Greater Mekong Subregion

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Energy Sector Strategy 2024-2030

Accelerating a Just Energy Transition

ABBREVIATIONS

ADB	–	Asian Development Bank
APG	–	ASEAN Power Grid
ASEAN	–	Association of Southeast Asian Nations
BESS	–	battery energy storage systems
BOT	–	build-operate-transfer
ETTF	–	Energy Transition Task Force
GDP	–	gross domestic product
GMS	–	Greater Mekong Subregion
GW	–	gigawatt
IPP	–	independent power producers
LTMS PIP	–	Lao PDR–Thailand–Malaysia–Singapore Power Integration Project
MW	–	megawatt
PPP	–	public–private partnership
PRC	–	People's Republic of China
PSH	–	pump storage hydropower
RPTCC	–	Regional Power Trade Coordination Committee
SOM	–	Senior Officials Meeting
USAID	–	United States Agency for International Development

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EXECUTIVE SUMMARY

The Greater Mekong Subregion (GMS) Energy Sector Strategy 2024–2030 supersedes the energy strategy approved in 2015 and updates the strategic direction outlined in the GMS Economic Program Strategic Framework 2030 that was adopted in 2021. Four key factors ushered in the preparation of this strategy: (i) new development challenges and opportunities for energy transition that require a regional or collective response from the GMS countries; (ii) evolving energy sector priorities of the GMS countries; (iii) the need to emphasize the human aspect of energy transition; and (iv) the necessity to describe the sector's strategic framework, innovative approaches, and strategy implementation arrangements.

The energy sector strategy supports the connectivity pillar of the GMS program. It was informed by GMS energy sector assessment conducted in 2023, past achievements and lessons learned, and inputs from stakeholders and experts.

The GMS energy sector vision is a secure and green energy future for the subregion. The expected outcome by 2030 is an accelerated just energy transition. The strategy introduces the concept of just transition to manage the impacts of transition on people and communities, alongside the environment and climate.

The energy cooperation program will focus on three strategic priorities: (i) expanding regional power trade of clean energy, including interconnection development, (ii) initiating regional efficiency and conservation measures, and (iii) improving capacities for energy transition.

The program will use innovative approaches under these crosscutting areas to achieve an accelerated just energy transition: (i) leveraging the digital revolution through smart grids; (ii) enhancing spatial approaches in interconnection development; (iii) fostering evidence-based policy dialogue and creating user-friendly knowledge products; (iv) promoting green finance and de-risking to attract private investment; (v) establishing an open platform through expanded and strengthened cooperation with the Association of Southeast Asian Nations and development partners; and (vi) ensuring a just transition by involving project or policy-affected people in decision-making, job creation including skills development, entrepreneurship, and gender mainstreaming.

The strategy outlines the roles of different stakeholders during implementation. Projects under the three strategic priority areas will come through the GMS Regional Investment Framework while the operation of the GMS Energy Transition Task Force (ETTF), which will lead the overall strategy implementation, monitoring, and review, will be supported by the Asian Development Bank technical assistance.

Progress toward achieving the strategy targets will be monitored and reported twice a year, coinciding with ETTF meetings. The ETTF will conduct a midterm review of the strategy to assess its validity, relevance, or need for updates.

The strategy also includes a mitigation and action plan to address risks to achieving the sector's outcome, such as low prioritization of regional projects, lack of resources, and inadequate monitoring and reporting of strategy implementation.

INTRODUCTION

1. The Greater Mekong Subregion (GMS) Energy Sector Strategy 2024–2030 outlines the vision and outcomes for the energy cooperation program, strategic priorities, crosscutting areas, and implementation arrangements for the GMS countries—Cambodia, Lao People's Democratic Republic (Lao PDR), Myanmar, Thailand, and Viet Nam, as well as the Guangxi and Yunnan provinces of the People's Republic of China (PRC). This strategy replaces the energy strategy approved in 2015 and updates the strategic direction outlined in the GMS Economic Program Strategic Framework 2030 endorsed by the Seventh GMS Summit of Leaders in 2021.[1] The strategy builds upon lessons learned from the previous strategy's implementation, a situational analysis of the sector conducted in 2023, and inputs from stakeholders.

2. Four key factors prompted the formulation of this strategy: (i) new development challenges and opportunities for energy transition requiring a regional or collective response from GMS countries; (ii) evolving energy sector priorities of GMS countries; (iii) the need to emphasize the human aspect of energy transition, and in particular, just energy transition; and (iv) the necessity to outline the sector's strategic framework, innovative approaches, and implementation arrangements.

3. The GMS Energy Transition Task Force (ETTF), with secretariat support from the Asian Development Bank (ADB), guided the development of this strategy update.

SECTOR DEVELOPMENT CONTEXT

4. **Overall context**. There have been significant changes on the energy program strategy since its adoption by the GMS countries. Between 2015 and 2022, the population had increased by 6% to 14% in Cambodia, Lao PDR, Myanmar, and Viet Nam, and over 2% in the PRC and Thailand. During this seven-year period, the gross domestic product (GDP) of all GMS countries, except the Lao PDR, increased by at least 23%. This economic growth was accompanied by a notable decline in the proportion of the population living below the national poverty line, except in Cambodia, where the proportion rose from 14% to 18%. The PRC, Thailand, and Viet Nam led poverty reduction efforts in the subregion during this period.[2]

5. By 2022, the PRC, Lao PDR, Thailand, and Viet Nam had achieved 100% access to electricity for their populations. Per capita electric power consumption increased significantly by as much as 100% in Cambodia, Lao PDR, Myanmar, and Viet Nam since 2015. Meanwhile, the share of renewable energy in total energy consumption increased by about 25% in the PRC but decreased by up to 16% in the other GMS countries since 2015.[3]

6. Although coal and gas currently dominate the energy supply mix of GMS countries, renewable energy sources are growing, and their increased impact could be evident by the end of the decade. The subregion has significant potential in hydro, solar, and wind power. Due to the economic and supply risks of relying on imported fuel and gas and in support for the region's net-zero targets, the GMS countries have been shifting attention toward renewable energy sources.[4] In 2023, for example, Cambodia approved one hydropower and four solar projects with a total

[1] ADB.2021. *The Greater Mekong Subregion Economic Cooperation Program Strategic Framework 2030*.
[2] ADB. Key Indicators Database (accessed 22 April 2024).
[3] ADB. Key Indicators Database (accessed 22 April 2024).
[4] ADB. 2023. *Greater Mekong Subregion Energy Sector Assessment, Strategy, and Road Map*. Consultant's report (TA-6744 REG).

capacity of 520 megawatts (MW).[5] The Lao PDR launched the Monsoon Wind Power project with a 600 MW contracted capacity, the largest in Southeast Asia.[6] Meanwhile, Viet Nam approved its Power Development Plan 8, which targets 47% of installed capacity to come from wind, solar, and hydropower by 2030.[7]

