



Policy Brief for ASEAN Power Utilities and Stakeholders: The Value of Data Sharing and Transparency in Driving Multilateral Power Trading under the ASEAN Power Grid



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Highlights

- Experience has shown that data sharing is one of the key enabling factors for successful cross-border power trading (and for initiating future multilateral power trading).
- Key Recommendations:
 - Map and identify the gaps in the current practice of data sharing under the existing cross-border trading or multipower trading (MPT), and establish a stepwise data-sharing framework for ASEAN
 - Develop clear guidelines and standards for data sharing in the pursuit of expanding MPT
 - Establish a data-sharing framework implement it as a practice and adapt it as the MPT evolves. A piloting exercise would be beneficial to shape the framework and guidelines which will evolve depending on the needs and stages of MPT.
 - Increase stakeholders' (i.e. the developing partners' and international donors') awareness of the investment opportunities arising from supporting the development of the data-sharing infrastructure, in both technical and financial aspects.

In any market, access to data is vital. However, in the initial stages of a multilateral power market, data sharing among different country stakeholders and utilities can be challenging for the several countries involved due to differences in jurisdictions and power landscapes. The reluctance to share data between utilities is mainly due to the lack of uniform data types and its sensitivity categories, in short, unclear governance with respect to data sharing. This will in turn make discussions on the development of the power sector between relevant stakeholders harder as discussions will be based on different data and information which make decisions harder, and misunderstandings might occur due to different starting points among the stakeholders.

Moreover, with such a limited data sharing mindset, utilities can potentially miss out on opportunities to improve their operations and businesses through power trading, notably

the spotting of new market trends, and recognising the potential for cross-border electricity trading. Data sharing makes it possible to tap into external data sources to improve risk management and boost revenues. For power sectors trying to navigate major energy transitions, a lack of data sharing could make the shift away from the use of fossil fuels to renewable forms of energy more expensive and slower.

In a regional context, data sharing among utilities is especially important. If data-sharing practices are not implemented, it will be difficult to form a regional market to facilitate MPT. In the case of the Association of Southeast Asian Nations, it will be impossible to use the existing ASEAN Power Grid (APG) infrastructure and optimally identify the necessary new infrastructure unless there is data sharing. Hence, data sharing has been identified under the ASEAN Plan of Action on Energy Cooperation (APAEC) within the APG Program area as one of the key action plans for harmonising the minimum technical

requirements to advance MPT among the ASEAN Member States (AMS).

This policy brief outlines the role and value of data sharing and transparency to spur the development of the APG, encourage more cross-border electricity trading and expand existing bilateral cross-border electricity trading into MPT arrangements.

Transparency and Data Sharing as a Key Enabler for Multilateral Power Trading

Transparency implies openness, communication and accountability. Meanwhile, data sharing is a process of gathering different sets of data from various sources and blending them to create a new set of data. When both transparency and data sharing are carried out on an enterprise-wide basis, they can improve business outcomes and create competitive advantage. There are many benefits to businesses that take advantage of data sharing, including improved operational efficiency, better decision making, risk reductions and improved business intelligence.

Right from the start of power market development in ASEAN, there have been consistent efforts to establish a transparent power trading model. A report published by the IEA in 2019, [1] emphasises the role of data sharing, especially during the early stages of bilateral and multilateral power exchange. Accurate, consistent and transparent data is fundamental to the efficient functioning of cross-border power trading and regional power markets, giving all parties equal access to relevant information. This helps them gain trust in each other, reduce barriers and attract new power market entrants.

The European and American electricity markets have gone to great lengths to ensure transparency by implementing a transparency regulation. The most concrete and tangible result is the transparency platform from which all parties can view all significant data about the electricity market. This includes hourly data on prices in all bidding zones, planned power flows between all bidding zones, countertrades, redispatch volumes and the cost of these actions per bidding zone. All planned outages for grid and generation/consumption are also published. The purpose of this is to ensure that all the market parties have the same level of market knowledge.

In a Southeast Asian context, the main consideration has been made based on which data should be shared, how the data should be shared and by whom. At the current stage, in order for the region to achieve the aspiration of MPT under APG, it is crucial to identify the data sharing governance which regulates the transparency and data sharing framework, guideline and standard and how data sharing shall be implemented in this region.

