Study on Regional Renewable Energy Cooperation in ASEAN

Strengthening Cooperation to Reach
ASEAN Renewable Energy Target

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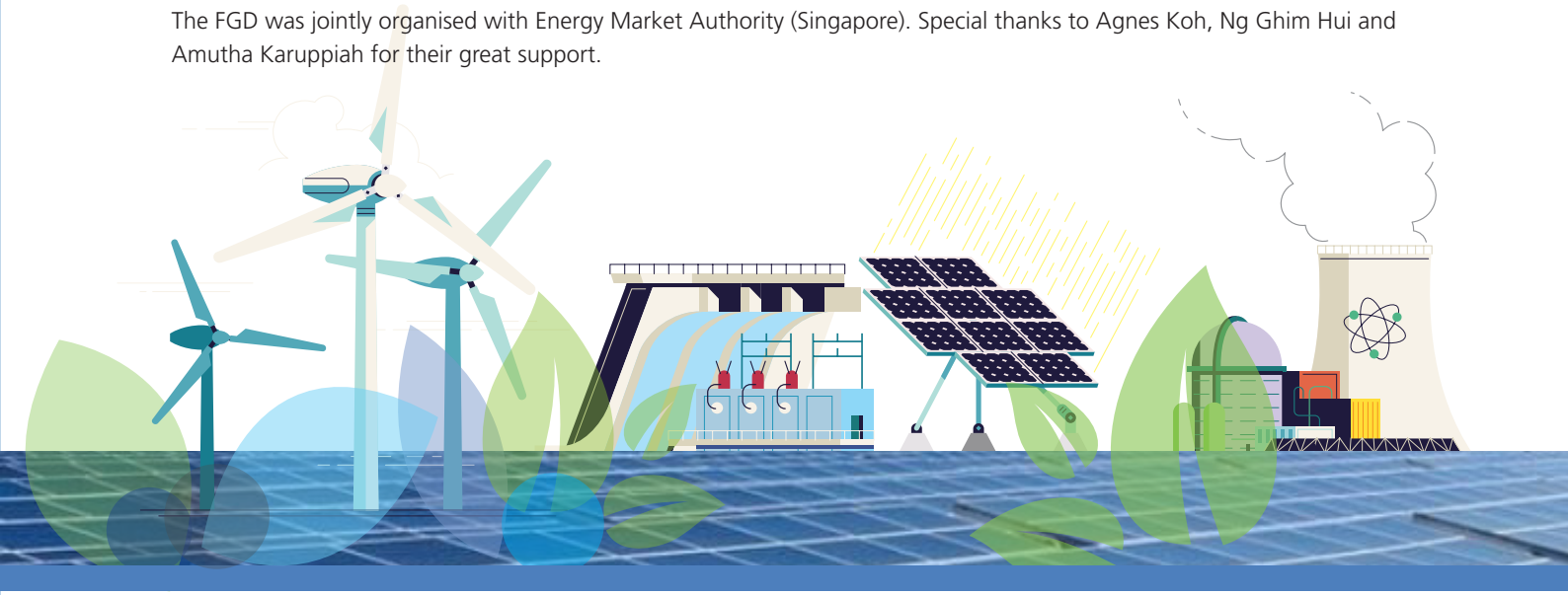

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ASEAN celebrated its 50th year of cooperation in 2017. With the establishment of ASEAN Economic Community (AEC) in late 2015, ASEAN is projected to become to fourth-largest economy in the world by 2030. One of the crucial elements in the realisation of AEC - which calls for a well-connected ASEAN to drive an integrated, competitive and resilient region - is energy. Securing affordable and sustainable energy supplies become an important agenda for ASEAN to achieve the aspirational target of 23% RE share in the primary energy mix by 2025 and to reduce energy intensity by 20% in 2020 based on 2005 levels, as outlined in the ASEAN Plan of Action for Energy Cooperation (APAEC).

The APAEC serves as a blueprint for ASEAN to strengthen and deepen the cooperation and integration amongst the ASEAN Member States (AMS), Dialogue Partners and International Organizations (DPs & IOs), which contributes to AEC. One of the important findings from the latest ASEAN Energy Outlook is ASEAN is well on track to reach its EI target, but stronger efforts are required to achieve the RE target.

Within this context, the ASEAN Centre for Energy (ACE), having a vision as a catalyst for the economic growth and integration of the ASEAN region by initiating and facilitating multilateral collaborations as well as joint and collective activities on energy, continues to play the important role as the regional centre of excellence that builds a coherent, coordinated, focused and robust energy policy agenda and strategy for ASEAN.

For that reason, the ASEAN-German Energy Programme (AGEP), jointly implemented by ACE and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ), conducted a *Study on Regional RE Cooperation in ASEAN* to assess the existing RE cooperation's framework. This study also provides options and recommendations to enhance regional RE cooperation including ACE's potential roles.

We hope that this report could provide AMS, our dialogue partners and stakeholders better understanding on the RE cooperation framework in ASEAN.

Dr. Sanjayan Velautham
Executive Director

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Endorsed by the 33rd ASEAN Ministers on Energy Meeting (AMEM) in Kuala Lumpur, Malaysia in October 2015, ASEAN set out to increase component on renewable energy (RE) as much as 23 percent by 2025. This target is well in line with the global target for renewables, though it will require a significant boost in renewable energy deployment over the next decade. The regional goal is part of ASEAN's Plan of Action for Energy Cooperation (APAEC) 2016-2025, a series of policy guidelines drafted to support the implementation of energy cooperation as a means to advance regional integration and connectivity goals in ASEAN.

Several studies have identified what individual countries and different sectors may contribute to regional RE share, including its quantifiable costs, investments and environmental benefits. However, one remaining question concerns how Member States can work to ensure the implementation of their RE policy cooperates seamlessly with regional efforts to achieve the regional RE target. This in turn requires thorough analysis and recommendations of how existing governance structure at the regional level and supporting actors can better facilitate collaborative regional efforts among AMS, as well as with dialogue partners and international organisations.

To support regional efforts in achieving the regional RE target, ASEAN-German Energy Programme (AGEP) – a joint venture implemented by the ASEAN Centre for Energy (ACE) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ) – developed the *Study on Regional RE Cooperation in ASEAN*. This study provides a comprehensive assessment on the current status of regional RE cooperation and addresses several options for regional cooperation among AMS, together with ASEAN Centre for Energy.

We hope that the *Study on Regional RE Cooperation in ASEAN* will aid policy makers and stakeholders in the ASEAN region in their mission to attain the regional target.

Maria-José Poddey
Principal Advisor for AGEP

Contents

Glossary

Abbreviations

/A	ACE	ASEAN Centre for Energy
	ACER	Agency for the Cooperation of Energy Regulators
	AEC	ASEAN Economic Community
	AFOC	ASEAN Forum on Coal
	AMEM	ASEAN Ministers on Energy Meeting
	AMS	ASEAN Member States
	APAEC	ASEAN Plan of Action for Energy Cooperation
	APEC	Asia-Pacific Economic Cooperation
	APG	ASEAN Power Grid
	ASCOPE	ASEAN Council on Petroleum
	ASEAN	Association of Southeast Asian Nations
/B	BNetzA	Germany's Federal Network Agency
/C	CA-RES	Concerted Action of Renewable Energy
	CCT	Clean Coal Technology
	CEF	Connecting Europe Facility
	CHP	Concentrated Heat and Power
	CIT	Corporate investment tax
	CNE	Civilian Nuclear Energy
/D	DP	Dialogue partner
	DEPP	Department of Energy Policy and Planning
/E	EE	Energy Efficiency
	EE&C	Energy Efficiency & Conservation
	EE&C-SSN	Energy Efficiency and Conservation Sub-Sector Network
	ENTSO-E	European Network of Transmission System Operators for Electricity
	EU	European Union
/F	FGD	Focus Group Discussion
	FIT	Feed-in Tariff
/G	GCF	Green Climate Fund
	GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH/ German International Cooperation
	GW	Giga Watt
/H	H&C	Heating and Cooling
	HAPUA	Heads of ASEAN Power Utilities/Authorities
/I	IAEA	International Atomic Energy Agency
	IRENA	International Renewable Energy Agency

