Powering ASEAN: Integration Through the Grid

The ASEAN Power Grid (APG) is the Association of Southeast Asian Nations' (ASEAN) flagship effort to connect the electricity networks of its 11 member states into a single, integrated regional grid. First envisioned in the 1997 *ASEAN Vision 2020* and formalised through a 2007 Memorandum of Understanding, the APG aims to stitch a patchwork of national power systems into an interconnected market by 2045.[1] Its promise is to let electricity flow across borders to where it is needed most – hydropower from Laos, geothermal from Indonesia, solar from the region's sun-rich tropics – turning geography into a shared asset rather than a national constraint. Unlike a conventional trade agreement that lowers tariffs on goods, the APG is *hard infrastructure*: subsea cables, converter stations and harmonised grid codes that physically bind economies together. In this sense, it is both an energy project and a test of ASEAN economic regionalism – of whether a bloc built on consensus and non-interference can deliver the binding, capital-intensive integration that a regional grid demands.

The urgency comes as much from the cost of inaction as from the promise of integration. On 28 February 2026, the Strait of Hormuz – through which more than half of ASEAN's oil imports pass – closed to commercial shipping, triggering a sharp increase in regional fuel prices and exposing how little collective capacity the region has to cushion an external energy shock.[2] As one analysis puts it, ASEAN's resilience remains "a strategy for absorbing shocks, not for reducing exposure to the conditions that produce them."[3] Meanwhile, regional electricity demand is climbing roughly 4% a year – data-centre electricity demand alone is set to nearly double by 2030 – even as nearly 18 million Southeast Asians, almost all in Myanmar, still lack access to electricity.[4] Yet after nearly three decades, only eight of the APG's 18 priority interconnection projects are operational, and cross-border trade remains overwhelmingly bilateral.[5] Studies suggest that fully linking the region's grids could cut the cost of its energy transition by some US$800 billion. Leaving them fragmented forfeits that prize and locks in exposure to the very shocks the grid is meant to absorb.[6]

This case study examines the ASEAN Power Grid through the lens of ASEAN economic regionalism – as a window onto how, and how far, the region can convert political consensus into physical integration. Specifically, it aims to:

- *Examine* what the APG is, the objectives it serves (ie energy security, the net-zero transition, economic efficiency and universal access) and the institutional architecture that governs it.

[1] ASEAN Secretariat, "ASEAN Vision 2020," December 15, 1997, https://asean.org/asean-vision-2020/.
[2] Jay Hilotin, "Strait of Hormuz Shutdown: How the 2026 Oil Shock Threatens ASEAN's Energy Security and Speeds the Shift to Renewables," *Gulf News*, 2026, https://gulfnews.com/world/asia/what-the-hormuz-shutdown-means-for-aseans-energy-security-renewables-10-things-to-know-1.500507341.
[3] Aniello Iannone, "ASEAN's Energy Crisis Is Not About Energy," *The Interpreter*, 2025, https://www.lowyinstitute.org/the-interpreter/asean-s-energy-crisis-not-about-energy.
[4] International Energy Agency, *Southeast Asia Energy Outlook 2024* (International Energy Agency, 2024), https://www.iea.org/reports/southeast-asia-energy-outlook-2024.
[5] Mirza Sadaqat Huda, *Towards a Dispute Resolution Mechanism for the ASEAN Power Grid: Best Practices from Europe and Africa*, ISEAS Perspective no. 2024/75 (ISEAS – Yusof Ishak Institute, 2024), https://www.iseas.edu.sg/wp-content/uploads/2024/09/ISEAS_Perspective_2024_75.pdf.
[6] United Nations ESCAP, "ASEAN Power Grid: Accelerating the Region's Energy Transition," UN ESCAP, January 2026, https://www.unescap.org/story/asean-power-grid-accelerating-regions-energy-transition.

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- *Analyse* why the APG matters now, situating it within the region's climate commitments, geopolitical exposure and the surging electricity demand of its digital economy.
- *Evaluate* the structural challenges impeding implementation – political and institutional, technical and infrastructural, financial and commercial, and regulatory and market – illustrated through specific interconnection projects.
- *Assess* the policy options and watchpoints for ASEAN as it moves from a patchwork of bilateral deals toward a genuinely multilateral grid.