7. **Regional power trade**. The subregion has a long history of bilateral electricity trade, led by independent power producers (IPP) and power utilities. Experience in multilateral trade is recent, involves small amounts, and is unidirectional. The sale of power by Lao PDR to Singapore, wheeled through Thailand and Malaysia under the Lao PDR–Thailand–Malaysia–Singapore Power Integration Project (LTMS PIP), was piloted from 2022 to 2024 under the Association of Southeast Asian Nations (ASEAN) Power Grid (APG) initiative. Political and institutional support for this project is relatively strong, but it is constrained by the 300 MW maximum capacity of the grid and a lack of consensus on wheeling charges, among other issues. There is significant potential for expanding power trade among GMS countries, especially with the promotion of renewable energy sources. Singapore plans to import up to 6 gigawatt (GW) of clean energy by 2035. Viet Nam will continue purchasing hydropower and wind electricity from Lao PDR from 31 December 2025 onwards.[8] Outside the subregion, the current markets for GMS exporting countries are Malaysia and Singapore, while the PRC exports to Mongolia and provides electricity to areas outside the Chinese mainland.

8. **Power interconnection**. Despite progress, the interconnection infrastructure is still insufficient to fully integrate power systems in the subregion. The ASEAN Interconnection Masterplan Study (AIMS) III has identified 18 priority interconnectors to advance the implementation of the APG, covering five GMS countries and excluding the PRC.[9] As of March 2024, 9 of these 18 interconnectors do not exist, including those between Lao PDR–Myanmar and Thailand–Myanmar. Feasibility studies are ongoing for two interconnectors (Sabah–Kalimantan and Peninsular Malaysia–Sumatra), and nine require upgrades, including those between Thailand–Lao PDR, Lao PDR–Viet Nam, and Cambodia's interconnections with Lao PDR, Thailand, and Viet Nam.[10] The 18 projects also consider potential subsea interconnections among the southern and eastern ASEAN countries. However, new developments such as connections to Singapore from other ASEAN countries have not yet been included.

9. **Energy efficiency and conservation**. The energy intensity, or the cost of converting energy into GDP, for all GMS countries is significantly lower at $220 million than Southeast Asia's average of $305 million (at 2017 constant prices). Within the subregion, Myanmar has the highest energy intensity at $276 million.[11] Energy efficiency and conservation are integral to the GMS countries' nationally determined contributions and long-term strategy targets to decarbonize their economies. Reducing energy use, especially in energy-intensive industries, transport, and buildings, can result in significant cost savings. ADB estimates that energy efficiency savings

[5] Vannak, C. 2023. Cambodia approves five Renewable Energy projects. *Khmer Times*. 8 April.
[6] ADB. 2023. ADB Signs Loan for First Cross-Border Wind Power Project in Asia, First Plant in Lao PDR and Largest in Southeast Asia. News release. 1 March.
[7] National Power Development Planning in 2021–2023 with an outlook to 2050, 15 May 2023. file:///C://Users/AMY/OneDrive/Desktop/ENERGY/REF/ADB hsu-2022.pdf.
[8] Viet Nam MOIT's Decision No.2647/QD-BCT issued on 8 October 2024.
[9] AIMS III is intended to be used as the main reference of ASEAN for pursuing regional cooperation in the power and variable renewable sector in Southeast Asia. Phase 1 covers capacity expansion planning, Phase 2 grid analysis and Phase 3 multilateral power market.
[10] ASEAN Centre for Energy. 2024. *Recap on the Latest Status of APG*. Presentation prepared for the meeting between the ASEAN Deputy Secretary General, Asian Development Bank and the World Bank. Jakarta. 20 March.
[11] ADB. Key Indicators Database (accessed 1 May 2024).

across Cambodia, Lao PDR, and Myanmar alone could reach 30.4 terawatt-hours (TWh) from 2021 to 2030 if energy efficiency programs are implemented. [12]

10. **Smart grids**. Electricity networks in the GMS need upgrades to match the demand and supply of energy while promoting cost-efficiency, stability, and reliability of the grid. The integration of variable renewable energy into the grid requires smart grid technologies to monitor and manage the transport of electricity from different generation sources to meet the varying demands of consumers. Solar and wind forecasting play a crucial role in this process, helping to predict generation fluctuations and optimize grid stability. Thailand, Lao PDR, and Myanmar have made progress in upgrading substations recently, but Lao PDR's grid remains operationally separated into four zones. While countries like Thailand, Myanmar, and Viet Nam have begun charting a path to a national smart grid, progress is still in its early stages. Critical infrastructure developments, including advanced forecasting systems, need to be implemented before extensive renewable integration or automated supply and demand management can occur. [13]

11. **Just energy transition.** The concept of "just transition" has been around since the 1980s, but it has gained traction recently in relation to the negative social impacts of climate goals on people, workers, and communities. [14] While no formal assessment of sector practices related to just transition has been undertaken, an examination of GMS energy projects approved by ADB from 2015 to 2023 provides some indication. About 42% of these projects were classified as addressing remaining poverty and reducing inequalities through human capital and social protection, job generation, and access to opportunities for the most vulnerable (ADB operational priority 1). Similarly, 58% of the projects were classified under accelerating progress in gender equality (ADB operational priority 2). [15] Moreover, the current practice of the ETTF is to encourage the nomination of at least 30% women in ETTF meetings and other activities. There is currently no assessment or evidence to support conclusions on the effective participation of project-affected people in these projects.

12. **Capacity improvement**. The GMS countries are on varying pathways and at different stages of energy transition. To accelerate this process, they need to continue building capacities in governance, technology and innovation, energy efficiency and conservation, and access to green and transition finance. To make sure the transition is just, the capabilities of GMS countries to design inclusive programs that address the negative social impacts of the transition need to improve as well. In 2023 and 2024, capacity building for GMS countries and the ETTF focused on tools to support energy transition, including regional power market, demand side management, demand response, smart grids, renewable energy technologies, energy efficiency, battery energy storage systems (BESS), solar and wind forecasting, issues in renewable energy integration to the power grid, emerging technologies (such as hydrogen, ammonia, and vehicle-to-grid or V2G), and green finance. Prior to 2023, and under the previous energy strategy, capacity building focused on enhancing the GMS governments' ability to develop an environmentally sustainable power sector, as well as the renewable energy and energy efficiency potential in the subregion.