/L	LTMS PIP	Laos Thailand Malaysia Singapore Power Integration Project
/M	MERCOSUR	*Mercado Común del Sur*
	MoU	Memorandum of Understanding
	MW	Megawatt
/N	NAFTA	North America Free Trade Agreement
	NDC	Nationally Determined Contributions
	NEC-SSN	Nuclear Energy Cooperation Sub-Sector Network
	NREAP	National Renewable Energy Action Plans
	NSCOGI	North Seas Countries' Offshore Grid Initiative
/P	PDR	(Lao) People's Decmocratic Republic
	PLEF	Penta Lateral Energy Forum
	PPA	Power Purchase Agreement
	PREE	Peer Reviews on Energy Efficiency
	PV	(Solar) Photovoltaic
/R	RE	Renewable Energy
	RED	Renewable Energy Directive
	REPP	Regional Energy Policy and Planning
	REPP-SSN	Regional Energy Policy and Planning Sub-Sector Network
	RE-SSN	Renewable Energy Sub-Sector Network
	RECs	Renewable Energy Certificates
	RETS	Renewable Energies Transfer System
/S	SAPP	Southern African Power Pool
	SEB	Specialised Energy Body
	SOME	Senior Officials Meeting on Energy
	SSN	Sub Sector Network
/T	TAGP	Trans-ASEAN Gas Pipeline
	TPES	Total primary energy supply
	TSO	Transmission System Operator
	TTFs	Technical Task Forces
/U	UNFCCC	United Nations Framework Convention on Climate Change
/V	vRE	Variable Renewable Energy

Key Terms

Opt-in option	In the context of regional RE cooperation, a country may join regional cooperation initiatives in the region
Opt-out option	In the context of regional RE cooperation, a country may choose to leave a specific regional cooperation initiative in a setting that would otherwise include all countries

Executive Summary

This study provides current situation and opportunity analysis and offers recommendations on regional renewable energy (RE) cooperation. It assesses several options for regional RE cooperation among ASEAN Member States (AMS) and sheds light on the role the ASEAN Centre for Energy (ACE) can play as a catalyst for economic growth and integration of the ASEAN region by initiating and facilitating multilateral collaborations, as well as joint and collective activities on energy.

Regional cooperation for RE can be understood as the purposeful collaboration of AMS on issues related to the deployment of RE; it may encompass both the cooperation between two or more AMS and the cooperation among all AMS. Against the background of AMS' full decision-making power regarding their national energy mixes, regional cooperation may help bridge gaps between the ASEAN aspirational RE target of 23% by 2025 and the sum of the national efforts.

As AMS are responsible for their national energy mixes, regional RE cooperation in ASEAN cannot be imposed by any political, legal or institutional instance above the AMS. Opt-in and opt-out options[1] can therefore give AMS the desired flexibility to choose their level of cooperation regarding RE deployment. In addition, the following benefits and challenges of regional cooperation for RE shall be taken into account:

Benefits	Challenges
Cost reduction	Political barriers e.g. different energy policies and approached at national level
Enhance energy security and reduce import dependencies	
Contribute to grid stability	Technical barriers, e.g., issue of transmission infrastructure and market integration can impede cooperation.
Support regional target achievement	
Create space for dialogue and improved coordination	Financial barriers can also present obstacles that negatively affect the implementation of bilateral, multilateral or regional agreements
Create frameworks for Member States to discuss issues	
Promote knowledge exchange	Legal barriers may include incompatibility of cooperation formats with national legislation, as well as differing legislation across AMS
Enhance competitiveness	

Regional cooperation, also in the field of RE, is non-binding and may continue to be non-binding for reasons of political acceptability. Although AMS initiative for regional RE cooperation increases ownership of the efforts agreed upon, it is currently not bridging the gap between national RE deployment and the aspirational regional RE target. Though bilateral cooperation can sometimes open the door to RE cooperation, regional cooperation from the outset remains more desirable for issues such as grid cooperation/power integration.

Bilateral agreements, especially concerning the power sector or electric power transmission in general, are the main form of regional cooperation in ASEAN today. Examples include an agreement on geothermal energy between Indonesia and the Philippines[2], as well as agreements on the transfer of electric power between Lao PDR and Thailand[3].

[1] Opt-in: In the context of regional RE cooperation, a country can join regional cooperation initiatives in the region; Opt-out: In the context of regional RE cooperation, a country can proactively leave a specific regional cooperation initiative in the region that otherwise would include all countries in that region

[2] The treaty mentions that the areas of cooperation under Memorandum of Understanding (MoU) are coal, oil and gas, renewable energy, energy efficiency and capacity development; transfer of technology; exchange of information, experience, best practices; and other forms of cooperation as may be agreed by both countries. Source: 2014-2016 Indonesia-Philippines Plan of Action', Ministry of Foreign Affairs Indonesia, 2014.

[3] The MoU signed on 24 December 2007 allows Thailand to purchase additional hydropower energy from Lao PDR, up 7,000 megawatts from the initial 5,000 MW in 2015. Source: ASEAN Centre for Energy, 2017.

Differing approaches to regional RE cooperation among AMS exist. These can be grouped by thematic focus and by the degree of collaboration they entail. It is important to note that regional cooperation may be chosen by several AMS or all AMS. A gradual shift from a small group of countries collaborating on a specific topic to regional cooperation encompassing all AMS is possible and, in fact, probable as the benefits of collaboration become more apparent over time. However, it is important to note that varying degrees of cooperation implemented at the same time may be beneficial if not outright necessary, including bilateral, multilateral and regional cooperation. The following are regional RE cooperation options for AMS:

- Exchange of best practice for RE deployment among AMS. This may concern regulatory, policy, legal, technical or financial aspects of RE support and deployment.
- AMS to mutually peer-review their national RE plans. The decision on which country's plan should be reviewed could either be decided at random or be taken based on preferences. Once both countries have discussed their review and finalised the report, it may be published so that other AMS can learn from it.
- AMS to provide recommendations on other AMS' national RE plans. Recommendations should focus on reaching the regional ASEAN RE target in an efficient and collaborative manner, rather than addressing wider energy policy issues to ensure political acceptance of said recommendations.
- Open national support scheme to other AMS. A single energy market alone cannot deliver the desired level of renewables, meaning national support schemes may be needed to overcome this barrier and spur increased investment in renewable energy.
- Establish common support scheme for RE among AMS. The opening of a support scheme to projects from other countries is one step towards regionally-aligned schemes, ensuring efficient use of RE potential.
- Establish sub-regional cooperation initiatives on specific issues/technologies. Two or more AMS may choose to create sub-regional cooperation initiatives within ASEAN. Through these sub-regional initiatives, AMS may strengthen their framework on specific issues and/or technologies that are of particular importance for the participating countries.

The role of ACE as catalyst is undoubtedly essential in enhancing regional cooperation on RE in the region by facilitating AMS to achieve RE target. Several roles that ACE may assume are as follows:

- Providing guidance in the development of national RE targets and action plans. This option can also facilitate the achievement of national RE targets.
- Gathering information related to the status quo of implementation of national pledges toward the achievement of the aspirational regional RE target and comparing them.
- Performing regular reviews of pledges to identify the gap(s) toward target achievement on a regional level.
- Formulating recommendations based on reviews of national RE action plans, e.g., in terms of moving closer to open/coordinated support schemes for RE and increasing transparency for investors.
- Potentially create and manage a regional fund for RE projects. An upfront template for project applications and a transparent set of selection criteria could help turn funding opportunities into concrete RE projects. The fund could be utilised, for example, to help AMS in enhancing their electrification ratio by providing funding for RE projects in rural areas.

Regional cooperation encompasses both the cooperation between two or more AMS, and the cooperation among all AMS. This type of cooperation can potentially be facilitated by ACE as a catalyst. It is important to note for all options presented below that, as regional cooperation in ASEAN is not mandated, so-called opt-in and opt-out options for AMS give them the desired flexibility to choose to or abstain from cooperating in specific forms on certain thematic areas. These opt-in/opt-out options[4] can improve the flexibility of RE cooperation and can thus improve political acceptability for closer cooperation among AMS with varying energy mixes.

4 Refer to footnote no.2

1 Introduction

Credit: GIZ

1 / Introduction

Renewable energy (RE) deployment has become a priority around the globe and is among the key means to achieving the goals of the Paris Climate Agreement. Depending on national capabilities, signatory parties lay out their plans for emissions reduction in Nationally Determined Contributions (NDCs), which undergo continuous review. Many of these NDCs contain provisions listing RE as a major component in reaching climate protection goals [UNFCCC, 2015]. RE sources are not only vehicles to decarbonisation, but also a cost-efficient addition to electric power generation, a means to reduce energy import dependency, and can also contribute to added domestic value.

Leaders in the Association of Southeast Asian Nations (ASEAN) region have recognised that sustainable energy will play a major role in securing the energy supply critical to ASEAN economic and demographic development. In December 2015, ASEAN Member States (AMS) established the ASEAN Economic Community (AEC), which calls for creating ASEAN as a single market and production base with the goal of making ASEAN more dynamic and competitive [Velautham, 2016]. As stated in the AEC Blueprint 2025, ASEAN intends to actively support "green development" by promoting a sustainable growth agenda that enables the use of clean energy, including renewables [ASEAN Secretariat, 2015].

