



SCOPING STUDY ON INTRA-ASEAN
VALUE CHAIN COOPERATION AND
TRADE IN ENERGY EFFICIENCY AND
RENEWABLE ENERGY TECHNOLOGIES

EXECUTIVE SUMMARY

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Scoping Study on Intra-ASEAN Value Chain Cooperation and Trade in Energy Efficiency and Renewable Energy Technologies

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▶ EXECUTIVE SUMMARY

The countries of the Association of Southeast Asian Nations (ASEAN) have been very active in promoting energy efficiency (EE) and renewable energy (RE) technologies in order to fulfil their global commitment on climate change. In the ASEAN Plan for Action for Energy Cooperation 2016-2025 (APAEC), EE and RE are key program areas to be addressed. In this vein, examples of actions include feed-in tariffs (notably in Thailand and Malaysia) and the liberalization of the electricity market.

In relation to EE, ASEAN member countries are progressively adopting Minimum Energy Performance Standards (MEPS) with EE standard and labelling programs. ASEAN member countries coordinate their energy policies through the ASEAN Energy Efficiency & Conservation Sub-Sector Network (EE&C-SSN) and the Renewable Energy Sub-Sector Network (RE-SSN). Both are composed of government agencies acting as program coordinators, and report to the Senior Officials Meeting on Energy (SOME) and the ASEAN Ministers on Energy Meeting (AMEM).

Under the broader umbrella of the Association of Southeast Asian Nations Standards Harmonization Initiative for Energy Efficiency (ASEAN SHINE) program, a scoping study was initiated. This study aimed to foster understanding among ASEAN policymakers (ministries in charge of energy, trade, commerce, industry, etc.) of the benefits of increasing intra-ASEAN value chain cooperation and trade in the field of EE and RE technologies, and to build related regional capacities.

This study closely reviews the existing intra-ASEAN trade in selected EE and RE technologies, and identifies the potential to further enhance intra-ASEAN supply chain integration for these technologies. Key findings of this scoping study are delineated below.

PERFORMANCE TESTING STANDARDS

Concerning energy performance testing standards for air conditioners, all ASEAN countries have agreed to the gradual adoption of ISO 5151 2010 as the common testing standard, by 2020, with the support of the ASEAN SHINE¹ program.

The international standard for testing the energy performance of refrigerators, which is applied in the majority of ASEAN's big economies (the Philippines, Indonesia, Malaysia and Singapore), is IEC 62552; Vietnam is currently working on aligning its national standard to IEC 62552. Hence, adoption of IEC 62552 in ASEAN countries as the common testing standard is the recommended way forward from the perspective of regional harmonization.

¹ ASEAN SHINE is an activity funded by the EU-SWITCH program; it aims to increase the market share of more highly efficient air conditioners in ASEAN by harmonizing test methods and energy-efficiency standards, adopting common Minimum Energy Performance Standards, and changing consumer purchasing attitudes in favour of energy-efficient air conditioners.

National standards for testing the energy performance of alternating current (AC) induction motors in ASEAN countries are found in Indonesia, Malaysia, Thailand and Vietnam, with these standards moving towards alignment with the IEC 60034-2 standard. As a next step, a detailed analysis of the gaps between IEC 60034-2 and the existing national standards would be useful, as it would help prepare detailed roadmaps for harmonization in ASEAN.

IEC 60076-1 (distribution transformers) is mostly used by ASEAN electric utilities to meet their loss reduction targets. However, this standard is not mandatorily applied by the commercial-industrial sectors at the national level.

Exhibit ES 1. Summary of applied performance testing standards for selected technologies in ASEAN