Current Electricity Trade Data-Sharing Implementation and Governance Structures within ASEAN

Over the past several years the APG has gradually progressed from long-standing cross-border and grid-to-grid power exports and power trading, towards sub-regional arrangements (MPT). Major accomplishments in the progression towards regional power trade have been multilateral power flows via the Lao PDR-Thailand-Malaysia (LTM) and Lao PDR-Thailand-Malaysia-Singapore (LTMS) agreements. As of 31 May 2024, these arrangements enabled the export of 266 GWh from Laos to Singapore via transmission grids operated by Thailand's EGAT and Malaysia's TNB. To ensure the smoothness of the MPT, the LTMS Working Group, which consists of the policymakers and regulators along with the task force which consists of utility and power system operators, has developed the data-sharing and communication platform, hosted by EGAT of Thailand.

This data-sharing platform (see Figure 1) allows the power system operators from the LTMS countries to exchange real-time or near real-time operational data, confirm their daily selling/wheeling/purchasing declarations, share the actual confirmation of selling/wheeling/purchasing, and share the planning data on a week-ahead basis. This platform also allows the LTMS system operators to coordinate in the event of system constraint, an EGAT-TNB HVDC trip, control failure or the need for a stability function to be launched.



Figure 1. LTMS – Power Integration Project: Existing Data Sharing Platform hosted by EGAT of Thailand

Timely and accurate electricity data are made publicly available in several of the AMS in terms of what data is shared, how it is shared, and by whom: the stakeholders, including utility practitioners, regulators and/or policy makers. However, it is not standardised. Each country has its

own way of collecting and presenting the data. Therefore, a first crucial step is to map out the current respective stakeholders' data-sharing practices and the types of data shared (described in Tables 1, 2 and 3) in each AMS.

Table 1. Electricity Sector Governance Structures in each AMS

Country	State-own utility	Electricity regulator	Ministry/ Government
Brunei Darussalam	Department of Electrical Service (DES)	Autoriti Elektrik Negara Brunei Darussalam (AENBD)	Ministry of Energy
Cambodia	Electricite Du Cambodge (EDC)	Electricity Authority of Cambodia (EAC)	Ministry of Mines and Energy
Indonesia	Perusahaan Listrik Negara (PLN)	Directorate of General Electricity (DGE) – under MEMR	Ministry of Energy and Mineral Resources (MEMR)
Lao PDR	Electricite Du Laos (EDL)	Under the Ministry of Energy and Mines	Ministry of Energy and Mines
Malaysia	Tenaga Nasional Berhad (TNB)	Energy Commissioning (Suruhanjaya Tenaga)	Ministry of Energy Transition and Water Transformation
	Sabah Electricity Sdn Bhd (SESB)	Energy Commission of Sabah (ECOS)	
	Sarawak Electricity Berhad (SEB)	Electricity Supply Division under the Ministry of Utilities Sarawak	
Myanmar	Department of Electric Power Planning (DEPP) – under MOEP	Department of Electric Power Planning (DEPP) under the MOEP	Ministry of Electric Power (MOEP)
Philippines	National Grid Corporation of the Philippines (NGCP)	Energy Regulatory Commission (ERC)	Department of Energy (DOE)
Singapore	Singapore Power Group	Energy Market Authority (EMA)	Ministry of Industry and Trade (MOIT)
Thailand	Electricity Generating Authority of Thailand (EGAT)	Energy Regulatory Commission (ERC)	Ministry of Energy
Vietnam	Electricity of Vietnam (EVN)	Electricity Regulatory Authority of Vietnam (ERAV)	Ministry of Industry and Trade (MOIT)

Table 2. Data-sharing practices and governance status in the AMS

Country	Is the country involved in bilateral power trading?	Is the country involved in multilateral power trading?	Is the market in the country liberalised?	Who shares the electricity data?			
				State-owned utility	Electricity regulators	Ministry/ Government	Market Operator
Brunei Darussalam	x	x	x	x	x	√	x
Cambodia	√	x	x	√	√	x	x
Indonesia	√	x	x	√	x	√	x
Lao PDR	√	√	x	x	x	x	x
Malaysia	√	√	x	x	√	x	x
Myanmar	√	x	x	x	x	√	x
Philippines	x	x	√	x	x	√	√
Singapore	√	√	√	x	√	x	√
Thailand	√	√	x	√	√	x	x
Vietnam	√	x	√	√	√	x	√