Understanding the APG: Purpose and Objectives

The APG is not a new idea. It was first proposed in the 1997 *ASEAN Vision 2020*, which called for "interconnecting arrangements for electricity, natural gas and water within the region," and was formalised a decade later in a 2007 Memorandum of Understanding.[7] Conceptually, the grid is organised into three sub-regional systems – North, South and East – to be progressively knitted together.[8] Its current blueprint, the third ASEAN Interconnection Masterplan Study (AIMS III), identifies 18 priority interconnection projects intended to more than double cross-border transmission capacity from today's 7.7 GW by 2040. Several flagship projects are already at various stages of approval, negotiation and construction (Table 1).[9]

Table 1. Selected ASEAN Power Grid interconnection projects in the pipeline

Project	Details	Resource	Status	Capacity
Singapore–Indonesia	Subsea cable, with solar PV and battery-storage manufacturing in Indonesia	Solar	Conditional approval (EMA, Singapore)	3.4 GW (across seven projects)
Laos–Vietnam (Monsoon Wind)	Land cable and wind farm	Wind	Operational (2025)	600 MW
Singapore–Cambodia	Subsea cable, with battery storage or pumped-storage hydro	Solar, hydro, potentially wind	Conditional approval (EMA)	1 GW
Singapore–Vietnam	Subsea cable	Offshore wind	Conditional approval (EMA)	1.2 GW
Australia–Singapore	Subsea cable	Solar	Conditional approval (EMA)	1.75 GW
Vietnam–Malaysia–Singapore	Land and subsea cable	To be announced	Joint Development Agreement	~2 GW

Source: Adapted from Huda (2025), compiled from various sources.[10]

The APG's governance runs through a dense lattice of regional bodies – the Heads of ASEAN Power Utilities/Authorities (HAPUA), the ASEAN Power Grid Consultative Committee and the ASEAN Ministers on Energy Meeting – supported by the ASEAN Centre for Energy.[11] The grid's appeal rests on four objectives, each

[7] ASEAN Secretariat, "ASEAN Vision 2020."

[8] Huda, *Towards a Dispute Resolution Mechanism for the ASEAN Power Grid: Best Practices from Europe and Africa*.

[9] ASEAN Secretariat, "ADB and World Bank Group Launch the ASEAN Power Grid Financing Initiative with the ASEAN Secretariat and the ASEAN Centre for Energy (ACE)," ASEAN Main Portal, October 2025, https://asean.org/adb-and-world-bank-group-launch-the-asean-power-grid-financing-initiative-with-the-asean-secretariat-and-the-asean-centre-for-energy-ace.

[10] Mirza Sadaqat Huda, "ASEAN Power Grid: Gleaning Best Practices from Worst Cases," *Fulcrum*, December 2025, https://fulcrum.sg/asean-power-grid-gleaning-best-practices-from-worst-cases.

[11] Huda, *Towards a Dispute Resolution Mechanism for the ASEAN Power Grid: Best Practices from Europe and Africa*.

of which is also an argument for deeper regionalism: energy security, transition to net zero, economic efficiency and universal access.

Energy Security

Southeast Asia's national energy systems are individually exposed to the same external shocks. More than half of ASEAN's oil imports transit the Strait of Hormuz, and imported natural gas made up 93.1% of Singapore's electricity fuel mix in 2025.[12] Interconnection lets member states pool generation and reserves, so that a disruption in one market can be met from another – what regional economists describe as a "collective buffer that allows for the sharing of risks against external energy disruptions."[13] Here the diversity that so often divides ASEAN becomes an asset: hydropower, geothermal, solar and wind resources peak at different times and face different risks, so a connected grid is inherently more resilient than any national system alone.

Transition to Net Zero

Most ASEAN member states have committed to net-zero or carbon-neutrality targets around mid-century, but few can decarbonise efficiently on their own. Modelling of the regional power sector finds that cross-border transmission, while accounting for a marginal share of total system cost – under 0.5% – can reduce cumulative system costs by up to 11.9% while helping drive renewables to 92% of ASEAN's generation mix by 2050.[14] Shared transmission allows renewable-rich areas to export surpluses and smooths the intermittency of solar and wind, reducing the backup capacity each country would otherwise have to build alone.

Economic Efficiency

Pooling resources across a larger market yields gains no single economy can capture. Recent studies suggest that greater cross-border connectivity could lower electricity costs for consumers and businesses and cut the cost of Southeast Asia's decarbonisation by some US$800 billion, largely by avoiding duplicated generation and storage.[15] The build-out is itself an economic engine: adding 30 GW of solar and wind could create around 182,000 jobs, while cleaner shared power could prevent up to 15,000 pollution-induced deaths a year.[16] This is the classic regional-integration dividend – economies of scale unobtainable at the national level.