Country	National Energy Performance Testing Standard			
	Air Conditioners	Refrigerators	Distribution Transformers	Electric Motors
Brunei Darussalam	Under development	N/A	N/A	N/A
Cambodia	N/A	N/A	N/A	N/A
Lao PDR	N/A	N/A	N/A	N/A
Indonesia	Aligned with ISO 5151	Aligned with 62552-3:2007 (Reference to IEC 62552-2:2015 is currently available under SNI 62552-2:2016)	SPLN D3.002-1:2007 (Aligned with IEC 60076-1)(Electric utilities)	SNI IEC 60034-2-1:2014 (aligned with IEC 60034-2)
Malaysia	Aligned with ISO 5151 (old version)	MS IEC 62552-3:2016 (Aligned with IEC 62552-3:2015)	Apply IEC 60076-1 (Electric utilities)	Aligned with IEC 60034-2
Myanmar	N/A	N/A	N/A	N/A
Philippines	(1) Aligned with ISO 5151-PNS ISO 5151:2014 (2) PNS ISO 16358-1:2014	Aligned with 62552-3:2015: DPNS 62552-3:2016	PNS IEC 60076-1:2002	PNS IEC 60034-2-2:2016
Singapore	Aligned with ISO 5151	Aligned with 62552-3:2007	Apply IEC 60076-1 (Electric utilities)	N/A
Thailand	Aligned with ISO 5151 (old version)	TIS 455-2537 and TIS 2186-2547	Apply IEC 60076-1 (Electric utilities), and TIS 384-2453	TIS 867-2550-2007 (Aligned with IEC 60034-2)
Vietnam	Aligned with ISO 5151 (old version)	TCVN 7829:2016 (ongoing) aligned with IEC 62552 (1/2/3)	TCVN 6301-1:2015 aligned with IEC 60076-1:2011	TCVN 6627-2-1:2010 aligned with IEC 60034-2-1:2007

MINIMUM ENERGY PERFORMANCE STANDARDS (MEPS)

Exhibit ES 2 provides an overview of the MEPS applied in ASEAN for selected technologies.

Indonesia, Malaysia, Singapore, Thailand and Vietnam already apply mandatory MEPS for air conditioners.



Malaysia, Singapore, Thailand and Vietnam are far ahead of other ASEAN countries in developing and implementing MEPS for refrigerators. Nonetheless, meaningful discrepancies exist in the methods used by these countries to define energy performance. On one hand, Malaysia and the Philippines apply an Energy Efficiency Factor (EEF). On the other hand, Singapore, Thailand and Vietnam apply a linear energy consumption estimation, based on adjusted capacity. A discrepancy analysis between these two methods would clarify the potential for harmonization, thus paving the way for the establishment of a regional MEPS target.

At present, Vietnam is the only ASEAN country with mandatory MEPS for electric motors and distribution transformers. In Malaysia and Thailand, efforts to promote EE for electric motors have been initiated through voluntary programs. Vietnam has moved steps ahead in terms of applying regulations and standards for energy efficiency. Transferring experience and knowledge from Vietnam to other ASEAN countries would enhance these countries' capacity in formulating and implementing standards to promote EE.

Exhibit ES 2. MEPS for selected technologies in ASEAN

Country	MEPS			
	Air Conditioners	Refrigerators	Distribution Transformers	Electric Motors
Brunei Darussalam	Under Development	None	None	None
Cambodia	None	None	None	None
Lao PDR	None	Under development	None	None
Indonesia	Mandatory	Under development	None	None
Malaysia	Mandatory	Mandatory	None	Voluntary Energy Efficiency Standards
Myanmar	Mandatory	None	None	None
Philippines	Mandatory	None	None	None
Singapore	Mandatory	Mandatory	None	None
Thailand	Mandatory	Mandatory	None	Voluntary Energy Efficiency Standards
Vietnam	Mandatory	Mandatory	Mandatory	Mandatory

LABELLING

Exhibit ES 3 provides an overview of the labelling programs for selected technologies in ASEAN. The labelling programs in Malaysia, Singapore, Thailand and Vietnam follow a five-star/tick rating system. Indonesia is developing a labelling program based on a four-star rating system. For all countries, the higher the number of stars/ticks, the higher the performance; however, the methods of assigning the ratings and the requirements for labels vary between countries. Currently, no process for the adoption of a regional label is underway.

Exhibit ES 3. Labelling program for selected technologies in ASEAN

Country	Labeling			
	Air Conditioners	Refrigerators	Distribution Transformers	Electric Motors
Brunei Darussalam	Under consideration for development - voluntary - comparative	None	None	None
Cambodia	None	None	None	None
Lao PDR	None	None	None	None
Indonesia	Under development - voluntary - 1-4 stars	Under development - voluntary - 1-4 rating	None	Under development - voluntary - 1-4 rating
Malaysia	Voluntary - endorsement	Mandatory 1-5 star rating	None	None
Myanmar	None	None	None	None
Philippines	Mandatory label	Mandatory 1-5 star rating, pending implementation	None	None
Singapore	Mandatory - comparative label, 1-5 rating	Mandatory 1-4 rating	None	None
Thailand	Voluntary - comparative label	Voluntary - comparative 1-5 star rating	None	Endorsement label - voluntary
Vietnam	Comparative label is mandatory. Endorsement label is voluntary	Mandatory - comparative label	Mandatory - endorsement	Mandatory - endorsement