Against this backdrop, the 32nd ASEAN Ministers on Energy Meeting (AMEM) held on 23 September 2014 in Vientiane, Lao PDR endorsed the ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025, which is a series of essential guiding policy documents for AMS designed to support the implementation of energy cooperation and advance regional integration and connectivity goals. The APAEC Phase 1 document, covering the years from 2016 to 2020, focuses on enhancing energy connectivity and market integration in ASEAN to achieve energy security, accessibility, affordability and sustainability for all [ACE, 2015]. To achieve this target, ASEAN must enhance its RE cooperation in terms of intensity, scope and effective governance.

The APAEC consists of seven programme areas – RE is the focus of programme area No.5[5]. To promote access to affordable, secure and clean energy for up to 100 million people in the region without access to grid quality electricity, ASEAN has set a regional target of 23% RE in total primary energy supply (TPES) by 2025 across the region. At the country-level, AMS have also adopted national RE targets.

As part of a regional grouping, AMS have the opportunity to work together to reach the regional target of 23% TPES by 2025. Regional cooperation in RE deployment – cooperation among several or all AMS on a range of issues pertaining to the development of RE – can bring about benefits to reach sustainable energy goals more cost-effective than in a purely national approach.

This study takes stock and provides a gap and opportunity analysis on regional RE cooperation in ASEAN. It assesses several options for regional RE cooperation among AMS and sheds light on the role ASEAN Centre for Energy (ACE) can play as a catalyst for the economic growth and integration of the ASEAN region by initiating and facilitating multilateral collaborations as well as joint and collective activities on energy. These recommendations have been crafted to support AMS in reaching their RE targets.

[5] The programme areas of the APAEC 2016-2025 phase I are as follows: No.1) ASEAN Power Grid, No.2) Trans ASEAN gas pipeline, No.3) Coal and clean coal technology, No.4) Energy efficiency & conservation, No.5) Renewable energy, 6) Regional energy policy & planning, No.7) Civilian nuclear energy. See: ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025: Phase I: 2016-2020 [ACE, 2015]

1.1 Methodology

The study is both based on a thorough desktop study, as well as on primary information received in the framework of a focus group discussion (FGD) with ASEAN RE Sub Sector Network (RE-SSN) Focal Points. A literature review provides an overview on the status of regional cooperation and existing concepts for the further development of regional cooperation in ASEAN. The study also relies on insights from projects on regional and international energy cooperation. The FGD with RE-SSN Focal Points, implemented in the framework of a half-day workshop in July 2017 in Singapore, is one essential source of information and expertise used to verify the collected information and complement the resulting analysis.

The study is structured as follows: First, regional cooperation is defined and the potential benefits and challenges/barriers of regional RE cooperation are described and analysed. Next, the status quo of regional cooperation in ASEAN is presented and gaps are identified. This is followed by a discussion of different options for regional cooperation governance. These options are then assessed against the criteria of effectiveness, efficiency, political acceptability in the specific context of ASEAN. The final section presents recommendations on potential ways to further develop regional RE cooperation governance for AMS and ACE's role therein.

2 Benefits, Challenges and Global Experience in Regional RE Cooperation

Credit: ACE

2 / Benefits, Challenges and Global Gxperience in Regional RE Cooperation

Regional cooperation for RE can be understood as the purposeful collaboration of AMS on issues related to the deployment of RE, which encompasses both the cooperation between two or more AMS, and the cooperation among all AMS[6]. Against the backdrop of AMS' full decision-making power regarding their national energy mixes, voluntary regional cooperation for RE may help bridge gaps between the ASEAN aspirational RE target of 23% in TPES by 2025.

The study takes into account that regional cooperation in ASEAN cannot be legally prescribed given ASEAN's commitment to non-intervention concerning the affairs of member countries and the fact that community decisions are made by consensus. Regional cooperation for RE is instead based on voluntary commitments by AMS. To accommodate varying levels of participation by AMS, opt-in and opt-out options can give them flexibility on whether or not to cooperate on certain thematic areas related to RE deployment [Gephart et al., 2016].

Goals of regional RE cooperation in ASEAN, include: a.) reaching the aspirational regional target of 23% RE in TPES; b.) Member States learning from each other and other regions; and c.) promoting energy security. Regarding the achievement of the 23% regional target, regional cooperation should facilitate reaching both regional and national RE targets. Learning as a goal should aim at knowledge and experience sharing in terms of technology exchange and capacity development. Moreover, having unified data on RE across AMS is another key goal of regional RE cooperation.

2.1 Examples of Regional Energy Cooperation from Around the World

ASEAN, formed in 1967, adopted a series of principles that have collectively come to be known as 'the ASEAN Way'. These principles emphasise the commitment to non-intervention into the affairs of member countries. In line with the Treaty of Amity and Cooperation in Southeast Asia [ASEAN, 1976], this approach can be characterised as being guided by non-interference, building trust, and decision-making by consensus, rather than by majority. Regional cooperation in ASEAN, including on energy topics, can therefore be characterised as being driven by consensus and non-interference, in contrast to more institutionalised efforts, such as those observed in Europe.

In the European Union (EU), regional cooperation can be characterised as a more institutionalised effort, where there is deep market, grid, and to a lesser extent, policy integration. Regional cooperation in the EU can be seen as an incremental step towards completing the internal market and creating an Energy Union [Gephart et al., 2016].

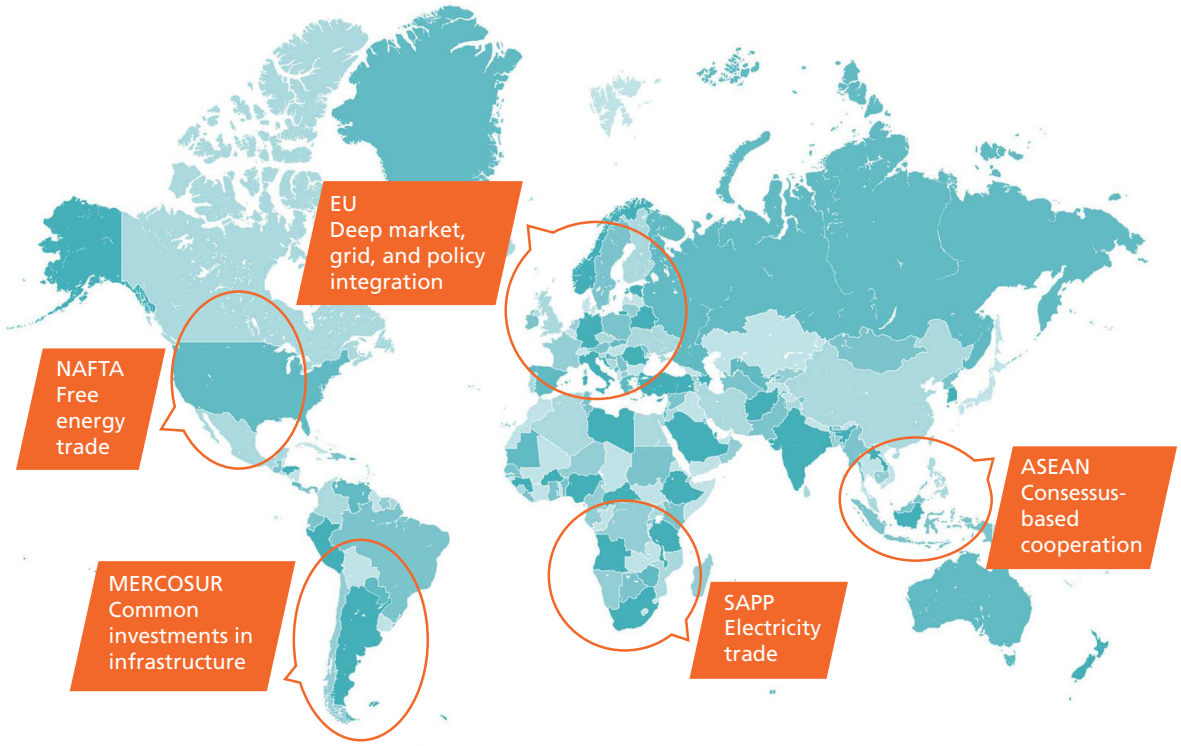
In Latin America, the regional cooperation is known as *Mercado Comun del Sur* (MERCOSUR)[7], regional energy cooperation was triggered by myriad investments in infrastructure, which was part of the economic openness and trade liberalisation in Latin America in the 1990s. This liberalisation includes investments in natural gas pipelines and electricity transmission lines. For instance, the grid interconnection between southern Brazil and Argentina, which was built in 1999, allowed Brazil to access Argentina's thermal power capacity during periods of drought and, in turn, allowed Argentina to access Brazil's cheap hydropower during peak demand periods [Navarro and Sambodo, 2013].

