priority for assistance based on the criteria. It is envisioned that AIMS III could provide priorities for after the completion of Phase 2. The criteria to be used, still in discussion with ACE as this scope is drafted, include net economic benefits of the planned power trade, amount of power trade facilitated, and the amount of VRE generation built in the relevant countries. ACE and HAPUA will also be proposing an approach to conducting power trade pilots as part of Phase 3.

The services sought include:



- Develop criteria to analyze the readiness of Southeast Asian countries to improve their grid codes to address the goals of improving reliability and stability, increasing power trade and increasing VRE to meet their individual country VRE targets, if they exist, and/or the VRE allocated to each country as part of the AIMS III study
- Review the priorities provided by ACE, if completed and provide and evaluate the pros and cons of the method used and the results.
- Recommend prioritized pairs of countries for developing pilots to harmonize grid codes and support bilateral trade among LM and/or Southeast Asian countries.

#### **Deliverable**

Report on the strategy and framework for future assistance to Lower Mekong and Southeast Asian countries on to improve grid stability and reliability, promote power trade and increase VRE on their systems, based on the priorities provided by ACE and/or revised priorities proposed by the consultant.

#### ***4. Task B4: Prepare presentations***

The grid codes and regulations expert(s) will prepare presentations on results of tasks 1-3, including donor assistance, desk study and strategy/framework for future assistance at various venues.

#### **Deliverable**

Presentations for various venues which could include meetings of ASEAN or LM countries and other venues as to be determined later.

#### ***5. Task B5: Cooperation with other donor programs through coordination with power system planning consultant***

The expert will coordinate with a power system planning consultant, in cooperating with JICA and ADB GMS on grid code harmonization in Lower Mekong countries.

#### **Deliverable**

Monthly memo summarizing meetings and calls with the power system planner, JICA, and ADB.

#### ***6. Task B6. Draft scope of work for firm to analyze barriers to improving grid stability and reliability, power trade and increasing VRE ad prepare an implementation plan***

The expert will draft a scope of work for a firm to conduct a study and analyze all political and regulatory, institutional and technical barriers to 1) improving grid stability and reliability (especially as regards synchronizing grids between and among SE Asian countries, 2) developing bilateral and multilateral trade in Southeast Asia), and 3) increasing levels of VRE in SE Asian countries; and, with a particular focus on the Lower Mekong countries and propose a program to address these barriers.

#### **Deliverable**

A scope of work for a firm to analyze all relevant barriers and prepare implementation plan to



improve grid codes and regulations to improve grid stability and reliability, promote power trade and increase VRE integration in LM and Southeast Asian countries.

### **Power System Planning Optional Tasks**

Several optional tasks are included in this scope of work, including desk studies on the transmission planning processes in LM countries. Options include a study of data, tools and approval process in country and for export/import; synthesizing information from other Southeast Asia studies on transmission planning and operations; summarizing global best practices related to transmission planning/analysis; and implications for ASEAN and Lower Mekong countries specifically.

#### ***1. Task C1: Desk study on the transmission planning, operations and maintenance in LM countries***

The grid codes and regulations expert(s) will conduct a transmission planning desk study for domestic needs and exports/imports in LM countries, as well as operations and maintenance, including standards, data, tools and approval processes, building on initial planning assessments conducted by Abt Associates.

#### **Deliverable**

20-30-page report on transmission planning and O&M standards, data, tools and approval processes in Lower Mekong countries.

#### ***2. Task C2: Desk study on transmission planning, operations and maintenance in other SE Asian countries***

The grid codes and regulations expert(s) will conduct a desk study of transmission planning and O&M standards, data, tools, and approval processes, building on studies and analyses included in JICA and ADB reports and other studies and reports.

#### **Deliverable**

20-30-page report on transmission planning and O&M standards, data, tools and approval processes in other Southeast Asian countries.

#### ***3. Task C3: Compare global best practices for transmission planning, operations and maintenance to LM and SE Asian countries***

The grid codes and regulations expert(s) will research and summarize global best practices for transmission planning, operations and maintenance and compare to those in LM countries and non-LM countries in Southeast Asia.

#### **4. Deliverable**

Short report comparing global best practices for transmission planning, operations and maintenance for Southeast Asian countries (LM and non-LM).