MEPS FOR LIGHTING

In addition to the technologies mentioned above, another study conducted under the guidance of ASEAN SHINE, with the support of the UN Environment *en.lighten* initiative (Coyne et al., 2016), has identified linear fluorescent lamps and LED lamps as important products to target. This is because:

- Linear fluorescent lamps command a large market share, with stable annual sales across the ASEAN region. In addition, there are major differences between existing MEPS levels in Malaysia, the Philippines, Thailand and Vietnam. Therefore, there are significant opportunities for harmonization, both in terms of realising energy savings and in terms of regional trade.
- LED lamps have a small but fast-growing market share across the ASEAN region, and only two countries (Malaysia and Singapore) have existing MEPS. Indonesia, the Philippines and Thailand are currently considering developing their MEPS. Through relatively modest policy interventions, the latter countries could enjoy significant gains in energy security and energy savings; in today's market LED lamps tend to have higher efficiency levels than those required by regulations. This aspect of LED technology therefore presents the ASEAN Member States with an opportunity to establish a short-term efficiency requirement that is higher and could be harmonized across the region (Coyne et al., 2016).

Energy Performance Standards for Renewable Energy Technologies

Solar PV and solar thermal: Current solar PV standards in ASEAN are mostly related to connecting the solar PV system to the grid, the Balance of System (BoS), and the safety of installation. This situation may persist, as the current priority for solar PV is the safety and harmonization for grid connection, rather than the performance of the module/cell itself. The standards for energy performance of modules/cells will be more important in the future when solar PV is mass-produced in the region; at present this technology is still heavily imported. Despite growing interest in this technology, there are neither reliable official figures on the number of solar thermal units installed in each ASEAN country, nor information on energy performance standards, with the exception of Thailand and the Philippines.

The Proposed Approach: Facilitate the Identification and Recognition of EE and RE Products

The six-digit HS code does not differentiate EE and non-EE products: The analysis of trade-flow provides only a single trade value (in US\$ thousands) that includes both EE and non-EE products classified under a single six-digit HS code. Thus, if there is no performance standard as defined by regulation, all products are treated as the same for import purposes (e.g., no differentiation of energy-efficient vs. non-efficient by HS code for tariff). The World Trade Organization (WTO) assesses products to be “like” under Article XX of the GATT. Only if products are regarded as sufficiently different can they be justifiably regarded as “unlike” and differentiated on environmental (or ethical or other) grounds. We recommend that a standard or “classification” to distinguish energy efficiency technologies be introduced to support intra-regional trade of EE technologies. In terms of recognizing EE and RE products, no regional labelling currently distinguishes EE/RE products. Having such regional labels in place would facilitate and further simplify intra-ASEAN trade of such technologies and their recognition by end users.

Tariff Barriers

In line with the ASEAN Trade in Goods Agreement (ATIGA), ASEAN countries apply mostly “tariff free” rates for the technologies covered by this study. Hence, for these technologies, tariffs are no longer a significant barrier to intra-ASEAN trade. From the same perspective, the impact of the Environmental Goods Agreement (EGA) on intra-ASEAN trade is expected to be limited. The EGA could benefit ASEAN countries by enhancing their potential to trade with other countries or economic regions, but specific opportunities should be investigated on a country-by-country basis rather than on a regional one.

For products that are mostly imported from non-ASEAN countries, such as electric motors, tariffs could still play a role. For example, such products could be imported to Singapore and then re-exported to other ASEAN countries. This would have an indirect impact on intra-ASEAN trade. Singapore is a trading hub for ASEAN, with the lowest average MFN tariff; for most products under study, tariffs applied in Singapore are set at zero.



Non-tariff Barriers

In this study, possible non-tariff barriers are explored through a review of the trade policies and existing EE and RE promotion policies of each ASEAN member country.

In terms of trade policy and regulations, all ASEAN member countries already have an applied e-custom system, which facilitates trade and imports in general. The average time from customs declaration to customs clearance varies from ten minutes to a maximum of three days, and there is no restriction/prohibition for EE and RE technologies. Limitations on RE investments, notably concerning local content requirements, are only observed in Indonesia, Malaysia and Myanmar.