Table 3. Types of data collected by the AMS

Country	Report	Latest year Published	Type of Data
Brunei Darussalam	eData Library^[2]	2022	generation capacity, peak demand, electricity supply and breakdown consumption
Cambodia	Salient Report by EAC^[3]	2023	historical power supply (breakdown of different sources), imported power from Thailand, Vietnam and Laos; development plans for national grid and transmission service, existing and under construction transmission infrastructure and substations, development plans for distribution networks, electricity supply structure, growth of electricity consumption for each sector (residential, business, commercial and industrial) and progress of electricity tariffs.
Indonesia	PLN Statistics^[4]	2023	installed capacity and electricity generation, electricity load and demand, electricity sales for each sector (residential, industrial, business, social, buildings), number of electricity customers in each sector, average electricity tariff for each sector, and historical transmission and distribution outages.
	Handbook of Energy Economic Statistics of Indonesia (HEESI)^[5]	2023	installed capacity and electricity generation, electricity load and demand, import power; electricity sales for each sector (residential, industrial, business, social, buildings).
Malaysia	Suruhanjaya Tenaga's web portal^[6]	2024	daily and hourly system generation (published on monthly basis with daily log sheet)
	Suruhanjaya Tenaga Statistical Report^[7]	2023	(electricity consumption by sectors and by states, number of costumers by sector, installed capacity and electricity generation by energy source and region, transmission system performance (i.e., tripping, unsupplied energy, load shedding), monthly average electricity supply interruption, distribution performance by regions (latest data for year 2020)

Myanmar	MOEP's website^[8]	2019	existing power grid and projects under construction including power stations, substations and transmission lines presented in a grid map; substation and transmission data in each division and state.
Philippines	Philippines Power Statistics^[9]	2023	historical installed capacity per plant type and per grid/system, electricity generation per plant type and per grid, annual/monthly electricity sales and consumption by sector and per grid, annual peak demand per grid.
	Electricity Market Data, powered by IEMOP^[10]	Updated daily	<ul style="list-style-type: none"> - real-time dispatch data, hour-ahead projection data, and day-ahead projection data: reserve prices, reserve schedules, generation offers, market clearing prices, HVDC schedule, HVDC limits, congestion, outage schedule, security limits. - other data: constraint on generators, registered capacity – ancillary services, must-run list, merit order table (containing all generation units and imports arranged in ascending order of their variable generation cost)
Singapore	Singapore Energy Statistics^[11]	2023	installed capacity, generation, peak demand, electricity tariff, market share of electricity generation, electricity consumption by sub-sector
	National Electricity Market of Singapore, powered by EMC^[12]	Updated daily	real-time energy prices and demand, 72-hour period energy prices and demand, daily average electricity demand, solar forecasts, real-time ancillary services prices, 3-day ancillary services prices, daily market generations
Thailand	EGAT's statistics^[13]	2024	installed capacity and electricity generation, fuel consumption, transmission system (circuit-length), energy sales, reservoir operation
	ERC's power statistics electricity^[14]		system peak (hourly, daily, monthly), installed capacity and electricity generation
Vietnam	EVN annual report^[15]	2024	installed capacity, power generation output, historical power exchange (imports and exports), power transmission and distribution data, electricity sales per sector, power plant projections and annual average ceiling price for electricity market, electricity price (wholesale and retail)
	ERAV's web portal^[16]	2024	hydropower operations, electricity prices (wholesale and retail) for each customer target group, wholesale electricity market information (hosted by EVN NLDC).

Singapore and the Philippines, the two AMS whose markets have been liberalised, have more committed data sharing practices compared to those of the other AMS. This has helped the stakeholders in these countries to maintain fairness in their electricity markets. Essential data for maintaining the competitiveness of the market, such as electricity supply, demand, prices, consumption and market shares, are made available to the public.

In the Philippines, the Independent Electricity Market Operator of the Philippines Inc. (IEMOP) serves as the Independent Market Operator of the Wholesale Electricity Spot Market (WESM), endorsed by the market participants and the Department of Energy. The IEMOP's main objective

is to pursue the WESM objectives of having a fair, competitive and reliable market for the trading of electricity throughout the Philippines. It is also responsible for hosting the market data platform for its market participants. **In Singapore**, the Energy Market Company (EMC) implements the wholesale electricity market systems, data sharing platforms and business processes that underpin its liberalised market.