6 Cooperation between ASEAN and dialogue partners (DPs) or international organisations (IOs) outside ASEAN are forms of inter-regional or, more broadly, internal cooperation, and therefore beyond the scope of reginal cooperation. This does not mean that different forms of cooperation for RE deployment should be treated in silos; synergies between these different forms should be encouraged.

7 Formed in 1991, MERCOSUR stands for Mercado Comun del Sur or Common Market of the South which brought together Argentina, Brazil, Paraguay and Uruguay, as well as Venuezuela and Bolivia in the later stage. As per 2017, the members also include Chile, Colombia, Ecuador, Guyana, Peru and Surinam. Source: www.mercosur.int

In the North America Free Trade Agreement (NAFTA)[8], regional energy cooperation has evolved along free trade efforts by Mexico, Canada and the United States of America. It started with bilateral natural gas trading between the United States and Mexico, followed by electric power trading between the United States and Canada.

In the Southern African Power Pool (SAPP)[9], production facilities operated by the utilities of the 12-member countries are linked to transfer excess capacity from one system to another. These examples illustrate how regional energy cooperation can adopt varying forms and respond to the particular needs of a given region.



/ Figure 1 Selected regional energy cooperation initiatives from around the world [Navarro and Sambodo, 2013]

2.2 Benefits of regional RE cooperation in ASEAN

Regional RE cooperation could bring about several benefits for AMS and ASEAN. First, regional cooperation can potentially lead to cost-reductions in a number of ways. If AMS within a region jointly use their RE potential by allocating RE support according to resources availability in a wider geographical region, support cost, capital expenditures, and fuel imports into that region may be lowered. Based on regional best practices, removing barriers to obtaining permits, which are a primary source of delay for RE development, can reduce developer costs. RE project developers and investors can benefit from streamlined processes, thereby cutting transaction costs and enabling projects to be offered at a lower price. In addition, regional cooperation that promotes the convergence of previously disparate regulations (e.g., permit procedures for RE projects) applied by AMS can lead to efficiency gains by means of scale effects for investors active in the region. All of these elements can lower capital expenditures, which can in turn lower support costs and consumer electricity prices.

8 NAFTA, North America Free Trade Agreement.

9 SAPP, Southern African Power Pool, is a cooperation of the national electricity companies in Southern Africa under the auspices of the Southern African Development Community (SADC). The members of SAPP have created a common power grid between their countries and a common market for electricity in the SADC region. SAPP was founded in 1995. Taken from: Musaba, 2010

Experience in the EU

Redundancies in the approval processes are frequently experienced by wind project developers in Europe, in part due to the lack of streamlining of permit processes across countries [Groenenberg et al., 2017]. In the EU's 2020 RE[10] framework, the Renewable Energy Directive (RED) allowed EU Member States to cooperate to achieve (part of) their target jointly. Joint support schemes (Art. 11 of RED) mean that EU Member States merge or coordinate (parts of) their RE support schemes and jointly define how the renewable energy produced is allocated to their national targets [Gephart et al., 2015]

Second, regional RE cooperation can enhance energy security and reduce import dependencies. If AMS with similar energy security challenges (e.g., insufficient fossil fuels to meet increasing demand) coordinate their RE deployment in the region, together with infrastructure development, this can help diversify their energy mix and result in an increase of overall energy security and quality in the supply of electric power.

Third, regional cooperation can also contribute to grid stability. Ensuring the compatibility of system operations and market design is more important than ever with increasing shares of RE (e.g., the relationship between gate closure time, balancing responsibilities and operational grid stability becomes more important). Regional cooperation may contribute to grid stability if, for example, balancing regions went beyond national borders.

Experience in the EU

Within the framework of the so-called Penta Lateral Energy Forum[11], a regional cooperation initiative in Europe, regional assessments of whether generation and grids are adequate in ensuring safe and reliable operation of the power system provide decision makers with a holistic assessment on future investment needs. The Forum also exchanges knowledge on best practices in and cooperates on converging its market design.

Fourth, regional cooperation can support regional target achievement. An assessment of whether current measures and policies are capable of reaching a regional target is the necessary starting point of any gap analysis. Regional cooperation can therefore help bridge this gap between national policies and the aspirational RE target by creating a space for dialogue and coordination between AMS. For instance, regional cooperation on support schemes can help AMS explore and test the deployment of specific technologies that are perhaps technically and/or economically unviable for individual AMS. Moreover, it would allow two or more AMS to jointly test new support scheme elements (e.g., the introduction of auction schemes or specific auction scheme designs to reduce the cost of RE deployment). In addition, regional cooperation can create frameworks for members to discuss issues (e.g., unintended consequences of individual Member States' RE policies), thereby increasing the chance to mitigate potential conflicts early on [Gephart et al., 2016].

10 RES, Renewable energy sources

11 The Pentalateral Energy Forum (PLEF) was created in 2005 by Energy Ministers from Benelux, Germany and France to promote collaboration on cross-border exchange of electricity. It aims at enabling electricity market integration in the region and improving security of supply. The main characteristic of this forum is its voluntary nature. It now includes Austria, Belgium, France, Germany, Luxembourg, and the Netherlands. Switzerland participates as an observer country. National regulatory authorities, TSOs, and power exchanges are represented From: Gephart et al., 2016

Fifth, regional cooperation can facilitate the achievement of the aspiration regional RE target by advancing knowledge exchange between AMS and regional ASEAN actors. Exchanging knowledge and experiences with RE deployment/project development, support schemes for RE, or grid integration can help overcome obstacles in the less experienced AMS.

Lastly, regional cooperation can enhance competitiveness and advance a region's global technological ambitions. Cooperation on RE-relevant technologies and innovations across a larger number of states can help spur diffusion of knowledge and improve technological ingenuity. This may also include cooperation on training to ensure skilled staff is available.

2.3 Challenges of Regional RE Cooperation in ASEAN

Despite the benefits to be gained from RE regional cooperation, it is not to be mistaken as an "easy way out" from tensions between national energy preferences and ASEAN-wide targets [Steinbacher and Schoenefeld, 2015]. Indeed, cooperation efforts and initiatives do not always come to fruition. The reasons for this may be political, technical, or legal in nature. These barriers, nonetheless, also point to potential areas for strengthening regional RE cooperation.

Experience from other regions and the literature indicate that ***political barriers*** for regional RE cooperation may include different energy priorities and approaches at the national level to engage in cooperation on RE deployment and target achievement (i.e. political will), uncertainty regarding absence of a regional RE framework or a lack of willingness to move away from purely national approaches [Klessmann et al., 2014]. Thorny governance questions of membership, responsibilities and legitimacy are to be addressed [Steinbacher and Schoenefeld, 2015]. Gephart et al. [2016] note that the political will to implement cooperation mechanisms among EU member states is limited when the benefits of cooperation are not clearly outlined and communicated and when the political risk seemingly outweighs the potential advantages. Therefore, in ASEAN or regional RE efforts elsewhere, the actual aims of cooperation and the specific benefits related to it need to be publicly defined, explained and discussed to generate public support and, ultimately, political will to cooperate.