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[12] ADB. 2022. Energy Efficiency Opportunities and Business Models in the GMS as a First Fuel for Energy Security and Climate Mitigation. Consultant's report. Manila (TA 9003-REG). Unpublished.
[13] ADB. 2023. Greater Mekong Subregion Energy Sector Assessment, Strategy, and Road Map. Consultant's report. Manila (TA-REG 6744). Unpublished.
[14] The movement was initiated by trade unions in the United States in the 1980s to protect workers affected by new water and air pollution regulations.
[15] Data was derived from ADB's internal database 2010–Dec 2023 OCR, COL, ADF approvals and commitments accessed on 3 April 2024. Operational priorities as set out in ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific.*

This was mainly undertaken through the GMS Regional Power Trade Coordination Committee (RPTCC), the precursor to the ETTF, which was formed in 2022.

13. **Private sector participation**. The private sector plays a significant role in power generation in Cambodia, Lao PDR, Thailand, and Viet Nam, contributing 64% to 83% of the domestic capacity mix. In Myanmar, the private sector participates through the IPP model, while in the PRC, local investors are primarily involved in generation through the build-operate-transfer model. For transmission, the private sector engages through build-operate-transfer schemes in Cambodia, PRC, Lao PDR, and Thailand. Viet Nam has introduced a new public–private partnership (PPP) law for power transmission, while Myanmar does not yet have a legal framework for public–private partnerships (Table 1).[16]

Table 1: Private Sector Participation in the Energy Sector

Country	Private Participation	Public–Private Partnerships
Cambodia	Significant role in generation (83% of domestic capacity mix in 2021).	Public–private partnership (PPP) structures in place and have operated in transmission sector under build-operate-transfer (BOT) agreements.
People's Republic of China	Private participation largely concentrated in local investors through BOT.	Greenfield projects represent majority of PPPs in energy sector infrastructure under BOT agreements.
Lao People's Democratic Republic	Significant role in generation (65% of domestic capacity mix in 2020).	PPP structures in place and have operated in transmission sector under BOT agreements.
Myanmar	Direct private role in generation with prevailing independent power producer model.	No common PPP framework, but guidelines for unsolicited proposals with approval from Investment Commission.
Thailand	Significant role in generation (64% of domestic capacity mix in 2021).	PPP structures in place and have operated in transmission sector under BOT agreements.
Viet Nam	Significant role in generation (83% of domestic capacity mix in 2020).	New PPP law to support power and infrastructure projects. Continues to operate mostly under BOT for infrastructure projects.

Source: ADB. 2023. Greater Mekong Subregion Energy Sector Assessment, Strategy, and Road Map. Consultant's report. Manila (TA-REG 6744). Unpublished.

14. **Analysis of regional cooperation in energy**. An assessment of the strengths, weaknesses, opportunities, and threats in the sector indicates that energy cooperation in the GMS has more strengths and opportunities that can be leveraged. Beyond the accomplishments on technical and institutional requirements in regional power trade under the leadership of the GMS RPTCC and the subregion's renewable energy potential, the timing is favorable for GMS countries due to current climate commitments and incentives to decarbonize all sectors, as well as renewed interest in the APG. These strengths and opportunities have the potential to overcome the lack of political will that has hindered the energy sector's pursuit of regional power trade and interconnection projects.

[16] ADB. 2023. Greater Mekong Subregion Energy Sector Assessment, Strategy, and Road Map: Accelerating the Clean Energy Transition in Southeast Asia. Consultant's report. Manila (TA 6744-REG). Unpublished.

Table 2: Strengths, Weaknesses, Opportunities and Threats for Energy Cooperation in the Greater Mekong Subregion

STRENGTHS	WEAKNESSES
1. Developed regional grid code, harmonized performance standards, and necessary regulatory framework for regional power trade 2. Long experience in bilateral energy trade and pilot experience in multilateral trade (LTMS PIP) 3. Renewable energy resource endowments 4. GMS countries' net-zero and carbon neutrality targets 5. Institutionalized mechanism for energy cooperation 6. A culture of cooperation among GMS and ASEAN countries	1. Inadequate priority afforded to regional projects 2. Diverse legal and regulatory frameworks 3. Limited experience in multilateral power trade and domestic power market 4. Inadequate interconnection infrastructure 5. Country concerns over the firmness of renewables are balanced by natural gas or conventional fossil fuels.
OPPORTUNITIES	**THREATS**
1. Renewed interest in implementation of the Association of Southeast Asian Nations Power Grid 2. Lessons from the experience in interconnection and power market development of other countries and subregions 3. Global climate agenda. 4. Improvement in energy efficiency and conservation 5. Availability of green and transition finance; transmission projects supporting renewable energy development, climate resilience, etc. can qualify for green finance. 6. Technology and innovations (e.g., smart grid, battery storage, green hydrogen, offshore wind, etc.)	1. Concerns over availability, quality and reliability of electricity supplied through the integration of variable renewable energy in the grid. 2. Geopolitical tension that creates economic and energy supply risks 3. Climate change and extreme weather events

Source: Author.

LESSONS AND STAKEHOLDER ENGAGEMENT

15. The preparation of the GMS energy sector strategy draws upon the achievements and lessons from the implementation of the sector strategy since 2015. It is also informed by inputs gathered from a multistakeholder and multilevel consultation process that began in 2023 during the preparation of the energy sector assessment.[17]

A. Achievements and Lessons from Previous Strategy

16. The previous energy sector strategy guided the GMS countries from 2015 to 2020, including through the coronavirus disease (COVID-19) pandemic period. The expected outcome of the old strategy—improved energy security of GMS countries in an environmentally sustainable manner—had two outputs: (i) increased power exchanges of electricity among GMS countries, and (ii) enhanced government capacity in developing an environmentally sustainable power sector as well as renewable energy and energy efficiency potentials in GMS countries.

[17] This strategy update followed a consultative process involving key stakeholders and experts. The ADB team, serving as the ETTF secretariat, completed the consultation draft that was circulated to ETTF members in May and discussed during the third meeting of the ETTF on 5–6 June 2024 in Manila.

17. Achievements of these desired results are mixed. At the subregional level, regional power trade between GMS countries remains suboptimal. The Regional Power Coordination Center, agreed to be established through a memorandum of understanding in 2012, has not materialized. However, substantial progress has been made toward developing a regional grid code, harmonized performance standards, and a regulatory framework. These await adoption by the GMS countries or need updating to include other ASEAN countries under the APG framework for multilateral power trade. After almost a decade of annual mentions in ASEAN joint ministerial statements, multilateral power trade was finally piloted, and talks are underway for the next phase of the LTMS PIP. The GMS countries endorsed a project concept note on regional power market and interconnection development to start multilateral power trade in cooperation with ASEAN, focusing initially on expanding connectivity with the LTMS countries.