In Brunei Darussalam, the Department of Economic Planning and Statistics of the Ministry of Finance and Economy publishes electricity data under an e-data library platform collected from the Department of Energy, Prime Minister's office which contains quarterly and annual generation capacity, peak demand, electricity supply and the consumption breakdown for each sector served.

In Cambodia, the country's electricity regulator, the Electricity Authority of Cambodia (EAC) regularly publishes power data statistics and a complete report which summarises comprehensive power supply and generation data necessary for attracting new potential power trading, including existing and planned transmission infrastructure, distribution networks planning, projections of necessary customer growth to identify potential markets, and tariffs reduction.

Indonesia, through its state-owned utility company PLN and its Ministry of Energy, offer considerable information and electricity data on their website. The key drivers for the country to practice data sharing are firstly the need to maintain its accountability, and secondly, to sustain its appetite for expanding power exports to neighbouring countries in need of electricity.

Although **Lao PDR**, sells the largest amount of renewable-based electricity to neighbouring countries and is committed to unilateral power trading with Singapore, its stakeholders have not yet publicly shared the relevant electricity data. **In Malaysia**, with three states, three different systems and three different utilities (i.e., Peninsular, Sabah and Sarawak), it is the energy commissioning who serves as the electricity regulator responsible for sharing the relevant electricity data. **Myanmar**, through its Ministry of Electric Power (MOEP) website, publishes grid maps which contain information about existing power grids and new projects under construction, as well as data on substations and transmission.

Thailand, through EGAT and ERC, has shared a good amount of relevant information and historical data on electricity generation, fuel consumption, transmission systems (circuit-length), energy sales and reservoir operations, as well as near real-time information such as system peak (hourly, daily, monthly) data.

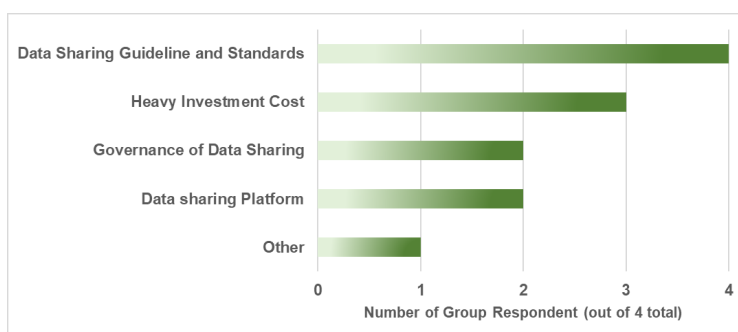
Vietnam has officially operated the VWEM (Vietnam's wholesale electricity market) since 2019. By the end of 2020, 100 power plants participated directly in the power market with a total installed capacity of 27,640 MW, accounting for 40% of the national power system. ERAV as electricity regulators, and EVN NLDC as system operators, have been in the forefront in terms of data-sharing practices in Vietnam striving to maintain the fairness of their electricity market.

As the AMS vary in terms of data-sharing practices in their electricity sectors, to encourage more bilateral power trading and MPT, a strong commitment to standardisation of data sharing is required. When this policy brief was being written, several new power trading negotiations were taking place between various AMS: Indonesia – Singapore[17], Cambodia – Singapore[18], Vietnam – Singapore[19], Sarawak State of Malaysia – Singapore[20], Malaysia – Indonesia[21] and Thailand – Myanmar. The collection and standardisation of data on electricity markets and infrastructure reliabilities is imperative to assist these negotiations, increase the confidence of the parties involved, and reveal the mutual benefits of power trading.

The Challenges of Electricity Trade Data Sharing and Transparency

Given the differences across the ASEAN region in the electricity market models, governance structures, appetite for expanding business in other countries, and regulatory policies for data sharing, the AMS face multiple challenges in deciding how to enhance their data sharing practices. The five challenges for data sharing and transparency identified (see by the authors (see Figure 2 and the text below) are based on four focused group discussions that consisted of utilities (member of Head of ASEAN Power Utilities/Authorities), regulatory bodies (member of ASEAN Energy Regulatory Network) and policymakers (members of ASEAN Power Grid Consulting Committee).