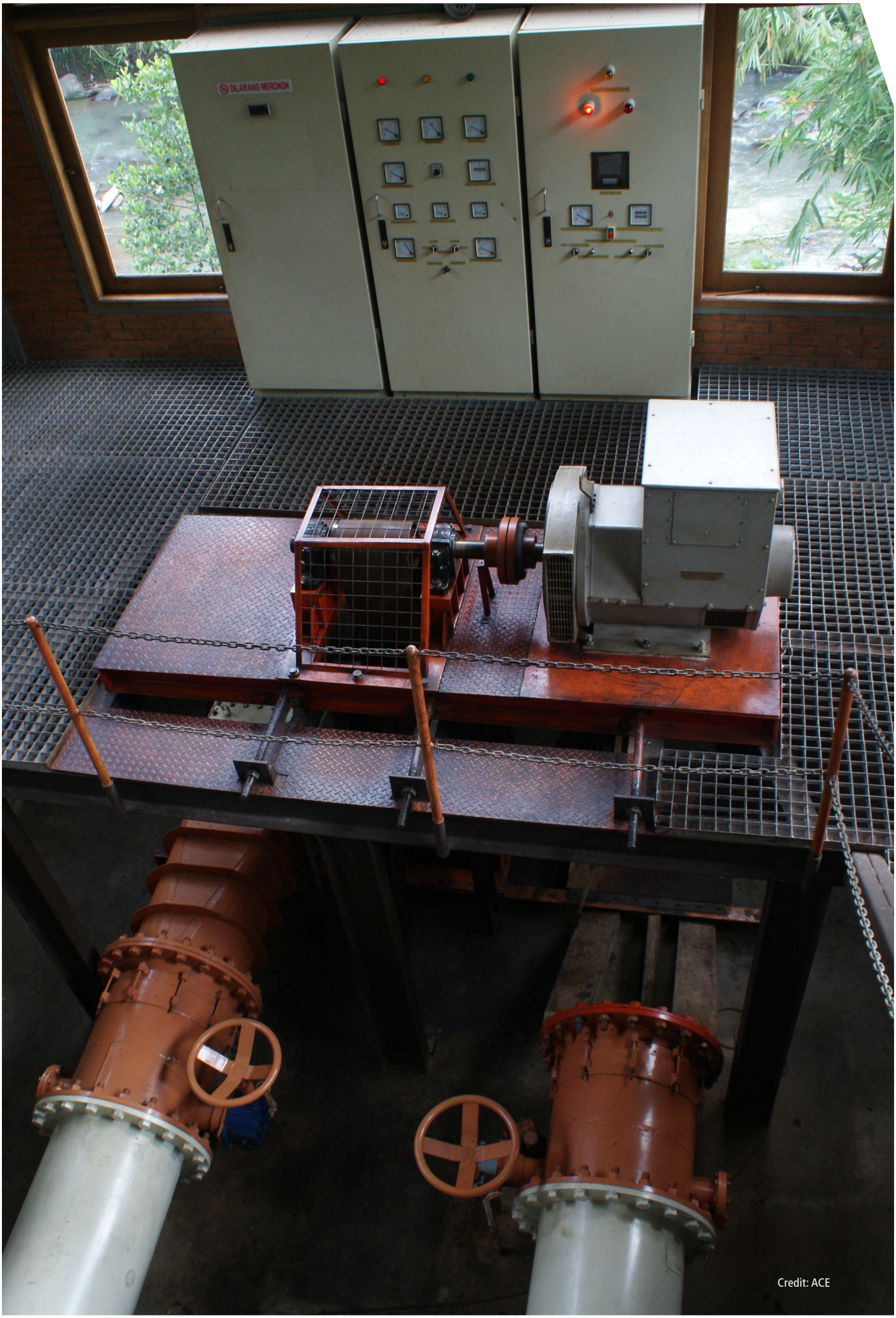
In ASEAN, while there are considerable policy differences in RE deployment in the region (e.g., the use of electricity subsidies), there is also an awareness of the different levels of development across AMS and how this plays a role in the choice of policies at the national level. In the case of electricity subsidies, which may have distortionary effects on further expanding RE, a gradual phasing out of subsidies needs to take place (since other policy objectives at AMS need to be considered). Indeed, ample fossil fuel resources, a policy goal supposedly competing with increasing RE shares (e.g., reaching a 100% electrification rate), and political acceptance of phasing out electricity subsidies are challenges to RE deployment in certain AMS, and, indirectly, to strengthening regional cooperation.

Technical and financial barriers may also prevent countries from engaging in cooperation despite the political desire to do so. These barriers may concern a high degree of uncertainty regarding quantifiable costs and benefits, design options of cooperation formats, and challenges for AMS to forecast their own RE target fulfilment. A lack of transmission infrastructure and market integration can also pose an obstacle to cooperation because it prevents electricity, also from RE, from being transmitted and traded. In ASEAN, leaders must overcome technical challenges in order to, for example, ensure the multilateral connections of the ASEAN Power Grid (APG) work. An important technical challenge potentially hindering cooperation in the region is a lack of proper electricity infrastructure (i.e. interconnections but also reinforced national girds). For example, in the Laos-Thailand-Malaysia-Singapore Power Integration Project (LTMS PIP), each interconnection has its own bilateral agreement instead of an overarching one. Also, market structures differ heavily, with Singapore being a liberalised market, while single-buyer or fully vertically integrated models prevail in other markets. While leaders in these respective markets have made a concerted effort to further collaborate, the working level needs to sort out cooperation step by step. The definition of more harmonised technical standards and codes for electricity will also be key in the development of the APG.

Financial constraints can also be an important factor, in particular a shortage of funding. Efforts toward the deployment of RE in the region, such as the implementation of bilateral agreements between AMS, the elaboration of studies, the harmonisation of Energy Efficiency and Conservation (EE&C) and RE products, and the transfer of RE technologies require extensive funding to ensure proper implementation. Similarly, insufficient funding by some AMS for the organisation of meetings with other member countries can hinder progress in regional cooperation.

As an aside, capacities and knowledge for the implementation of national RE projects shall be advanced through capacity development.

Legal barriers include incompatibility of cooperation formats with national legislation, as well as differing legislation across AMS. Legislation concerning energy and the environment currently differs substantially between AMS. Similarly, the legal protection of investor funding – among other barriers – is not clearly defined in some AMS, thus there is reluctance within the private sector to invest. It should be noted that legal barriers are believed to not only hinder regional cooperation, but also RE investment.



Credit: ACE

3 State of Play in Regional Cooperation in ASEAN and Gap Analysis

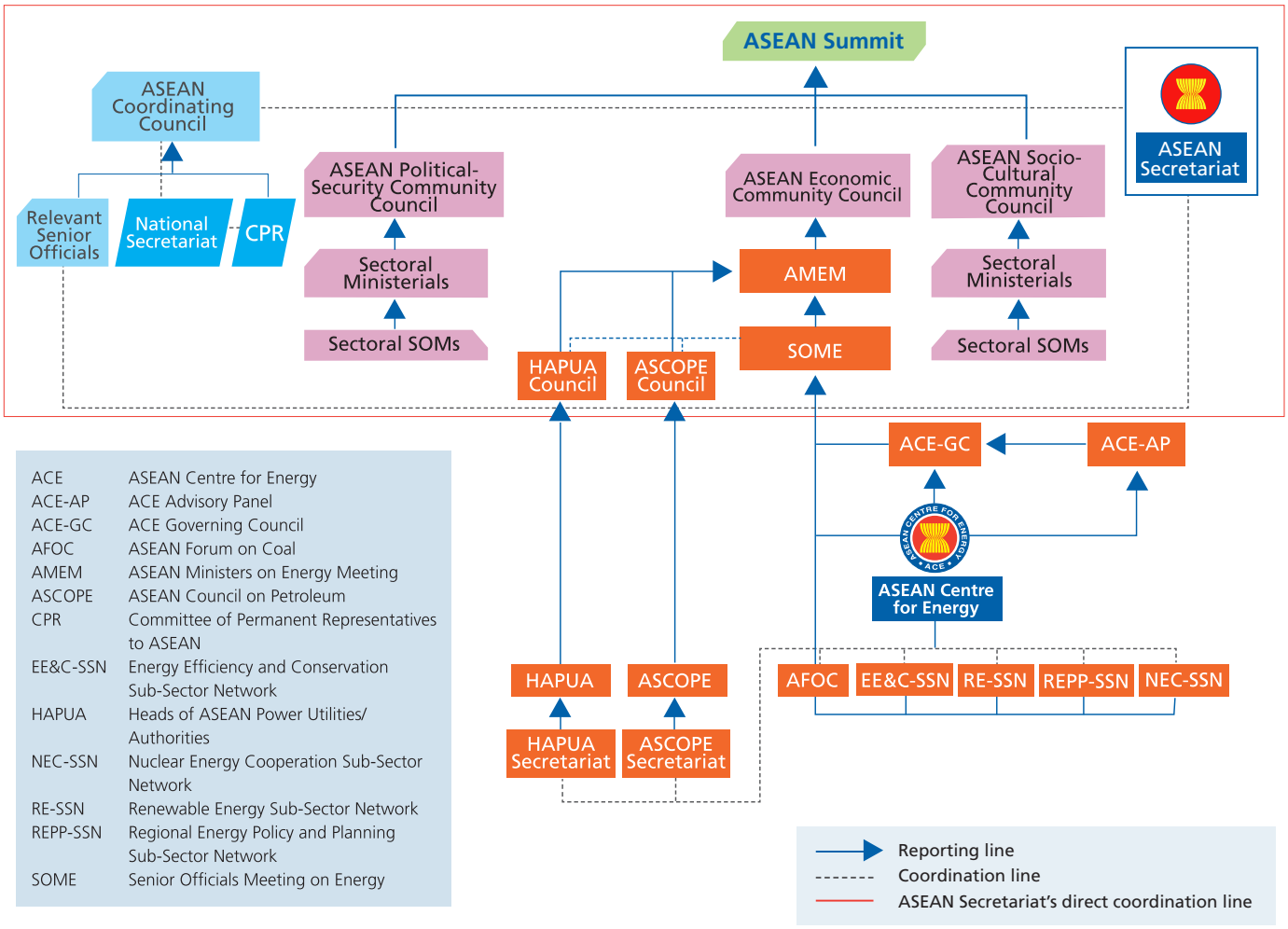
Credit: GIZ

3 / State of Play in Regional Cooperation in ASEAN and Gap Analysis

3.1 Overview of Actors and Cooperation Efforts in the ASEAN Region

This sub-section presents an overview of the players involved in regional cooperation in ASEAN and highlights current RE-specific cooperation efforts. In addition to RE, efforts related to energy policy and planning, and the ASEAN power grid will be touched on.