Universal Access

Although the number of Southeast Asians without electricity fell by 135 million between 2010 and 2023, roughly 18 million – almost all in Myanmar – still lack access. Meanwhile, the progress on promoting clean cooking options (eg liquefied petroleum gas and improved cook stoves) still lags, as more than 130 million people in the region, mostly from Lao PDR, Myanmar, Cambodia and the Philippines, still rely on harmful fuels like traditional biomass, coal or kerosene for cooking. With regional electricity demand rising about 4% a year to 2035, a robust and interconnected grid underpins the reliability and affordability of supply. One caveat is worth noting: the International Energy Agency (IEA) notes that the remaining access gap will be closed mainly through mini-grids and stand-alone systems rather than the regional grid; thus, the APG's access dividend lies chiefly in reliability and price, not in first connections.[17]

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[12] Hilotin, "Strait of Hormuz Shutdown: How the 2026 Oil Shock Threatens ASEAN's Energy Security and Speeds the Shift to Renewables."

[13] Laura Britt-Fermo et al., "Fast-Tracking the ASEAN Power Grid Amid Global Energy Turmoil," *AMRO Blog*, May 2026, https://amro-asia.org/fast-tracking-the-asean-power-grid-amid-global-energy-turmoil.

[14] Sheng Zhong et al., "Accelerating ASEAN's Energy Transition in the Power Sector through Cross-Border Transmission and a Net-Zero 2050 View," *iScience* 28, no. 1 (2025): 111547, https://doi.org/10.1016/j.isci.2024.111547.

[15] United Nations ESCAP, "ASEAN Power Grid: Accelerating the Region's Energy Transition"; ASEAN Secretariat, "ADB and World Bank Group Launch the ASEAN Power Grid Financing Initiative with the ASEAN Secretariat and the ASEAN Centre for Energy (ACE)."

[16] United Nations ESCAP, "ASEAN Power Grid: Accelerating the Region's Energy Transition."

[17] International Energy Agency, *Southeast Asia Energy Outlook 2024*.

The Strategic Imperative: Why the APG Matters Now

If the four objectives explain what the APG is for, three forces explain why completing it has become urgent now: climate commitments, geopolitical resilience and linkage to digital economy.

Climate Commitments

The window to align the region's power sector with its mid-century targets is narrowing as demand surges. Renewables account for roughly a third of installed capacity, and the ASEAN Centre for Energy projects their share to reach nearly 40% in 2025, beating the bloc's 35% target, with a further goal of 45% renewable capacity by 2030.[18] Yet the foundation remains fossil-heavy: Thailand, Vietnam and the Philippines have all reactivated or maximised coal-fired generation, a reminder that decarbonisation targets sit atop a system still fully exposed to external disruption.[19] Without the flexibility a regional grid provides, integrating ever-larger shares of variable renewables nationally becomes both costlier and less reliable.

Geopolitical Resilience

The February 2026 closure of Hormuz – a strait that normally carries about a fifth of the world's seaborne oil – translated almost immediately into higher regional fuel and power prices.[20] Macroeconomic modelling suggested that oil prices sustained above US$100 a barrel could add 0.8 percentage points to regional inflation and shave 0.3 points off growth.[21] The episode exposed a deeper weakness of the prevailing approach: ASEAN, one analysis observed, "issued no substantive statement on the Hormuz crisis [and] proposed no coordinated diplomatic position," practising a resilience that absorbs shocks rather than reduces exposure to them.[22] A genuinely integrated grid is one of the few structural hedges available – a way to convert 11 vulnerable national systems into a single more defensible one.

Digital-Economy Linkage

Finally, the APG has become inseparable from ASEAN's digital ambitions. Regional data-centre electricity demand is set to nearly double by 2030, and these facilities increasingly demand round-the-clock renewable power.[23] In Malaysia, the fastest-growing hub, data-centre electricity demand alone is projected to leap from around 9 TWh in 2024 to 68 TWh by 2030 – roughly 30% of national consumption, exceeding Singapore's entire 2023 electricity use.[24] Reliable, low-carbon power at that scale, available across borders at all hours, is precisely what a regional grid is meant to deliver. The power grid is, in this sense, the physical substrate of the digital economy that frameworks such as the ASEAN Digital Economy Framework Agreement (DEFA) aim to integrate – making the APG not a parallel project but a precondition for the region's next phase of economic regionalism.

[18] ASEAN Centre for Energy, *The 8th ASEAN Energy Outlook 2023–2050* (ASEAN Centre for Energy, 2024), https://aseanenergy.org/publications/the-8th-asean-energy-outlook.

[19] Iannone, "ASEAN's Energy Crisis Is Not About Energy."