Six ASEAN countries have already set EE and RE targets in their national energy policies. However, for the private sector, the perception remains that regulatory and policy frameworks for electricity are unstable, that the existing roadmaps and action plans to reach the EE and RE targets are unclear, and that there is a lack of direction in implementing EE and RE policies. This creates doubts and reinforces the risk perception of potential foreign investors who wish to develop EE and RE projects.

Case Study of Solar PV in Vietnam

A case study on solar PV development in Vietnam was undertaken to analyse non-tariff barriers that impede the adoption of solar PV technology. The key findings from the case study show that the development of solar PV projects has been slow in Vietnam because of roadblocks such as policy and institutional barriers, issues with economic and financial resources, and the lack of adequate data and information.

Solar PV technology currently available in Vietnam has mostly been imported, with large numbers of existing solar PV panels and components coming from China. Components are also imported from Korea and some European countries where quality is higher, yet for a cost that is still reasonable. A limited number of local companies and research institutions are starting to play a role in the solar PV industry. The infrastructure of the power sector has not yet developed to meet the requirements of solar PV integration. For example, the infrastructure for rooftop net metering is not available in Vietnam.

The existing policy framework provides limited support for solar PV in Vietnam. The only policies that can be applied for solar PV development are the Renewable Energy Development Strategy (REDS) and Power Development Plan (PDP) VII-revised. However, there are still no action plans for these policies. The underdeveloped policy framework, as well as the inadequate nature of current support mechanisms, cast doubt on the government's commitment to solar PV development.

As suggested above, the Vietnamese market for solar PV is not yet mature. In the absence of a competitive solar power market, the financial feasibility of solar PV projects relies heavily on the state budget. In this context, investors find it difficult to make cash flow projections,



mobilize financing and make loan arrangements with banks.

No comprehensive geospatial map of Vietnam's solar resources, nor a master plan for Vietnam's solar PV development, have been published. There is therefore an overall lack of information, and solar PV developers and investors have a limited understanding of proper investment procedures. To obtain permissions, they must guess their way through many procedural steps, as pertaining to investment certificates, construction permissions and electricity operation licenses.

CONCLUSIONS AND RECOMMENDATIONS

Based on the review of tariff and non-tariff barriers, the interest of ASEAN countries in participating in the EGA negotiations can be better understood from a global perspective than from a regional one. This is because the preferential tariffs in ASEAN allow zero or very low tariffs for most products, including the aforementioned EE and RE technologies.

In parallel, at the ASEAN level, the development of regional trade in EE and RE technologies is still highly dependent on the national regulations and policy frameworks of the six largest ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam). In that regard, a lack of harmonization affects energy performance testing methods, MEPS and labelling:

- MEPS and labelling requirements vary greatly across the region.
- Enforcement of those requirements is limited, even in countries that have developed and implemented MEPS.
- Across the technologies studied, labelling is still in its initial stages, even in the six largest ASEAN countries.

This results in limited potential for the mutual recognition of energy performance when technologies are traded between countries. This lack of mutual recognition directly influences the potential for increasing intra-ASEAN trade in EE technologies.

In line with the above, two key strategies are recommended for EE technologies.

The first recommended strategy consists of harmonizing standards aimed at testing the energy performance of EE equipment. Not all ASEAN countries reference their national standards to the relevant international standard. Alignment of national standards to an international standard has been achieved for air conditioners, where the reference used is ISO 5151:2010. This is not the situation for the other household appliances in this study (refrigerators and linear fluorescent and non-directional LED lighting), or for other EE equipment used in industry (electric motors and transformers).

The second strategy consists of adopting and harmonizing MEPS from the perspective of progressively phasing out inefficient equipment from the market. The rationale for this second strategy is that technologies with a lower efficiency usually have a lower initial price and limit



market opportunities for more efficient equipment. Hence, MEPS set a minimum standard for entering the market, creating a barrier for continuous penetration of inefficient products.

For RE technologies (solar PV and solar thermal), the study suggests that general approaches cannot be applied because the situation in each ASEAN country is unique. For these technologies, the study recommends employing technology-specific approaches, including by improving the policy framework for solar PV and increasing the market understanding of solar thermal technologies.