3.1.1 ASEAN Regional Players Involved in Regional RE Cooperation



/ Figure 2 Key actors involved in regional RE cooperation in ASEAN. Source: ACE

There are three pillars under the ASEAN Secretariat: the ASEAN Political-Security Community Council, the ASEAN Economic Community Council, and ASEAN Socio-Cultural Community Council. Energy topics are treated under the second pillar, with energy ministers gathering once a year at the ASEAN Ministers of Energy Meeting (AMEM). AMEM provides overall guidance and advice on the implementation of the APAEC, and on setting the policy direction to achieve energy cooperation goals under the framework of the AEC [ACE, 2015].

Below AMEM, the Senior Officials Meeting on Energy (SOME) gathers representatives, e.g., Director General or Undersecretary, from the 10 AMS. Most of the relevant decisions for regional cooperation are made within SOME, who then reports to AMEM. SOME, together with Sub Sector Network (SSN), collectively determines implementation priorities and provides directions and advice on the APAEC to ensure proper coordination and integration of APAEC strategies and actions. SOME also guides the creation and implementation of the yearly Work Plan of each of the APAEC Programme Areas, and provides annual progress updates to AMEM. Decisions by SOME are then to be approved by AMEM.

Established on 1 January 1999, the ASEAN Centre for Energy (ACE) is an independent intergovernmental organisation within the ASEAN structure representing the interests of 10 AMS in the energy sector. The Centre accelerates the integration of energy strategies within ASEAN by providing relevant information and expertise to ensure the necessary energy policies and programmes are in sync with the economic growth and environmental sustainability of the region. It is guided by a Governing Council comprising Senior Officials on Energy from each AMS, along with a representative from the ASEAN Secretariat as an ex-officio member. Hosted by the Ministry of Energy and Mineral Resources of Indonesia, ACE's office is located in Jakarta [ACE, 2016].

The ACE Governing Council endorsed the business plan of an enhanced ACE: a high-performing institution and a regional centre of excellence which builds a coherent, coordinated, focused and robust energy policy agenda and strategy for ASEAN. As an ASEAN energy think tank, ACE assists AMS by identifying innovative solutions for ASEAN's energy challenges regarding policies, legal & regulatory frameworks and technologies. ACE also implements relevant capacity development programmes and projects to assist the AMS in developing their respective energy sector. ACE also assists SOME and SSNs in carrying out various activities.

There are seven areas of focus under ACE grouped around sub-sector networks (SSNs) and specialised energy bodies (SEBs) that operate at the working level. These are: the Renewable Energy Sub-sector Network (RE-SSN); Regional Energy Policy and Planning Sub-sector Network (REPP-SSN); the Heads of ASEAN Power Utilities/Authorities (HAPUA); the Energy Efficiency and Conservation Sub-sector Network (EE&C-SSN); ASEAN Council on Petroleum (ASCOPE); ASEAN Forum on Coal (AFOC); and the Nuclear Energy Cooperation Sub-sector Network (NEC-SSN) [ACE, 2015]. These networks and bodies serve as SOME's implementing arms in their respective programme areas of APAEC. They convene their respective meetings as necessary to identify priorities and implementing arrangements, as well as further develop the work programmes.

/ Table 1 APAEC Programme areas and responsible implementing bodies. Source: ACE

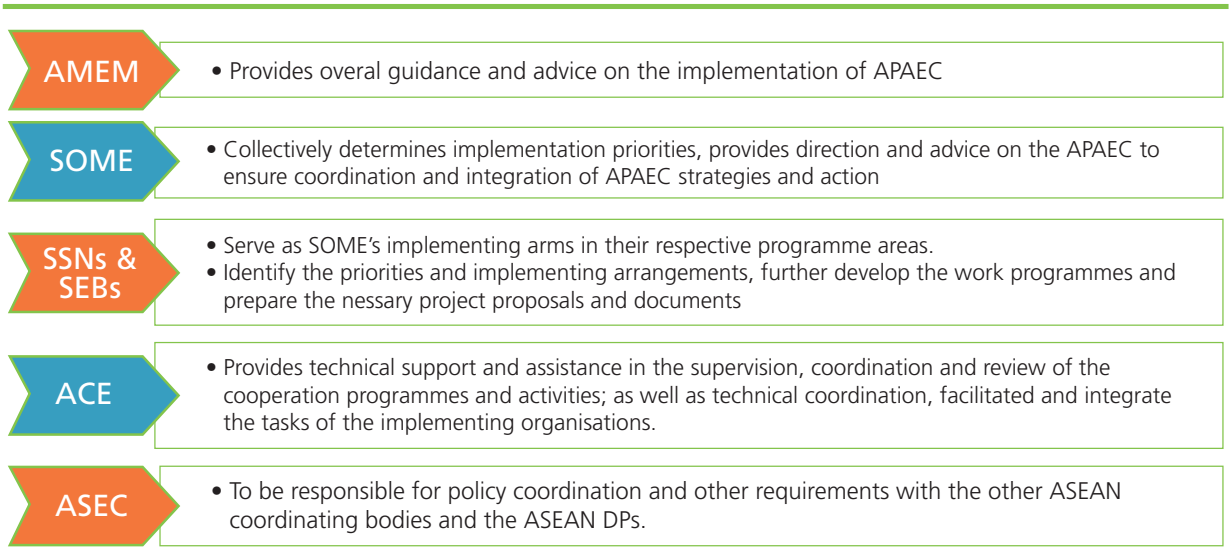
APAEC Programme Area	Responsible implementing body (SSNs and SEBs)
ASEAN Power Grid (APG)	Heads of ASEAN Power Utilities/Authorities (HAPUA)
Trans-ASEAN Gas Pipeline (TAGP)	ASEAN Council on Petroleum (ASCOPE)
Coal and Clean Coal Technology (CCT)	ASEAN Forum on Coal (AFOC)
Energy Efficiency and Conservation (EE&C)	Energy Efficiency and Conservation Sub-Sector Network (EE&C-SSN)
Renewable Energy (RE)	Renewable Energy Sub-Sector Network (RE-SSN)
Regional Energy Policy and Planning (REPP)	Regional Energy Policy and Planning Sub-Sector Network (REPP-SSN)
Civilian Nuclear Energy (CNE)	Nuclear Energy Cooperation Sub-Sector Network (NEC-SSN)

Dialogue partners and international organisations do not have competencies assigned to them within the institutional framework of ASEAN. Their functions are therefore defined by virtue of their activities with AMS and/or other institutionalised ASEAN actors.

3.1.2 APAEC as Regional Cooperation Framework

The APAEC 2016-2025 will be implemented in two phases. Phase I will cover the period of 2016-2020 for the implementation of short to medium term measures to enhance energy security cooperation and to take further steps toward connectivity and integration. In 2018, there will be a stocktake of the progress of Phase I which will guide ASEAN in charting the pathways and directives for Phase II (2021-2025). Formulated by AMS with the lead of REPP-SSN, APAEC represents the interests of AMS on regional energy cooperation. The plan states that, for the period o f2016-2025 (Phase I), ASEAN's energy cooperation efforts shall focus on "enhancing energy connectivity and market integration in ASEAN to achieve energy security, accessibility, affordability and sustainability for all". [ACE, 2015].

The APAEC is implemented in hierarchal arrangement from AMEM to ACE. AMEM provides overall guidance and advice on the implementation of the APAEC. AMEM also provides guidance to address key issues, challenges and concerns of common interest and to set policy directions to achieve the goals of energy cooperation under the framework of the AEC.



/ Figure 3 The role of AMEM, SOME and ACE in the implementation of APAEC [Ecofys, based on ACE, 2015]

The SOME guides the formulation and implementation of the yearly Work Plan of each of the APAEC Programme areas and provides annual progress updates to AMEM.

ACE, in coordination with the ASEAN Secretariat, assists SOME, SSNs and SEBs in carrying out the above responsibilities, including technical support and assistance in the supervision, coordination and review of cooperation programmes and activities. ACE shall provide technical coordination, facilitate and integrate the tasks of the implementing organisations, such as the planning and providing of policy analysis and statistics.

To promote development and utilisation of renewable energy (Programme Area 5), AMS have developed and implemented several renewable energy initiatives related to bio-fuels, solar PV programmes, as well as promoted open trade and cooperation in the renewable energy sector [ACE, 2015]. Besides these initiatives, regional cooperation efforts have focused on knowledge generation, capacity development, and knowledge exchange among AMS. APAEC 2016-2025 Phase I: 2016-2020 aims to develop and adopt ASEAN RE Roadmap by 2020, with clear policies, response plans and programmes in renewable energy. Another example of these efforts is the ASEAN Energy Awards, category renewable energy project. Introduced in 2001, this initiative seeks to promote and disseminate best practices in renewable energy projects in AMS, and encourage all sector participation in developing innovative RE projects to enhance business growth.