Figure 2. The challenges for data sharing and transparency in pursuing power trading-- either bilateral



1. The nonexistence of data-sharing guidelines and standards, especially relating to what data is to be shared, the granularity of the data, and the need for a standard template and common platform for data sharing.
2. High investment costs of building a common data-sharing platform and upgrading the database system.
3. Unclear governance and responsibilities for data sharing, including agreements on handling the data, inputting it into a database and maintaining consistent standards.
4. Agreeing on a common platform among all AMS. As some countries already have their own platforms and standards, creating one new common platform that all countries agree on requires high-level agreement at the country level.
5. Different institutional structures and human resources among the AMS, as well as different data security issues.

Best Practices on International Data Sharing from More Advanced Electricity Trading Models

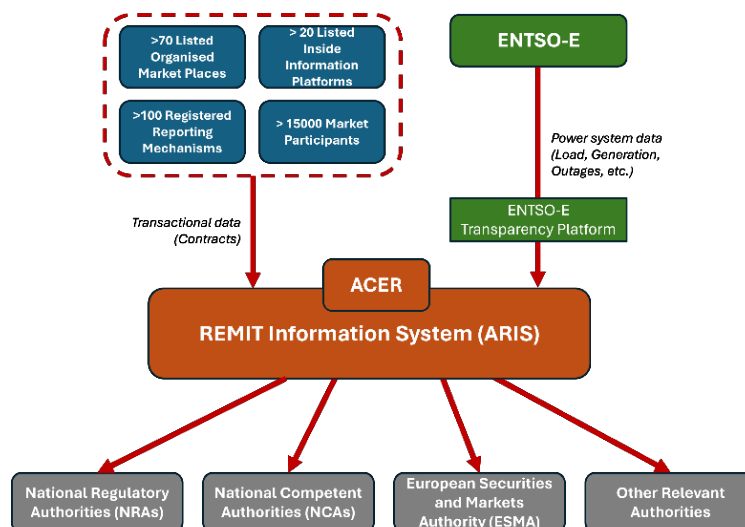
The desire for more bilateral and multilateral interconnectivity is growing around the world through common goals for enhanced regional cooperation. Various countries under different regional cooperation agreements have been exchanging power trading data with each stakeholder, and in some cases are sharing it publicly. Figure 3 depicts the data-sharing governance in the European

Union’s wholesale energy market.

In Europe, the European Union Agency for the Cooperation of Energy Regulator (ACER) oversees the wholesale market operations to ensure their integrity and transparency through the Regulation on Wholesale Energy Market Integrity and Transparency (REMIT). It prevents market manipulation and ensures fair energy prices.[22] The ACER stores analyse the submitted transaction contract orders, both from the transmission system operators (TSOs) and market participants, to identify the potential breach cases from the mismatch orders. Through the REMIT Information System (ARIS), ACER collects approximately 7.2 million records of transactions on a daily basis.[23] As ACER acts as the regulating authority in the wholesale energy market operation, besides data collection, it is also in charge of establishing the data reporting requirements and later checking whether the reporting parties comply with the requirements.

In ensuring that the wholesale market and power system operations runs seamlessly, the European Network of TSOs for Electricity (ENTSO-E) is mandated to report the forecasted and operational data to ACER through the transparency platform, which was established under Regulation 543/2013. Figure 3 shows the data-sharing governance between ACER, ENTSO-E and relevant stakeholders, in which ACER holds the crucial role in compiling, storing, and analysing the collected data. While the cooperation in ASEAN and the EU is different in nature, there are some lessons to learn from the perspective of data-sharing practices that can be adopted and adjusted in the ASEAN context. In the next section, a data-sharing framework for ASEAN is proposed along with the necessary actions to make it successful.