[20] Hilotin, "Strait of Hormuz Shutdown: How the 2026 Oil Shock Threatens ASEAN's Energy Security and Speeds the Shift to Renewables."

[21] ASEAN+3 Macroeconomic Research Office, "The ASEAN+3 Economic Outlook: From Tariff Shock to Energy Shock," *AMRO Blog*, 2026, https://amro-asia.org/the-asean3-economic-outlook-from-tariff-shock-to-energy-shock.

[22] Iannone, "ASEAN's Energy Crisis Is Not About Energy."

[23] International Energy Agency, *Southeast Asia Energy Outlook 2024*; Britt-Fermo et al., "Fast-Tracking the ASEAN Power Grid Amid Global Energy Turmoil."

[24] Ember, *From AI to Emissions: Aligning ASEAN's Digital Growth with Energy Transition Goals* (Ember, 2025), https://ember-energy.org/app/uploads/2025/05/Report-From-AI-to-emissions-ASEAN.pdf.

Key Issues and Challenges

The vision is compelling, but the terrain is hard. ASEAN is not a monolith but a mosaic of political systems, development levels and technical capacities, and the APG must be built across all of them at once. Four clusters of challenges stand between the masterplan and an operating grid: political and institutional, technical and infrastructural, financial and commercial, and regulatory and market. They are deeply interlinked, and each tests a different dimension of the region's capacity for integration.

Political and Institutional Barriers

The most fundamental obstacles are political. Electricity is a strategic asset, and ASEAN member states are deeply protective of their sovereignty over it. This produces a paradox: the very interdependence that makes a regional grid valuable is also what makes governments wary of it. Depending on a neighbour for power – or allowing a neighbour's electricity to cross one's territory – requires a level of trust the region has not consistently built. ISEAS researchers identify the two most crucial political challenges as a lack of regional trust and discontinuity in energy policy: stakeholders are not assured that contracts will be honoured, and there is a perception that political disputes could lead to the deliberate disruption of supply.[25]

Compounding this is the "ASEAN Way." Unlike the European Union, which integrates through binding legislation and supranational institutions, ASEAN proceeds by consultation and consensus, favouring informal accommodation over confrontation. This norm has held the bloc together, but it sits awkwardly with the demands of hard infrastructure. The ASEAN Charter's dispute-settlement provisions (Articles 24–26) remain largely unused, hampered by unclear terms and limited resources, and there is no overarching regional energy agreement on which a binding dispute-resolution mechanism could rest. Decision-making instead threads through a dense web of consensus-bound committees – HAPUA, the ASEAN Power Grid Consultative Committee and the ASEAN Energy Regulators Network – so that any single member's hesitation can slow the whole.

National politics adds a further layer. Energy policy is electorally sensitive and prone to reversal: a change of government can shelve a project that took a decade to negotiate, and the prospect of such discontinuity erodes investor confidence. Cross-border interconnections can take as long as 15 years to complete – spanning several electoral cycles in several countries at once – so domestic political durability becomes a practical prerequisite for the grid.

Box 1. The LTMS-PIP breakthrough

The Laos–Thailand–Malaysia–Singapore Power Integration Project (LTMS-PIP) is the clearest evidence that political barriers can be overcome. Commissioned in 2022, it became the region's first multilateral cross-border electricity trade, moving up to 100 MW of Lao hydropower to Singapore across the Thai and Malaysian grids.[26] In 2024, the arrangement was extended and its capacity doubled to 200 MW, and on 16 October 2025, it became fully multidirectional, allowing power to flow from Malaysia to Singapore as well as from Laos.[27,28]

[25] Huda, *Towards a Dispute Resolution Mechanism for the ASEAN Power Grid: Best Practices from Europe and Africa*.

[26] Huda, *Towards a Dispute Resolution Mechanism for the ASEAN Power Grid: Best Practices from Europe and Africa*.

[27] "Multidirectional Power Trade under LTMS-PIP Now Fully Operational," *Free Malaysia Today*; ASEAN Centre for Energy, "Growing Momentum of LTMS-PIP and Its Impact on Regional Integration," 2025, archived at https://web.archive.org/web/20251213164240/https://aseanenergy.org/post/growing-momentum-of-ltms-pip-and-its-impact-on-regional-integration/.