Efforts related to energy policy and planning and the ASEAN power grid have also been made. Regarding the former, the REPP-SSN successfully completed the APAEC 2010-2015 Full Term Review, which was endorsed by the 33rd ASEAN Ministers on Energy Meeting (AMEM) in Kuala Lumpur in October 2015. This illustrates the progress monitoring already taking place in ASEAN, in this case to take stock of the achievements of the previous APAEC. REPP-SSN oversees the preparation, evaluation and monitoring of regional energy plans of the APAEC, and has successfully implemented several capacity development activities for policy-makers.

Achievements in terms of regional cooperation in the APG include the implementation of 6 out of 16 power interconnection projects for APG by the end of 2015 [ACE, 2015]. These projects connect Singapore and Malaysia, Thailand and Malaysia, and via Thailand to Cambodia, Lao PDR and Vietnam. Six projects under the APG are currently under construction, set for completion in 2017.

Moreover, HAPUA renewed its commitments for sub-regional, multilateral electricity trading by 2018. Several electricity interconnecting arrangements within the region were adopted in 1997 to move towards integrated energy systems. Thru 2020, further development of bilateral and multilateral interconnections remains a core need, as well as an exchange on and alignment of legal and regulatory practices.

3.2 RE Policies in ASEAN

AMS increasingly implement policies to incentivise the deployment of RE generation. This subsection provides a high-level overview of RE policies in ASEAN to identify potential areas of cooperation. RE policies or RE support schemes can be grouped into three categories: primary support schemes, secondary support schemes and framework conditions.

Types of RE support schemes

Primary support schemes are those which are crucial for the expansion of renewable energies. Because of their continuous implementation, the cost differences between renewables and fossil fuel technologies like coal are offset, leaving the former an attractive investment.

Examples of primary support policies include feed-in tariffs (FiTs), quotas (i.e. renewable energy certificates), and net metering. A FiT is a guaranteed price for electricity generated from renewable energy sources that is usually paid for a fixed period for each unit of electricity produced and fed into the grid [Gephart and Klessmann, 2013]. With quota obligations, power plant operators receive certificates for their green final energy, which they may then sell to those obliged to fulfil the quota obligation. Selling the certificate provides additional earnings on top of the common market price of the final energy sold [Held et al., 2014]. Lastly, net metering is a billing mechanism that credits solar energy system owners for the electricity they add to the grid. For example, if a residential customer has a PV system on the home's rooftop, it may generate more electricity than the home uses during daylight hours. If the home is net-metered, the electricity meter will run backwards to provide a credit against what electricity is consumed at night or other periods where the home's electricity use exceeds the system's output. Customers are only billed for their "net" energy use [SEIA, 2017].

Secondary support schemes can lead to a reduction in overall support costs, for example, by giving public-sector loans to investors, which represent a higher level of security, thereby reducing capital costs. They can also be used to promote additional desired plant properties, e.g., more technically advanced concepts for grid integration or stimulate investment in a region by granting tax reductions or 'soft-loans'.,

Framework conditions are all regulatory measures that influence RE deployment. Central measures include grid or generation licences and environmental permits. One may note that renewables have been rapidly deployed in recent years, particularly in countries which grant privileged grid access to renewables [Tiedemann et al., 2016].

Credit: GIZ

/ Table 2 RE policies in the region [ACE et al, 2016]

	Primary support schemes (e.g. FIT, quotas)	Secondary support schemes (fiscal and financial incentives)	Framework conditions conditions (e.g. permits and licences)	RE installed capacity by 2016[12] (GW)
Brunei Darussalam	No FiT[13]	No	No	0.001
Cambodia	No FiT Tariff for off-grid RE installations[14] Rent-to-own for Solar Home System (SHS)	Subsidy and grants	Power licences (technical, safety, environmental standards)	1.2
Indonesia	FiT Net metering	Income tax exemption and reduction VAT exemption Accelerated depreciation Import duty exemption Low-interest loans	One-stop shop for permit procedures	9.9
Lao PDR	No FiT Tariff for RES installations	Import duty exemption for RES equipment Access to loans Fiscal privileges for small hydro	If RE project meets license criteria, the government may consider joint investment	4,3
Malaysia	FiT Net metering	Corporate investment tax (CIT) incentives Accelerated depreciation for solar Financial guarantees for loans	Electricity generation licence is open-ended and must not be renewed RES projects under 3 MW have access to less strict licencing process	6.0

12 Includes large scale hydro and several 2016 data are based on projections

13 FITs and a net metering policy are planned in Brunei Darussalam. Renewable Energy Certificates (RECs) are being considered by the Energy Ministry. One REC will be worth 1 MWh of RE power generation, with the proposed fixed price at B$O.25 per kWh or B$250 per certificate. Taken from: ACE et al., 2016

14 The tariff for electricity generated from RES installations is currently based on negotiations between producers and the power utility on a case-by-case basis. The Department of Energy Policy and Planning (DEPP) is in the process of preparing the policy tariffs for different RES Taken from: ACE et al., 2016

/ Table 2 RE policies in the region [ACE et al, 2016]

	Primary support schemes (e.g. FIT, quotas)	Secondary support schemes (fiscal and financial incentives)	Framework conditions conditions (e.g. permits and licences)	RE installed capacity by 2016[12] (GW)
Myanmar	No FiT Fixed monthly fees for off-grid, rural RES projects	Fiscal privileges for foreign investors Access to grants and soft loans for off-grid, rural RES	No information available	4.8
The Philippines	FiT Net metering	Income tax holiday (7 years) Import duty exemption on equipment Accelerated depreciation Preferential financial products	Online one-stop shop platform for permits and licences	6.6
Singapore	No FiT Net metering	Fiscal incentives Non-fiscal incentives for testing RES technologies and capacity development Grants for solar	Installations below 1 MW exempted from generation licence Streamlined market registration and settlement procedures for solar	0.3
Thailand	FiT Additional payment for projects in the south and bioenergy	Import duty exemption on equipment CIT exemption Financial support from special funds	Licence is required for all types of RES installations	7.9
Vietnam	FiT	CIT exemption Import tax exemption Reduced land rental fees Loans with favourable rates	Installations above or equal to 50kW need to obtain power operation licence	18.5

Between 2006 and 2016, installed power capacity from RE more than doubled from around 23.6 GW in 2006 to 59 GW in 2016 [ACE et al., 2016]. Vietnam increased its RE installed capacity by 13 GW between 2006 and 2016, which positioned the country as the AMS with the largest RE capacity installed. Some countries gained significant ground in RE deployment between 2006 and 2016. Indeed, the RE capacity installed increased annually by 1.5 GW in Vietnam, 0.5 GW in Malaysia, 0.5 GW in Thailand, 0.4 GW in Lao PDR, 0.3 GW in Myanmar and 0.3 GW in Indonesia [ACE et al., 2016].

That said, the experience in RE development in ASEAN is highly mixed. RE deployment of certain technologies appears to have been most successful in Indonesia (hydro and geothermal), Malaysia (biomass and solar PV), the Philippines (wind and geothermal), Thailand (solar PV, biomass and wind) and Vietnam (hydro and wind), which exhibit the largest RE installed capacity by 2016. These countries have been implementing FITs, as well as secondary support policies such as tax reductions or exemptions for RE equipment and/or access to favourable financing for investors [ACE, 2016].

AMS like Brunei Darussalam, Cambodia, Lao PDR, Myanmar, and Singapore[15] on the other hand do not have a FIT in place. It should be noted that RE development in Cambodia and Myanmar is to be understood within the broader scope of devising electrification schemes to enable full access to their populations, up from their current rates of 30% and 32%, respectively [IRENA and ACE, 2016]. Nonetheless, countries with more experience in support scheme implementation (e.g. FITs) could offer insights to interested countries within the framework of bilateral or ACE-facilitated RE cooperation.

3.3 Gap Analysis on RE Cooperation

There are two dimensions within the analysis of gaps presented in this section. One concerns the progress AMS have already made toward the achievement of the aspirational regional RE target. The other dimension of the gap analysis looks at the governance structure of regional RE cooperation and competences of involved institutions/organisations in ASEAN, which is the focus of this study.

Current RE deployment at several AMS – in terms of installed capacity – is currently not yet in line with the level of ambition expressed in their national targets, which suggests there is a gap between RE targets and deployment. National targets also show a considerable degree of divergence (Figure 4). For example, the Philippines have a 15 GW target of installed RE capacity, while Indonesia has a share of TPES goal for new RE of 23%. Moreover, it seems the regional aspirational target for RE generally does not play a major role in the definition of RE policies by AMS at the national level. AMS place high value on being able to define RE targets nationally – both in terms of the level of ambition and the unit of measurement. Though the conversion of a target from one unit to another is certainly possible, the degree of divergence does not allow for an immediate comparison between AMS and the aspirational target of 23% RE in TPES by 2025.