18. On enhancing government capacity toward an environmentally sustainable power sector, it is notable that despite strong economic growth, the energy intensity, or the cost of converting energy into GDP, of all GMS countries is significantly lower than Southeast Asia's average. Additionally, the national development plans or power sector development plans of GMS countries articulate clear targets for reducing carbon emissions in the energy sector to support their climate ambitions. While the renewable energy share in the total final energy consumption in the PRC increased by about 25% since 2015, it declined by up to 16% in the rest of the GMS countries, indicating that investment in renewable energy is not keeping pace with the growth in energy demand.[18] However, ADB's approval of 59 energy projects from 2015 to 2023 shows a positive trend, with 31 of the 59 projects (about 53%) primarily intended for renewable energy generation. Another 8 projects (14% of the total) promote energy efficiency and conservation. [19]

19. Key lessons identified in the past years include the following:

(i) **Political support**. Initiatives to increase regional power trade within the GMS, such as the regional grid code and regulatory and pricing measures produced and the memorandum of understanding to establish the Regional Power Coordinating Center would need sustained political support to materialize.

(ii) **Financing**. Regional projects are not always prioritized for financing by the GMS governments. Additionally, the nature of some projects limits access to green finance and discourages private financing due to an unattractive risk-return profile. Demonstrating the economic benefits of regional projects and initiatives and assisting GMS countries in developing business models, creating bankable projects, and designing de-risking approaches to investment are necessary. It is important to seek climate funds or carbon financing to lower the costs of energy transition projects.

(iii) **Climate push**. The global climate agenda and the corresponding climate commitments of GMS countries are providing incentives to GMS countries to accelerate the development and trade of renewable energy and further improve energy efficiency and conservation.

(iv) **Resiliency to shocks**. The COVID-19 pandemic, geopolitical tensions, and extreme weather events due to climate change have impacted energy sector policies, plans, and projects in the GMS. The GMS energy cooperation program needs to account for these shocks and promote resilience during planning.

[18] ADB. Key Indicators Database (accessed 25 April 2024).
[19] ADB. 2010–Dec 2023 OCR, COL, ADF approvals and commitments (accessed 3 April 2024).

(v) **Expanded cooperation**. The GMS program needs to strengthen alignment and cooperation with the ASEAN and other subregional power trade initiatives such as the LTMS PIP.

(vi) **Energy efficiency**. Focusing on demand-side measures through energy efficiency and enhancing the capacity building of GMS countries through partnerships with other development partners is essential.

B. National Priorities of Member States

20. **Net-zero targets**. The GMS countries have committed to long-term decarbonization targets to align with the goals of the Paris Agreement While meeting these climate ambitions requires efforts across sectors, the energy sector's contribution is expected to be significant, given its over 70% share in global emissions. Renewable energy, as well as energy efficiency and conservation, will play a pivotal role in achieving the net-zero targets. Cambodia, Lao PDR, and Viet Nam aim for net-zero emissions by 2050. Thailand has committed to carbon neutrality by 2050 and net-zero emissions by or before 2065. The PRC has set a 2060 carbon neutrality target and launched a carbon emissions trading scheme. Myanmar's commitment to net-zero emissions by 2040 primarily comes from forestry and other land use. These targets are shaping the policies, plans, and investment decisions of GMS countries in the energy sector.

21. **Transition technologies**. The GMS countries are eager to embrace and adopt new and emerging technologies to accelerate their energy transition pathways. Currently, there is momentum for piloting BESS across Cambodia, Lao PDR, Thailand, and Viet Nam. Thailand, for instance, has begun integrating BESS into their planning processes, as evidenced by the inclusion of a category for solar with BESS in their latest feed-in tariff announcement.[20] Cambodia is implementing its first utility-scale BESS systems with the technical and financial support of ADB, and has been requiring the IPPs of new solar projects to install BESS for output smoothing. In addition, Cambodia is conducting a nationwide study on opportunities to complement their 2 GW solar build-out with BESS through to 2035.[21] Similar to BESS, pump storage hydropower (PSH) offers highly flexible supply that can support the integration and 'firming up' of renewables across the subregion. Thailand currently has 1.5 GW of installed PSH capacity with an additional 2.5 GW planned for 2034–2037. Viet Nam is also developing a 1.2 GW asset in Ninh Thuan scheduled to come online in 2028 and is currently implementing BESS projects. Lao PDR is considering adopting this technology. Furthermore, according to the Mid-term and Long-term Development Plan for Pumped Storage Hydropower 2021–2035, the PRC aims to reach 62 GW of operating capacity of PSH by 2025, and 120 GW by 2030.[22]

22. Regarding electric vehicles, manufacturing capabilities are growing in Thailand and Viet Nam.[23] Thailand's 30@30 Policy Plan aims for zero-emission vehicles to account for at least 30% of total automotive production by 2030, including domestic manufacturing of batteries.[24] Viet Nam aims to develop battery manufacturing facilities and electric vehicle charging infrastructure. Viet

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[20] McKenzie, Baker. 2022. Thailand Poised to Launch New Round of Renewable Energy Auctions. *Lexology.*
[21] ADB. 2022. ADB, EDC Sign Mandate for 2 GW Solar and Battery Storage Power Program in Cambodia. News release. 2 November.
[22] ADB. 2023. Greater Mekong Subregion Energy Sector Assessment, Strategy, and Road Map: Accelerating the Clean Energy Transition in Southeast Asia. Consultant's report. Manila (TA 6744-REG). Unpublished.
[23] ADB. 2023. Greater Mekong Subregion Energy Sector Assessment, Strategy, and Road Map: Accelerating the Clean Energy Transition in Southeast Asia. Consultant's report. Manila (TA 6744-REG). Unpublished.
[24] ADB. 2024. Thailand's Big Push into the Electric Vehicle Market. *Southeast Asia Development Solutions*. 28 February.

Nam targets having 1.0 million electric vehicle cars in 2028 and 3.5 million electric vehicle cars in 2040, working toward the goal of 100% of transport vehicles using electricity and green energy by 2050.[25] By October 2023, Viet Nam's electric vehicle numbers had reached 33,000 cars, 2.0 million moto bikes, and 0.7 million bicycles.[26]

23. **Grid infrastructure development**. A review of the GMS power development plans indicates broad interest in constructing or upgrading existing grid infrastructure: (i) countries are developing transmission lines to un-electrified areas (Cambodia and Lao PDR), in high-resource potential regions (Viet Nam), and in industrial zones and other areas across the country to support a high proportion of renewable energy (Thailand);[27] (ii) establishing unified operations for the grid if unity does not already exist, as in Lao PDR; and (iii) improving grid and substation (grid automation) infrastructure to reduce system losses, improve reliability, and allow for a higher quality of power delivery.[28] Additionally, there is interest in evaluating the possibility of applying high-voltage direct current (HVDC) transmission technology to connect the grids for electricity import and export, while overcoming the technical differences of power systems of GMS countries. Currently, two studies are underway to assess the feasibility of interconnection projects in Sabah–Kalimantan and Peninsular Malaysia and Sumatra. Moreover, ASEAN has sought support from ADB and the World Bank to finance feasibility studies, project design and capital expenditures of interconnection projects.[29]

24. **Regional power trade**. GMS countries are gearing up for a new phase of power trade in the subregion. In 2022, Lao PDR's Monsoon Wind Power project, the largest in Southeast Asia, was approved to export electricity to Viet Nam. In 2023, Singapore granted conditional approvals of 1 GW of clean energy import from Cambodia, 2 GW from Indonesia, and 1.2 GW from Viet Nam.[30] In April 2024, Malaysia announced the establishment of Energy Exchange Malaysia to facilitate trade of green electricity to neighboring countries, Singapore, and Thailand.[31] Moreover, to strengthen and advance the implementation of APG, ASEAN countries are poised to execute an intergovernmental framework agreement. APG provides the framework for multilateral power trade.