[28] Natasha Busst, "Multidirectional Power Trade under LTMS-PIP Now Fully Operational," *Free Malaysia Today*, October 16, 2025, https://www.freemalaysiatoday.com/category/nation/2025/10/16/multidirectional-power-trade-under-ltms-pip-now-fully-operational; ASEAN Centre for Energy, "Growing Momentum of LTMS-PIP and Its Impact on Regional Integration," ASEAN Centre for Energy, 2025, https://web.archive.org/web/20251213164240/https://aseanenergy.org/post/growing-momentum-of-ltms-pip-and-its-impact-on-regional-integration/.

What made it work was not the surrender of national interest but its alignment. Laos gained an export market for its hydropower and a new source of state revenue. Thailand gained strategic weight in the Mekong region's transmission network through its utility EGAT, while Malaysia reinforced its position as a transit hub, explicitly tying participation to its National Energy Transition Roadmap. Singapore, in turn, advanced its diversification and decarbonisation goals, raising its low-carbon electricity import target from 4 GW to 6 GW by 2035.[29] Rather than a supranational mandate, the project relied on a dedicated working group to coordinate technical, legal and regulatory matters across four jurisdictions.[30] LTMS-PIP shows that the consensus model can deliver hard infrastructure – but project by project, where every participant can see a national win. It is now treated as the "business model" for replication, including the proposed Brunei–Indonesia–Malaysia–Philippines link.[31]

Technical and Infrastructure Hurdles

If the political barriers concern willingness, the technical ones concern capacity. Building a grid across Southeast Asia's geography, and reconciling 11 differently engineered power systems, is a formidable undertaking. The first challenge is managing variable renewable energy. Solar and wind are expected to make up at least 23% of the ASEAN power mix by 2030, and regional renewable capacity has more than doubled in a decade.[32] Integrating intermittent generation at this scale strains systems built for steady fossil baseload. Without modernisation, sharp swings in solar output can destabilise a grid, as India found when solar dips strained its system in 2023. Ember estimates ASEAN needs between US$4 billion and US$10.7 billion of smart-grid investment – sensors, automation, forecasting and demand-side management – to balance renewables reliably, which could in turn avoid some US$2.3 billion in annual economic losses by 2040.[33] A regional grid helps by widening the balancing area, but only if the underlying national grids are flexible enough to take part.

The second challenge is geography. Southeast Asia is a patchwork of peninsulas and archipelagos, so much of the APG must run undersea, with several priority interconnections requiring subsea cables across deep and busy waters (Table 1). The terrain is also hazardous. For instance, the Philippines is struck by around 20 typhoons a year, several of Category 4 or stronger, which damage transmission towers and expose the fragility of weakly connected island grids prone to yellow alerts and rotational brownouts.[34] Subsea and converter technology is costly and specialised, and the Philippines alone needs an estimated US$10 billion to upgrade its domestic transmission before it can meaningfully connect outward.

Third, the region's grids were never designed to work together. Member states run different voltages, frequencies and control philosophies under more than 20 separate grid codes, across ten regulatory regimes.[35] Harmonising these standards so that power can move safely across borders is a slow, painstaking work – and

[29] Sabina Putri Aulia and Septyanto Galan Prakoso, "LTMS-PIP for ASEAN Energy Integration: How the Members' National Interests Drive the Cooperation," *Journal of International Studies on Energy Affairs* 6, no. 2 (2025): 144–72, https://doi.org/10.51413/jisea.Vol6.Iss2.2025.144-172.

[30] Busst, "Multidirectional Power Trade under LTMS-PIP Now Fully Operational."

[31] ASEAN Business Advisory Council, *Unlocking Regional Power Trade: Policy Pathways for the ASEAN Power Grid* (ASEAN Business Advisory Council, 2025), https://asean-bac.org/news-and-press-releases/unlocking-regional-power-trade-policy-pathways-for-the-asean-power-grid.

[32] Ember, *Beyond Tripling: Keeping ASEAN's Solar and Wind Momentum* (Ember, 2023), https://ember-energy.org/latest-insights/beyond-tripling-asean/; Alnie Demoral and Dinita Setyawati, *ASEAN's Low-Carbon Future Flows Through Smart Grids* (Ember, 2025), https://ember-energy.org/latest-insights/aseans-low-carbon-future-flows-through-smart-grids/.

[33] Demoral and Setyawati, *ASEAN's Low-Carbon Future Flows Through Smart Grids*.

[34] Pete H. Maniego, "Rethinking the ASEAN Power Grid," Opinion, *Philippine Daily Inquirer*, December 18, 2025, https://opinion.inquirer.net/188300/rethinking-the-asean-power-grid.