## **VI. Schedule**

1. Questions on this scope of work are due by **Wednesday, December 9, 2020**.
2. Proposals are due to Abt Associates by **Wednesday, December 16, 2020**.
3. The winning firm must be able to begin the work as a soon as a subcontracting agreement is signed with Abt Associates.
4. All work and deliverables are to be completed by March 31, 2020 with estimated level of effort (LOE) of **80 days** for *power system planning* tasks (60% high priority tasks and 40% for optional tasks) and **80 days** of LOE for the *grid code and regulations* tasks.
5. The winning firm will discuss with Abt Associates on a schedule to ensure that each deliverable will meet the scheduled due dates to be established prior to signing an agreement. The firm subcontract manager must meet the Abt Associates' team at least once a week. The meeting can be held virtually depending on the location of the firm and its staff or consultants and the situation in Thailand and Abt Associates' policy on working from home during the COVID-19 pandemic.

## **VII. Qualifications / Requirements**

Firms may propose a combination of senior, mid-level and junior staff or consultants, as appropriate, to fulfill the requirements of the scope of work. The proposals must include at least one senior power system planning expert and at least one senior grid codes and regulations expert. The qualifications expected for these senior experts are described below.

### **Senior Power System Planning Expert(s)**

*Minimum qualifications required for this position:*

1. **Education:** Master's Degree in power engineering or a related field.
2. **Experience:** Minimum 8-10 years of relevant professional experience in transmission planning
3. **Other qualifications:** Ability to work effectively and harmoniously with colleagues from varied cultures and professional backgrounds; excellent in English writing, coordination, communication and negotiation.

*Preferred qualifications:*

1. Experience working for international organizations, nongovernmental; or governmental institutions /organizations or donors in a multi-cultural setting.
2. Excellent knowledge of English and at least one language of a South-East Asian country an advantage (Thai is preferable).

### **Senior Grid Codes and Regulations Expert(s)**

*Minimum qualifications required for this position:*



1. **Education:** Master's Degree in power engineering or a related field.
2. **Experience:** minimum 10-12 years of relevant professional experience working on power grid codes and regulations. Strong experience in conducting transmission engineering studies.
3. **Other qualifications:** ability to work effectively and harmoniously with colleagues from varied cultures and professional backgrounds; excellent in English writing, coordination, communication and negotiation.

*Preferred qualifications:*

1. Professional experience working for donor-funded projects in Southeast Asia and experience working with utilities, regulators or dispatching centers in using grid codes.
2. Experience working for international organizations, nongovernmental or governmental institutions /organizations in a multi-cultural setting.
3. Experience providing consulting services and/or development solutions related to renewable energy, electricity transmission and distribution, and grid code compliance.
4. Ability to demonstrate understanding of the technical requirements and operations for cross-border power transmission and power trading; experience with RE trading is a plus.
5. Excellent knowledge of English and at least one language of a Southeast Asian country an advantage (Thai is preferable).

**VIII. How to apply**

1. Interested firms may submit **questions by Wednesday, December 9, 2020** to Ms. Thida Ruengsit, Finance & Administration Manager at [Thida\\_Ruengsit@abtassoc.com](mailto:Thida_Ruengsit@abtassoc.com).
2. Proposals must be submitted to Ms. Thida Ruengsit at the above noted email address no later than **Wednesday, December 16, 2020**, and must include the following documents:
  - One page describing the proposed approach to the assignment including analytical approaches, software tools, etc. to be used in conducting the studies or analyses.
  - One page providing an organization chart and describing the proposed staff and roles, including the subcontract manager, power system planning expert(s) and grid codes and regulations expert(s).
  - A Gantt chart showing the timeline of proposed tasks and deliverables.
  - One page describing past experiences with similar assignments.
  - CVs of staff proposed to work on the project including the subcontract manager, power system planning expert(s) and grid codes and regulations expert(s).
  - Publications or technical analyses related to this scope of work, produced by the firm or its staff or consultants proposed for this scope of work.
  - Budget for the proposed work in the format provided by Abt Associates. Proposal budgets must be separated by grid code tasks and transmission planning tasks and with separate budgets for each task/deliverable(s) under these two categories.