C. Role of Development Partners

25. Many development partners have supported the GMS countries' energy transition pathways. Through multidonor-funded technical assistance projects, ADB has provided secretariat support to RPTCC and subsequently to ETTF since their inception, enabling both entities to identify, plan, and implement priority initiatives and activities. Their regular meetings and learning events are attended by development partners to encourage better coordination and collaboration at both subregional and country levels. Notable among these are the United States

[25] Viet Nam Automobile Manufactures' Association's estimate. 2024

[26] Viet Nam Registration Authority of the Ministry of Transport's statistics. November 2023

[27] Government of Cambodia, Ministry of Mines and Energy. 2015. *Power Development Plan.* USAID and Government of Lao PDR. 2020. *Power Development Plan 2020-2030 of Lao PDR;* Government of Viet Nam. *National Power Masterplan for 2021 to 2030 [Power Development Plan 8]*; and Government of Thailand, Ministry of Energy. 2019. *Power Development Plan 2018 Rev. 1.*

[28] ADB. 2023. Greater Mekong Subregion Energy Sector Assessment, Strategy, and Road Map: Accelerating the Clean Energy Transition in Southeast Asia. Consultant's report. Manila (TA 6744-REG). Unpublished.

[29] The ASEAN Secretariat invited ADB and the World Bank to a meeting on 20 March 2024 to discuss financing for APG.

[30] Energy Market Authority. Regional Power Grids.

[31] Ikram, I. *2024.* Malaysia sets up energy exchange, to open 100MW green electricity export to Singapore. *The Edge Malaysia.* 15 April.

Agency for International Development's (USAID) Southeast Asia Smart Power Program under the Japan–United States Mekong Power Partnership, which supports efforts in renewable energy certificate, variable renewable energy integration, and feasibility studies of two interconnection projects, among other initiatives. The Mekong–Australia Partnership is also supporting green energy transition, with a focus on solar, electric vehicle, and battery storage supply chains. It has also provided $1 million cofinancing to the ADB technical assistance to support the activities of the ETTF. Additionally, ESCAP's APG Advancement Program is delivering the APG road map and piloting multilateral power trade.

GMS ENERGY STRATEGY 2024–2030

D. GMS Energy Cooperation – Strategic Framework

26. The GMS energy sector strategic framework 2024–2030 is aligned to the GMS Economic Cooperation Program Strategic Framework 2030 (GMS-2030). It identifies strategic priorities and innovative approaches across crosscutting areas aimed at achieving the sector outcome and vision, which in turn contributes to the GMS program's connectivity pillar (Figure 1). The sector strategy is anchored on these principles: (i) environmental sustainability, akin to the GMS program's first core principle; (ii) support for knowledge-sharing on newer energy solutions; and (iii) a regional energy efficiency framework.[32]

27. A more detailed description of each component of the GMS energy cooperation strategic framework is provided in the succeeding paragraphs.

E. GMS Energy Cooperation – Vision and Outcome

28. The GMS energy cooperation program vision is a secure and green energy future for the subregion. By 2030, the anticipated outcome is an accelerated just energy transition in the GMS. The GMS governments aim to ensure energy security with an increasing proportion of clean energy through regional power trade, including interconnection development, energy efficiency and conservation programs, and capacity improvement for energy transition.

29. In addition to the imperative to meet transition targets, the anticipated outcome underscores the importance of addressing the human aspect of energy transition. It acknowledges that the process needs to be just, that is, centered around the development and protection of people's well-being alongside environmental and climate considerations. The Intergovernmental Panel on Climate Change defines just transition as "a set of principles, processes and practices that aim to ensure that no people, workers, places, sectors, countries or regions are left behind in the transition from a high-carbon to a low-carbon economy."[33] A just energy transition (i) fosters job creation and worker protection; (ii) promotes social and economic development; (iii) fosters equity, social inclusion and fairness; and (iv) supports people to become active participants in the process.[34] It requires that those who make decisions consider and work with those who will be impacted by the decisions.

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[32] These sector principles are mentioned in the connectivity pillar (energy) of the GMS Strategy 2030 (p.29).
[33] Intergovernmental Panel on Climate Change. 2022. Climate Change 2022: Mitigation of Climate Change. *IPCC Sixth Assessment Report*.
[34] International Energy Agency. 2021. *Recommendations of the Global Commission on People-Centred Clean Energy Transitions*.