Figure 3 – Data-Sharing Governance in the European Union’s Wholesale Energy Market



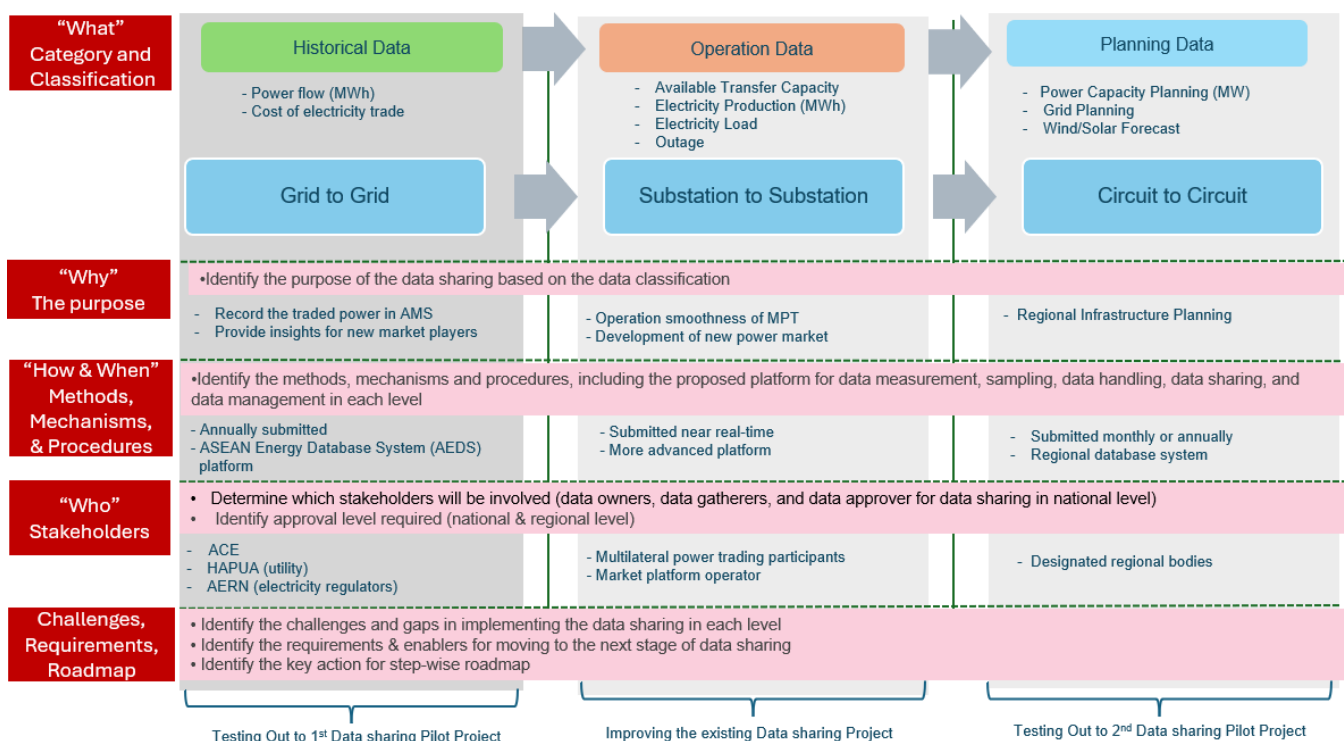
Defining the Data-Sharing Framework and Governance Guidelines for Accelerating MPT under the APG

Data-sharing governance requires defining data-sharing policies and standards, which provide rules and guidelines for what data is to be shared, how it is to be shared, who can access it and under what conditions. These standards must also cover data classification, access, security and quality. Creating appropriate governance structures for the development of data sharing is important to ensure that all stakeholders are appropriately consulted, and that consensus among the ASEAN utilities and regulators is eventually obtained. Governance structures might be simple in the beginning but should allow for organic development as data-sharing needs increase in line with increased regional integration.

A preliminary classification and governance structure for data-sharing purposes is illustrated in Figure 4. It identifies a

possible pathway for data-sharing practices in the ASEAN context. It can serve as a starting point for the APG stakeholders (the ASEAN power utility, electricity regulators and policy makers) to discuss and agree on the potential data-sharing framework needed to increase awareness of each country's power development plans and potential opportunities for bilateral or multilateral power trade in the future. To ensure long-term success, it is important that the proposed structure is well consulted among the stakeholders. They must understand that it may require several iterations to find the right governance structure for each data-sharing level through testing out/prototyping in pilot projects (see Figure 5). In the ASEAN Plan of Action for Energy Cooperation, the highest level of endorsement for the project usually comes from either the Senior Official Meeting on Energy (SOME) or the ASEAN Ministries on Energy Meeting (AMEM) It is necessary to secure their endorsement and commitment in order to implement the proposed data-sharing framework in ASEAN.