[35] Samantha Ho, "ASEAN to Prioritise Common Grid Codes, Transparent Tariffs and Dispute Resolution Mechanism for Regional Power Grid," *Eco-Business*, 2025, https://www.eco-business.com/news/asean-to-prioritise-common-grid-codes-transparent-tariffs-and-dispute-resolution-mechanism-for-regional-power-grid.

the surge of AI-driven data-centre demand is making load forecasting, the basis of system planning, harder still.[36]

Box 2. The Indonesia–Malaysia interconnection: Feasible for Decades, Still Unbuilt

If LTMS-PIP shows what political alignment can achieve, the proposed Sumatra–Peninsular Malaysia link shows that technical feasibility alone is not enough. Designated APG Project No. 4, it has been a regional priority since the first ASEAN Plan of Action for Energy Cooperation in 1999, with a dedicated High Voltage Direct Current (HVDC) interconnection study launched in 2002.[37] The engineering has never been the obstacle. Yet a 2012 coal-based proposal was postponed when the two countries could not agree on its economic viability, and the project was only revisited under the AIMS III update in 2022, which now points to a potential interconnection of up to 2,130 MW drawing on Sumatra's solar, geothermal and hydro resources.[38]

More than two decades after formal feasibility work began, the line remains unbuilt – the mirror image of LTMS-PIP. Where the LTMS partners found a commercial structure that served every national interest, the Sumatra–Malaysia link stalled because they could not. For the APG, the binding constraint is rarely the engineering. It is the political economy.

Financing and Commercial Constraints

Even where political will exists and the engineering is sound, the money must add up – and for cross-border interconnectors it rarely does easily. The scale of investment is enormous. The AIMS III masterplan puts the full cost of building the APG – generation and transmission with high renewable penetration – at US$764 billion.[39] Narrower estimates focused on the grid itself are still daunting: the IEA reckons Southeast Asia needs around US$300 billion of electricity-grid investment between 2025 and 2040, of which US$27 billion is for cross-border interconnectors alone. Realising even that slice would require annual interconnector spending to surpass US$1 billion before 2030 and average more than US$2 billion thereafter – roughly 20 times the rate of recent years.[40] The historical baseline makes the point starkly: only about US$2 billion has been invested in cross-border interconnectors since the 1970s, less than what the region spent on domestic transmission in 2024 alone.

Recognising this gap, ASEAN, the Asian Development Bank (ADB) and the World Bank launched the ASEAN Power Grid Financing (APGF) Initiative in Kuala Lumpur in October 2025. The ADB committed up to US$10 billion over ten years and the World Bank an initial US$2.5 billion, alongside technical assistance and a seed grant to the ASEAN Centre for Energy to prepare bankable projects.[41] The initiative offers a full suite of instruments – concessional loans, guarantees, political-risk cover, equity and advisory support – and is explicitly designed to crowd in private capital.

Crowding-in, however, is hard. A transmission line is a natural monopoly with high upfront costs, long payback and limited liquidity, and many ASEAN utilities are financially constrained, struggling to fund even domestic

[36] Samantha Ho, "Data Centres Are Reshaping the ASEAN Power Grid's Forecasts, Say Global Financiers," *Eco-Business*, 2025, https://www.eco-business.com/news/data-centres-are-reshaping-the-asean-power-grids-forecasts-say-global-financiers.

[37] Prihastya Wiratama et al., "Boosting RE through APG: Malaysia and Indonesia's Next Move in Pursuing Cross-Border Interconnection," ASEAN Centre for Energy, 2025, https://asian-power.com/project/commentary/boosting-re-through-apg-malaysia-and-indonesias-next-move-in-pursuing-cross-border-interconnection.

[38] Wiratama et al., "Boosting RE through APG: Malaysia and Indonesia's Next Move in Pursuing Cross-Border Interconnection."

[39] ASEAN Secretariat, "ADB and World Bank Group Launch the ASEAN Power Grid Financing Initiative with the ASEAN Secretariat and the ASEAN Centre for Energy (ACE)."

[40] International Energy Agency, *Financing the ASEAN Power Grid* (International Energy Agency, 2026), https://www.iea.org/reports/financing-the-asean-power-grid.