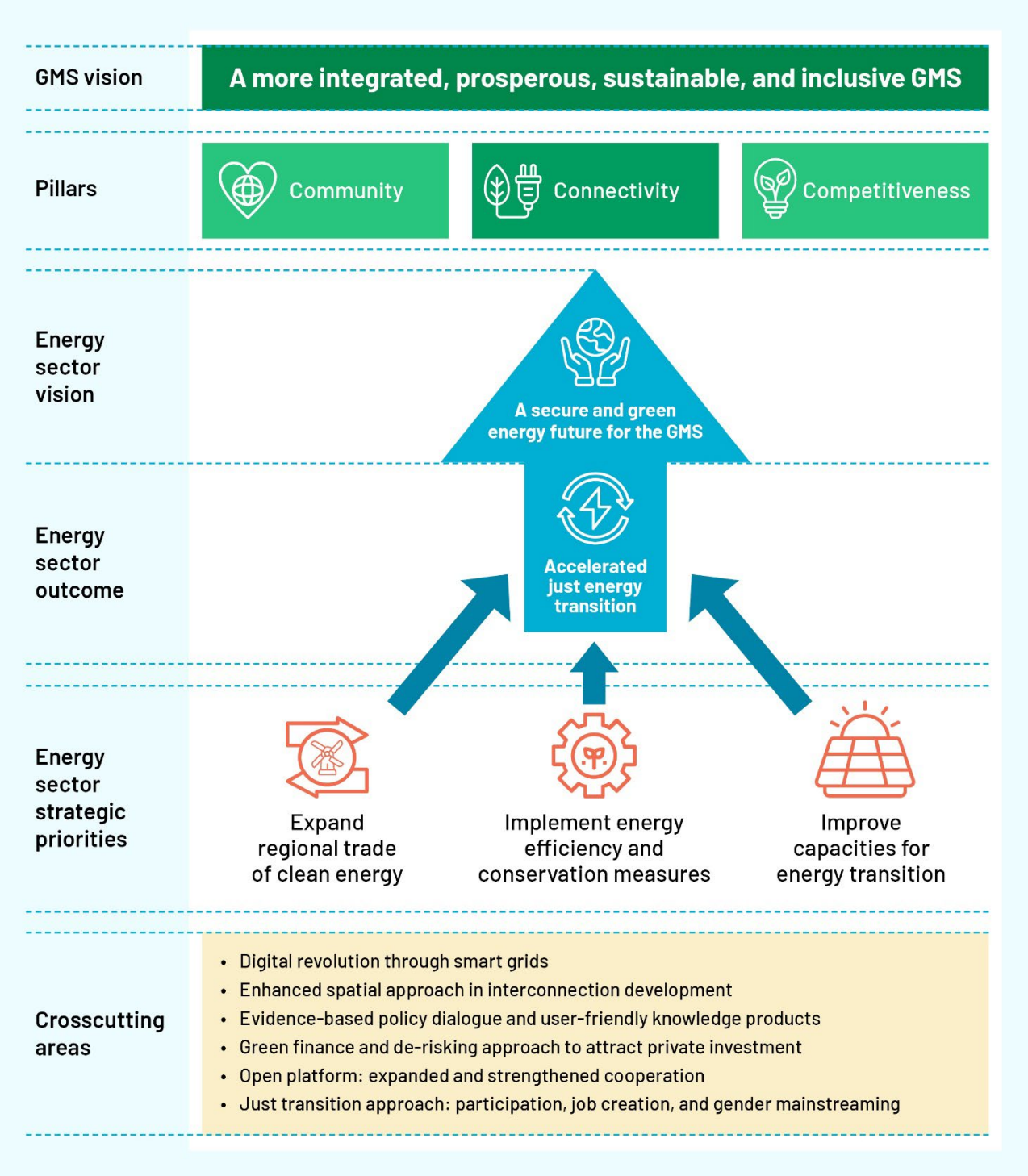
30. **Consistency with Core Principles of the GMS 2030**. The energy cooperation program is aligned to the three core principles of the GMS program: environmental sustainability and resilience, internal and external integration, and inclusivity.

(i) **Environmental sustainability and resilience**. The GMS energy program will promote the expansion of trade based on renewable energy sources and will employ a complementary approach of energy efficiency and conservation to mitigate or reduce energy consumption, especially of fossil fuels. In its pursuit of resilience, the GMS program will prioritize energy security by enhancing generation capacity and bolstering the resilience of power systems. The program will adopt various approaches such as vulnerability assessments, smart grids, climate proofing infrastructure, and diversification of energy sources and suppliers through regional power trade to bolster resilience. To ensure sustainable energy development while avoiding or minimizing negative environmental impacts and preserving limited resources, such as water security, the GMS energy program will promote environmental, social and governance or ESG practices and carbon credit market operations, and other sustainable initiatives.

(ii) **Internal and external integration**. The GMS energy program will endeavor to deepen integration among the GMS countries, with other ASEAN nations, and potentially with other subregions in Asia. For example, support will be extended to the next phase of the LTMS project and similar endeavors that expand the market scope of the GMS. The ETTF will actively collaborate with ASEAN in formulating protocols for the APG framework agreement. Furthermore, the GMS energy cooperation program will strive to glean insights from the experiences of regional cooperation programs in Central Asia and South Asia.

(iii) **Inclusivity**. The GMS energy program will promote an inclusive energy transition that encompass the following: (a) centrality of the well-being of people and communities; (b) recognition of the need of industries for upskilling, financing and incentives to manufacture, assemble or import low-carbon technologies; (c) improvement of access to technologies and innovations; (d) expanding access to transition and green finance both by the governments and private companies; and (e) support for assessing and mitigating the impacts of transition policies.

Figure: 1 GMS Energy Sector Strategic Framework, 2024–2030



GMS = Greater Mekong Subregion.
Source: Author.

F. Strategic Priority Areas

31. The GMS energy cooperation program will prioritize three strategic priority areas for intervention to achieve the sector outcome of accelerated just energy transition under the GMS program connectivity pillar: (i) expansion of regional trade of clean energy, (ii) implementation of regional efficiency and cooperation initiatives, and (iii) improvement of capacities toward energy transition. High-level actions under each strategic priority are:

32. Regional trade of clean energy:

(i) Align GMS agreements and memorandums of understanding, protocols (e.g., regional grid code and wheeling charge) and institutional arrangements for regional power trade to the APG framework to facilitate expansion of regional power market to other ASEAN countries;
(ii) Identify key interconnection projects of regional importance and seek their inclusion in the power development plans or GMS Regional Investment Framework (RIF);
(iii) Develop various financing mechanisms that includes sovereign, nonsovereign, and guarantee products to mobilize financing for project preparation studies and investment under the ASEAN multilateral power trade framework;
(iv) Implement shadow power trade and pilot multilateral power trade to foster learning through practical experience and to develop the suitable market rules and regulations; and
(v) Develop a regional qualification system for clean or renewable energy (e.g., mutual recognition of domestically issued renewable energy certificates).

33. Energy efficiency and conservation:

(i) Demand side: foster capacity strengthening for demand-side management for power utilities, explore potential cooperation in energy efficiency and conservation measures in building and industrial sectors, which include alignment, harmonization and/or mutual recognition of standards and labels for electrical appliances and electricity vehicle infrastructure in these sectors.
(ii) Supply side: promote generation efficiency at the country level (e.g., virtual power plant) and regional level (e.g., regional power pool) and support the integration of electric vehicles into national grids.