Figure 4. Proposed Governance Structure to present to the relevant stakeholders.



The proposed data-sharing framework will answer the “What” question in data-sharing practices which includes the category and classification of data to be shared, i.e. historical data, operation data and planning data. Historical data may include how much power was produced, transported, consumed, and lost, and how much it cost. The

purpose of sharing the historical data is to allow the system operators to handle contingencies, settle the business, validate predictions and deliver insights to the interested parties. The operational data include real-time operation data or near-real time data (such as available transfer capacity, resource allocation, confirmation of purchase, wheeling, etc.). This type of

data is primarily valuable in only the very short term; hence, it will require a quick and robust data-sharing system to allow such information/data exchange. Meanwhile, the planning data delivers the value of operation in longer timeframes for grid efficiency, transparency and evaluation.

The framework should also be able to answer the **“Why”** questions relating to the purpose/key drivers/necessity of

sharing such data. Sharing the operational data is often done to ensure the smoothness of MPT among the involved system operators, but sometimes it can serve as the basis for new market development. The former has already been implemented in the MPT arrangement between Lao PDR, Thailand, Malaysia and Singapore.

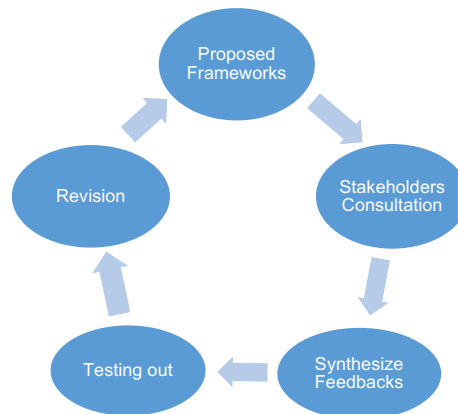


Figure 5. The process of prototyping the data-sharing governance

The questions of **“How and When”** pertain to the data-sharing methods (i.e., grid-to-grid/ substation-to-substation/ circuit-to-circuit), mechanism and data-sharing platform; and timely manner of sharing data (i.e., annually/ monthly/ daily/ hourly). Lastly, the question of **“Who”** explains the roles of the stakeholders involved in the data-sharing practices.

Conclusions and Recommendations

Conclusions

Experience has shown that to create a successful power market, the sharing of data is one of the key enabling factors. At present, the AMS have large differences in their data-sharing practices, including in their electricity market models, governance structures, appetite for expanding business in other countries and regulatory policies for data sharing. A strong commitment to the standardisation of data sharing is required to encourage more bilateral power trading and MPT. As discussions about more renewable-based electricity trade under the APG gain momentum, the ASEAN stakeholders must all work together to develop clear guidelines and standards for data sharing, then together rigorously test them to ensure their accuracy and ease of use.

Recommendations

The authors suggest the following recommendations to resolve the five main challenges in data sharing and transparency for MPT under the APG: above:

1. Map and identify the gaps in the current data-sharing practices among the AMS under the existing cross-border trading or MPT in order to establish a step-wise data-sharing framework.
2. Develop clear guidelines and standards for data sharing in the pursuit of expanding MPT.
3. Implement data-sharing piloting exercises to shape the framework and guidelines. These can then evolve depending on the needs and stages of the MPT.
4. Increase stakeholders’ awareness about the investment opportunities (i.e., from the developing partners and international donors) arising from supporting the development of data-sharing infrastructure, in both technical and financial aspects

Acknowledgement

Given the divergence in data collection and sharing practices among ASEAN countries, this policy brief serves as an important reference for ASEAN countries to accelerate and intensify power trading in bilateral and multi-lateral arrangements. The authors would like to express the gratitude to colleagues from ASEAN Centre for Energy, who have lent their expertise and reviews in the creation of this policy brief. The authors would like to also extend thanks to United States Agency for International Development (USAID) Southeast Asia Smart Power Program (SPP) for their invaluable support in the realization of this policy brief. Their generous contribution, encompassing financial aid and expert guidance, has been instrumental in the successful completion of this work. It is worth mentioning about the path finding project initiated by experts from USAID SPP, which resonates with a recommendation from this policy brief, i.e. "to implement data-sharing piloting exercises to shape the framework and guidelines". We are, therefore, profoundly grateful for their commitment and assistance.

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