[41] ASEAN Secretariat, "ADB and World Bank Group Launch the ASEAN Power Grid Financing Initiative with the ASEAN Secretariat and the ASEAN Centre for Energy (ACE)."

networks let alone capital-intensive interconnectors. Financing costs for clean energy in the region run well above those in advanced economies: sovereign ten-year yields in the Philippines and Indonesia sit around 6%, some 200 basis points above developed-market benchmarks, raising the cost of every project.[42]

Layered on top is currency risk. Interconnectors typically earn revenue in local currency but borrow in hard currency such as US dollars, and few ASEAN currencies offer a long-term hedge at commercially viable pricing, so projects cannot fully eliminate exchange-rate exposure over their decades-long lives. The risk is unevenly distributed: Singapore and Thailand have deep, hedgeable markets, whereas Laos and Myanmar – with thin reserves and largely inactive hedging markets – are, in the IEA's assessment, the least investable on currency grounds. The recommended remedy is hybrid: development banks and export-credit agencies supply credit enhancement and convertibility cover, governments offer sovereign guarantees against exchange-rate risk, and local-currency financing is used where possible to limit the mismatch.[43] The commercial structure, in short, has to be engineered as carefully as the cable.

Regulatory and Market Fragmentation

The final cluster concerns the rules of the market, and here the gap between vision and reality is widest. For all its ambition, ASEAN still has no functioning regional electricity market. The regional grid has, as one industry assessment puts it, "largely been a vision on paper," realised only incrementally through national and bilateral agreements. The first multilateral trading arrangement was endorsed in 2014 but not piloted until LTMS-PIP in 2022, and the overwhelming majority of cross-border power still moves bilaterally rather than through any shared marketplace.[44]

A core obstacle is the absence of agreed commercial rules for moving power across third countries. Wheeling charges – the fees a third-party producer or consumer pays a grid operator to use its transmission network – are not yet governed by transparent, harmonised rules, and establishing such rules for tariffs and wheeling is a stated regional priority precisely because their absence deters investment.[45] The difficulty is not academic: even within the successful LTMS-PIP, negotiations over the tariff formula caused a delay in 2024.[46]

Beneath the tariffs lies deeper legal fragmentation. Effective cross-border trade demands compatible legal frameworks – a regional exchange, harmonised market rules and, critically, a mechanism to resolve disputes. Building these across four or more jurisdictions is, in ASEAN Business Advisory Council's words, "arduous".[47] As noted earlier, ASEAN lacks an overarching regional energy agreement on which such a mechanism could be anchored, and a 2019 IEA study identified a formal dispute-resolution mechanism as a key step toward scaling multilateral trade.[48] The region's more than 20 grid codes – a technical problem – are also a market problem: without common codes and transparent tariffs, the "single market" remains a collection of separately governed national systems.[49]

Taken together, the four clusters reveal a consistent pattern: the APG's hardest constraints are not physical but institutional. Trust, rules, money and market design – the *soft* infrastructure of integration – lag well behind the cables and converters. This is the central tension of ASEAN economic regionalism applied to electricity: the technology to connect the region exists, but the collective institutions to govern that connection are still being built.

[42] International Energy Agency, *Financing the ASEAN Power Grid*.
[43] International Energy Agency, *Financing the ASEAN Power Grid*.
[44] ASEAN Business Advisory Council, *Unlocking Regional Power Trade: Policy Pathways for the ASEAN Power Grid*.
[45] Ho, "ASEAN to Prioritise Common Grid Codes, Transparent Tariffs and Dispute Resolution Mechanism for Regional Power Grid."
[46] ASEAN Business Advisory Council, *Unlocking Regional Power Trade: Policy Pathways for the ASEAN Power Grid*.
[47] ASEAN Business Advisory Council, *Unlocking Regional Power Trade: Policy Pathways for the ASEAN Power Grid*.
[48] Huda, *Towards a Dispute Resolution Mechanism for the ASEAN Power Grid: Best Practices from Europe and Africa*.
[49] Ho, "ASEAN to Prioritise Common Grid Codes, Transparent Tariffs and Dispute Resolution Mechanism for Regional Power Grid."

Policy Options

The challenges above point to a set of options ASEAN is actively weighing. Three stand out: step-by-step, modular integration, harmonised grid codes and market rules, and green and blended finance.

Step-By-Step, Modular Integration

The clearest lesson from the history of energy megaprojects is to build incrementally. Analysts note that large energy projects tend to fail not because of their complexity but because they are designed as one-off undertakings that must be completed in full before delivering any value. The Gobitec solar-and-transmission scheme is a cautionary example. Proposed in 2009, the project aimed to develop a 1 GW solar farm in the Gobi Desert, along with 4,000 km of transmission lines from Mongolia, through China to Japan and South Korea. It was never implemented due to extremely high capital costs – converter stations and cables alone were estimated to cost US$12.7 billion – and the technical risks of connecting four national grids, including the possibility of cascading blackouts.[50] The alternative is modularity: breaking a large interconnection into smaller parts that can operate, earn revenue and be improved upon independently, then replicated. LTMS-PIP, which began as a 100 MW unidirectional trade and grew into a multidirectional one, is exactly this approach in practice and is increasingly cited as the template for the grid's next phase.[51] A complementary option is to embed each interconnection within a broader regional development agenda rather than presenting it as a narrow energy trade, so that it speaks to the national interests of every party.