34. Capacity improvement:

(i) Examine potential synergies with programs offered by development partners, think tanks, and reputable institutions and
(ii) Co-create and implement annual capacity improvement plan for ETTF in consultation with the GMS countries, to learn and share new knowledge and practices including but not limited to renewable and low-carbon energy, solar and wind forecasting, BESS, energy efficiency technologies, and green finance

G. Crosscutting Themes and GMS 2030 “Innovative Approaches”

35. The GMS energy cooperation program will utilize innovative approaches across these crosscutting areas to achieve the sector outcome: (i) digital revolution through smart grids; (ii) enhanced spatial approach in interconnection development; (iii) evidence-based policy dialogue and develop user-friendly knowledge products; (iv) green financing and de-risking approach to attract private investment; (v) an open platform through expanded and strengthened cooperation; and (vi) a just transition approach focusing on participation, job creation, and gender equality.

i. Digital Revolution

36. Energy cooperation in the GMS will facilitate the transition to smart grids, which involves the modernization of transmission lines, substations, transformers, and other components through digital and advanced technologies. Smart grids aim to achieve several benefits, including increased integration of large-scale renewable energy systems, allowing customers to own renewable energy systems; more efficient transmission of electricity; quicker restoration of electricity following power disruptions; reduced operational and management costs, leading to lower power costs for consumers; decreased peak demand; and enhanced security.

ii. Enhanced Spatial Approach

37. The GMS energy program will prioritize the identification, assessment, construction, or upgrade of key interconnectors based on strategic geographical positioning and their significance to the regional electricity market. Priority will be given to interconnectors that have the potential to enhance regional power trade. For instance, priority may be placed on multilateral grid to grid interconnection projects within GMS countries and/or regional interconnectors linking GMS countries to other ASEAN countries like Malaysia or Singapore through the optimal combination of land-based and subsea cable interconnections, as well as those facilitating bidirectional power trade.

iii. Deeper Policy Dialogue and Knowledge Solutions

38. The ETTF will maintain its practice of inviting policymakers, regulators—including members of the ASEAN Energy Regulators Network—and utilities, such as the heads of ASEAN power utilities and authorities, to its meetings and other engagements to foster evidence-based policy dialogue within the sector. This dialogue will be further enriched by the participation of officials from planning and finance ministries, as well as experts with experience in other subregions or continents. Technical assistance projects will prioritize the development of demand-driven knowledge products that offer quick reference guides to tools, methods, and approaches, ensuring their accessibility and practicality. Additionally, GMS member countries may promote the participation of professional organizations that represent industry practitioners in developing user-friendly knowledge solutions.

iv. Private Sector Solutions

39. The GMS program will facilitate access to green financing and stimulate increased private investment in energy transition projects by advocating for a de-risking approach and developing suitable public–private partnership mechanisms (e.g., build-operate transfer schemes) for various renewable energy development, interconnection projects, pumped storage, and BESS. Collaborating with ADB and other development partners, the ETTF will investigate the establishment of an approach aimed at mitigating risks associated with projects to attract private capital. GMS countries will receive assistance in identifying obstacles and risks that hinder private investment, as well as in implementing government- or financial institution-led interventions to mitigate these risks. These interventions may involve reducing, transferring, or compensating for investment risks to create a risk-return profile conducive to scaling up private investment.

v. Open Platform

40. The strategy emphasizes the importance of the GMS energy cooperation program being more open and inclusive. The ETTF will work to coordinate and harmonize the energy program with the ASEAN Plan of Action for Energy Cooperation, especially the APG, as well as with programs and initiatives of development partners like the Japan–United States Mekong Power Partnership, Mekong–Australia Partnership, and Energy Transition Partnership, among others. To foster alignment and collaboration, optimize resource utilization, and prevent redundancy, the ETTF will maintain its practice of inviting ASEAN entities, development partners, and think tanks or academic institutions to its regular meetings and other engagements. Furthermore, the ETTF will actively encourage the involvement of expertise from the private sector and civil society in its activities.

H. Just Transition Approach

41. The GMS energy program will use social dialogue and robust stakeholder engagement to ensure that project- and policy-affected individuals actively participate in the design, implementation, and review of projects and initiatives. Stakeholder consultations will be conducted to establish trust, facilitate open discussion, and consider diverse perspectives in decision-making processes. Efforts will be made to maximize the creation of decent jobs, with government support focusing on skills development and re-training for affected individuals. Moreover, the program will seek to avoid or minimize the negative impact of transition as well as optimize and distribute equitably its benefits, especially toward the low-income, marginalized and vulnerable groups.

42. Additionally, a gender mainstreaming approach will be employed to promote gender equality and women's empowerment throughout the program. This will involve initiatives to improve gender balance in decision-making and leadership roles within the ETTF, as well as ensuring equal opportunities for participation and representation of genders in trainings and meetings. Project proponents will be encouraged to incorporate performance indicators and targets aimed at enhancing the economic empowerment of women, such as promoting labor participation, ensuring equal pay, providing vocational training opportunities, and fostering entrepreneurship. The indicators and targets will follow the guidance from the GMS Results Frameworks and the Gender Strategy Implementation Plan.

STRATEGY IMPLEMENTATION

A. Implementation Arrangements

43. To align with the GMS strategy 2030, this energy sector strategy update will be implemented soon after its target approval in 2024 up until 2030. Implementation will be led by the ETTF and coordinated by ADB as the ETTF Secretariat. General roles of key stakeholders involved in strategy implementation are outlined in Table 3.

Table 3: Institutional Mechanism for Energy Sector Strategy Implementation

Entity	Role
1. GMS Energy Transition Task Force (ETTF)	• Lead the overall strategy implementation, monitoring, and review • Identify and review project proposals for inclusion in the Greater Mekong Subregion (GMS) Regional Investment Framework

	• Identify and assess potential partnerships and opportunities for regional energy cooperation • Design and implement capacity building and knowledge-sharing activities • Serve as GMS energy cooperation program champions in their respective countries
2. GMS Senior Officials Meeting (SOM)	• Review energy cooperation projects and initiatives endorsed by the ETTF • Endorse energy projects and initiatives to GMS ministers • Provide strategic guidance to the ETTF
3. GMS Ministers	• Provide overall guidance to the GMS program, including energy
4. GMS Secretariat	• Coordinate the implementation of GMS sector strategies at the subregional level • Report sector strategy implementation progress to SOM and ministers
5. National GMS Secretariat	• Coordinate the implementation of the energy sector strategy at the country level, and with the GMS Secretariat
6. ADB's Energy Sector Pacific and Southeast Asia Team, Energy Sector Office, Sectors Group	• Provide secretariat support to the ETTF • Coordinate and collaborate with the ASEAN and development partners • Identify opportunities that can be tapped by the ETTF and individual GMS countries

Source: Author.

B. Costs and Financing

44. Projects under the three strategic priority areas will come through the GMS RIF, the medium-term pipeline of priority projects of GMS countries. The RIF's 3-year rolling pipeline will align with the strategy and will be updated on an annual basis by the ETTF. Additionally, ADB technical assistance will support the operation of the ETTF, which will lead the overall strategy implementation, monitoring, and review. A dedicated financing facility or mechanisms will be developed for ASEAN, which can also support interconnection projects in some GMS countries.