Harmonised Grid Codes and Market Rules

A second option targets the soft infrastructure directly: converging the region's 20-plus grid codes onto common technical standards, setting transparent rules for tariffs and wheeling charges, and creating a dispute-resolution mechanism to give investors and operators predictability.[52] The enhanced APG Memorandum of Understanding, signed at the 43rd ASEAN Ministers on Energy Meeting in October 2025, moves in this direction, though implementation timelines remain unspecified, and a one-stop administrative centre for permitting has been proposed to ease the coordination burden across jurisdictions.[53]

Green and Blended Finance

A third option addresses the funding gap by de-risking projects to mobilise private capital. The APGF Initiative is the principal vehicle, pairing concessional loans, guarantees and political-risk cover from multilateral development banks with technical support from bodies such as the IEA and the International Renewable Energy Agency (IRENA).[54] Instruments such as partial risk guarantees, first-loss capital and revenue floor-and-cap arrangements – alongside the region's deep and growing sustainable-bond market – can help bridge the bankability gap, while local-currency financing and sovereign guarantees address the currency mismatch that deters long-term lenders.[55]

These options are not mutually exclusive. In practice they reinforce one another, and each shifts a different part of the institutional bottleneck that the cables themselves cannot resolve.

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[50] Huda, "ASEAN Power Grid: Gleaning Best Practices from Worst Cases."

[51] ASEAN Centre for Energy, "Growing Momentum of LTMS-PIP and Its Impact on Regional Integration."

[52] Ho, "ASEAN to Prioritise Common Grid Codes, Transparent Tariffs and Dispute Resolution Mechanism for Regional Power Grid."

[53] ASEAN Centre for Energy, "43rd AMEM: Reaffirming ASEAN's Energy Connectivity and Sustainability Vision," ASEAN Centre for Energy, October 2025, https://aseanenergy.org/articles/43rd-amem-reaffirming-aseans-energy-connectivity-and-sustainability-vision.

[54] International Energy Agency, *Financing the ASEAN Power Grid*.

[55] Rapeepat Ingkasit, "Tackling ASEAN Grid's $800bn Challenge," Climate Finance Network Thailand, November 28, 2025, https://climatefinancethai.com/tackling-asean-grids-800bn-challenge.

Conclusion

The ASEAN Power Grid is among the most ambitious tests of regional integration the bloc has attempted. Three decades after it was first envisioned, the technology to connect Southeast Asia's electricity systems is proven, and the strategic case – energy security, decarbonisation, economic efficiency and the demands of a digital economy – has only grown stronger. What remains uncertain is whether ASEAN's distinctive model of integration, built on consensus and national sovereignty rather than binding supranational rules, can supply the trust, the rules, the financing and the market design that hard infrastructure requires.

The evidence is clearly mixed. LTMS-PIP shows that the consensus model can work when a project is structured so that every participant sees a clear national interest. The long-stalled Sumatra–Malaysia link shows how readily it falters when they do not. The APG will most likely advance not as a single grand design but as a widening mesh of such projects – modular, incrementally built and embedded in broader bargains. Its progress will be measured less in gigawatts than in the slow construction of the regional institutions that govern them. In that sense, the grid is not only infrastructure for ASEAN's energy transition, but a barometer of how far ASEAN economic regionalism itself can go.

Discussion Questions

1. LTMS-PIP succeeded because each member could see a clear national interest. To what extent can this "every participant wins" structure be replicated for more complex interconnections linking less complementary economies?
2. Does the "ASEAN Way" of consensus-based decision-making fundamentally constrain the APG, or is project-by-project incrementalism a feature rather than a flaw? What would establishing a binding dispute-resolution mechanism require ASEAN to give up?
3. Interconnection could cut the region's decarbonisation costs by an estimated US$800 billion, yet only a fraction of the needed investment has materialised. Why do the economic benefits of integration often fail to overcome the political and commercial barriers to it?
4. How should ASEAN balance the goal of a unified regional grid against members' desire to develop domestic energy industries and safeguard energy sovereignty? At what point does interdependence become vulnerability?
5. The surge in data-centre and AI electricity demand is reshaping the case for the APG. Does this new driver strengthen the prospects for regional integration, or could it instead push the largest economies toward energy self-sufficiency?