C. Monitoring of Results

45. The ETTF will closely monitor the implementation of the strategy utilizing the results framework outlined in Attachment 1. This framework delineates the performance indicators for both the sector outcome and outputs, providing a clear road map for tracking progress. Semiannual reporting, aligned with the ETTF meetings, will be conducted to assess advancements against the performance targets set for the sector outputs. Any significant achievements toward the sector outcome will also be highlighted in these reports. Additionally, the reports will address implementation challenges, issues, and outline necessary follow-up actions. ADB will undertake the consolidation of country and other relevant reports, which the ETTF will validate. Progress updates will subsequently be communicated to the GMS Secretariat for dissemination to senior officials and ministerial meetings. Furthermore, the ETTF will conduct a midterm review of the sector strategy to evaluate its validity, relevance, and identify any necessary updates. ADB, as the GMS Secretariat, will closely coordinate with the ASEAN Secretariat to share monitoring results.

D. Communication and Dissemination

46. Once approved, a user-friendly version (e.g., infographics) of the strategy document will be developed. This, along with the full text of the strategy, will be disseminated to ETTF members, who in turn will be requested to share the documents to stakeholders in their respective countries. Furthermore, these documents will be made publicly accessible through the GMS website and other relevant social media platforms. The ETTF Secretariat will take the lead in organizing briefing sessions aimed at familiarizing stakeholders in GMS countries with the strategy, either as

part of ETTF committee meetings or ASEAN events. Additionally, efforts will be made to identify and seize opportunities to present the strategy to relevant audiences. ETTF members will play a pivotal role as advocates and champions of the strategy throughout its rollout and implementation phase.

E. Risks Management

47. The strategy identifies three primary risks to achieving the sector outcome and outputs: low priority for regional projects, insufficient resources, and inadequate monitoring and reporting of strategy implementation. Each risk is assessed in terms of its likelihood of occurring and its potential impact, allowing for the identification of corresponding mitigation measures and action plans to be led by the designated risk owner (Table 4).

Table 4: Energy Sector Strategy Risk Management Plan

Risk	Likelihood (Unlikely, Possible, Likely)	Impact (Minor, Moderate, Major)	Mitigation and Action Plan	Risk Owner
1. Low country priority for projects of regional significance	Possible	Major	• Engage with country planning and finance ministries during the regional investment framework preparation and country planning processes	Energy Transition Task Force (ETTF)
2. Lack of resources	Possible	Major	• Pursue financing options for the implementation of the Association of Southeast Asian Nations Power Grid • Pitch priority projects including technical assistance to support the operation of the ETTF, to donors, development partners, and the private sector.	ETTF and Asian Development Bank (ADB)
3. Inadequate monitoring and reporting	Possible	Moderate	• Include update plan as needed, on strategy implementation in the agenda of ETTF meetings	ADB

Source: Author.

APPENDIX

RESULTS FRAMEWORK

Vision A secure and greener energy future for the Greater Mekong Subregion			
Sector Outcome/Output	**Performance Indicators and Targets**	**Information Source**	**SDG Link**
Outcome Accelerated just energy transition	By 2030 Proportion of renewable energy in total installed capacity of GMS countries increased by at least 10% (Baseline: 2021 country data) At least four GMS countries are on track to meet their energy transition targets. Renewable energy share in the total energy consumption of GMS countries increased by at least 10% (Baseline: 2021 country data)	GMS country reports, ASEAN energy outlook, TA consultant report Country reports, official news release	7,9
Output 1 Regional trade of clean energy expanded	Clean energy trade across GMS borders and beyond increased to xx Gigawatt hours (GWh) (2021 Baseline: 4,588 GWh) Shadow power trade and pilot regional power market operation that includes dispatch of clean energy implemented (2023 Baseline: None) Regional qualification system for clean energy developed, e.g., mutual recognition of domestically issued renewable energy certificates (2023 baseline: None) Pre-feasibility/feasibility of 4 interconnection projects assessed (2023 Baseline: 2 projects)	GMS country reports, ASEAN energy outlook, TA consultant report ETTF meeting summary ETTF meeting summary, TA report	7,9
Output 2 Regional energy efficiency and conservation initiative implemented	At least one regional energy efficiency and conservation initiative implemented (Baseline: None)	GMS country reports, ASEAN energy outlook, TA consultant report ETTF meeting summary	
Output 3 ETTF and GMS government capacity for energy transition improved	Annual capacity improvement plan targeting at least 30% women implemented		

Vision A secure and greener energy future for the Greater Mekong Subregion			
Sector Outcome/Output	**Performance Indicators and Targets**	**Information Source**	**SDG Link**
Crosscutting Areas			
Digital revolution	Use of digital and advanced technologies promoted to GMS countries for upgrading existing or constructing new interconnectors as well as regional market operation	ETTF meeting summary, TA and project reports	
Spatial approach	Potential for regional power trade included in the criteria for selecting interconnectors to be assessed	ETTF meeting summary, TA and project reports	
Policy dialogue and knowledge solutions implemented	Policymakers and regulators discuss pressing policy issues during ETTF meetings or events At least 3 user-friendly knowledge products developed	ETTF meeting summary, TA report	7,9
Private participation increased	De-risking approach for interconnection projects adopted by GMS countries (Baseline in 2023: None)	ETTF meeting summary, TA report	7,9
GMS energy cooperation expanded and strengthened	Development partners actively engage in ETTF meetings and activities New partnership with at least 2 institutions established	ETTF meeting summary, TA report	7,9
Just transition approach: participation, job creation, and gender mainstreaming adopted	ETTF regular meetings attended by at least 30% women (2023 Baseline: At least 30% invitees) Engagement of project-affected people and gender mainstreaming described in the projects and initiatives endorsed by ETTF, or in the GMS country updates shared during ETTF meetings Promotion of job creation, skills development, or entrepreneurship of affected people, particularly women, described in the projects/initiatives endorsed by ETTF, or in the GMS country updates shared during ETTF meetings	GMS Regional Investment Framework, , ETTF and TA reports	1,7,9

ASEAN = Association of Southeast Asian Nations, ETTF = Energy Transition Task Force, GMS = Greater Mekong Subregion, GWh = gigawatt hours, PRC = People's Republic of China, TA = technical assistance.

Source: Author.

Greater Mekong Subregion

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About the Greater Mekong Subregion Economic Cooperation Program

The Greater Mekong Subregion is made up of Cambodia, the People's Republic of China (specifically Yunnan Province and Guangxi Zhuang Autonomous Region), the Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam. In 1992, with assistance from the Asian Development Bank and building on their shared histories and cultures, the six countries of the GMS launched a program of subregional economic cooperation—the GMS Program—to enhance their economic relations. The GMS Program covers the following priority sectors: agriculture, energy, environment, health and human resource development, information and communication technology, tourism, transport, transport and trade facilitation, urban development, and border economic zones.