[15] In the case of Singapore, this can be explained by the country's decision not to give RE subsidies. Instead, the government focuses on the framework conditions that facilitate deployment for RE developers.

Brunei Darussalam
10% RE in Power Generation by 2035

Cambodia
2,241 MW of large hydro (apprx. 80% of total installed capacity) by 2020

Indonesia
23% RE in TPES by 2025;
31% RE in TPES by 2030

Lao PDR
30% RE in TFEC by 2025 (excl. large hydro)

Malaysia
2,080 MW of RE Installed Capacity by 2020 (excl. large hydro)

Myanmar
38% hydro and 9% other RE sources in Energy Mix by 2030-2031

Singapore
350 MWp Solar Power by 2020; 10,140 ton/day W-to-E by 2018

Thailand
30% RE in TFEC by 2036

The Philippines
15,2 GW of RE Installed Capacity by 2030

Vietnam
21% RE of 130 GW Installed Capacity by 2030

Figure 4 AMS national RE target [ACE, 2017]

Indeed, AMS have noted that differences in defining RE targets resulted in the need to compare across countries and pin down the size of the gap preventing the achievement of the regional target. This gap in national RE deployment and targets means more work needs to be done to make national RE policies compatible with the regional aspirational target of 23% RE in TPES. It should be noted that by defining RE targets and policies, albeit with varying levels of ambition, AMS reflect their intention and commitment to head in the "right direction" to achieve the 23% regional target.

The latest 5th ASEAN Energy Outlook (AEO5), which was published last September during 35th AMEM meeting in Manila, reported that in 2015, the share of RE in TPES was 13.6%. In the historical period, i.e. between 2005 and 2010, the share of RE in TPES was below 10%, and showed an increasing trend over time, reaching a value of slightly over 10% in 2010 and 13.6% in 2015.

As for the projection period, three scenarios (business as usual (BAU), AMS target scenario (ATS) and ASEAN progressive scenario (APS))[16] show an increasing trend over time, as illustrated in Figure 5. Increasing the component of RE to 23% by 2025 in the energy mix will require a more concerted effort among AMS than originally forecast. AMS have to upscale their targets in RE power sector, biofuel for transport and modern biomass for the industry to reach the 23% RE in 2025[17].

16 - Business as usual scenario (BAU) : without significant changes to past practices and assuming that AMS develop no specific policies in reaching their most recently issued EE and RE targets
- AMS target scenario (ATS) : target based scenario assuming that the most-recently-issued EE and RE targets are reached
- ASEAN Progressive Scenario (APS) : target based scenario assuming that regional targets defined in APAEC 2016-2025 are reached. It has a higher ambition level in EE and RE for each AMS as opposed to ATS

17 The complete report of the 5th ASEAN Energy Outlook could be downloaded at http://www.aseanenergy.org/resources/the-5th-asean-energy-outlook/

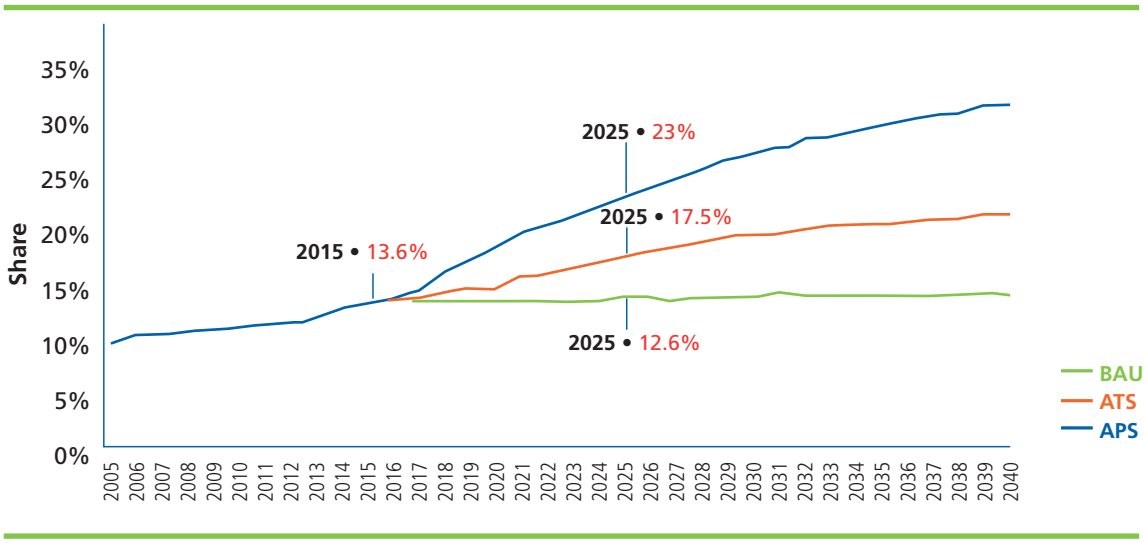


Figure 5 Projections on APAEC RE target (ACE, 2017)

Regional RE cooperation in the ASEAN region is based on voluntary, non-binding commitments between AMS. To gain further insights on the workings of regional RE cooperation in the ASEAN region, and potential gaps, several hypotheses were developed and presented as part of this study. These were also discussed as part of the Focus Group Discussion (FGD), (see notes in Annex 1).

3.3.1 Hypothesis 1: APAEC Aspirational Target of 23% RE in TPES by 2025 is an Optional and Non-Binding Commitment between AMS and with Actors Such as AMEM, SOME, SSNs and ACE.

The background to this hypothesis is that the APAEC aspirational target does not assign national obligations. Regional cooperation, also in the field of RE, is therefore also non-binding, does not assign obligations on individual member states and should continue to remain non-binding. The RE target for 2025 does not assign a specific RE share to be achieved by each country, although the REmap analysis indicates which national RE shares are compatible with the RE target for 2025.

3.3.2 Hypothesis 2: Most of RE Cooperation, Especially in the Power Sector, Currently Relies on Bilateral Agreements between AMS

Currently, much of regional cooperation in ASEAN, especially in the power sector, relies on the initiative of pairs of countries. One example of this is an agreement on geothermal energy between Indonesia and the Philippines, and agreements on the transfer of electrical power between Lao PDR and Thailand. Oftentimes, these agreements are not specifically targeting renewable energy, but rather electricity trade or transmission in general. In the area of knowledge exchange and capacity development, in contrast, it appears more multilateral activities – often prompted by ACE – are taking place. Among the main reasons why bilateral agreements are more prevalent than multilateral ones are the ease of initiating contact with one rather than many parties and the practicality of implementing agreements with one counterpart rather than several.

3.3.3 Hypothesis 3: Progress in Physical Infrastructure Development in ASEAN is Improving; so Too is The Proliferation of Energy Cooperation

Though progress regarding the physical infrastructure for a more connected and resilient ASEAN builds trust among AMS and encourages cooperation in other areas, having an RE cooperation governance is also key: the institutional arrangements created as a result set the framework for AMS to coordinate policies and bring them in line with the achievement of the indicate target of 23% RE in ASEAN's TPES by 2025. Regional RE cooperation can and should build upon power grid initiatives, and in turn draw from the experience gathered thus far.

APAEC 2016-2025 (Phase I) shows RE-SSN's work has focused on the elaboration of RE studies, capacity development for AMS, and gathering of data from civil society and the private sector on specific RE issues. AMS generally associate work on RE topics at the regional level with the following examples from their work: common work on studies such as the ASEAN RE Policies, ASEAN RE Outlook, capacity buildings and the ASEAN Energy Awards.

Lastly, progress toward the establishment of an institutional framework is part of ASEAN's vision for the coming decade, though it is still in the early stages of development. Indeed, although the Full-Term Review of APAEC 2010-2015 carried out by REPP-SSN represents a considerable first step in establishing a progress monitoring process for regional cooperation, this process needs to continue into the next APAEC phase so that lessons in implementation can be drawn and adjustments made. The development and adoption of an ASEAN RE Roadmap by 2020, and the monitoring of RE capacity additions/deployment of AMS on an annual basis, as established by the two action plans defined in programme area 5, are steps toward an institutional framework that supports regional RE cooperation.

4 Options for Regional RE Cooperation and Assessment


Credit: GIZ

4 / Options for Regional RE Cooperation and Assessment

Regional cooperation encompasses both the cooperation between two or more AMS, and the cooperation among all AMS. This type of cooperation can potentially be facilitated by ACE as a catalyst. It is important to note for all options presented below that, as regional cooperation in ASEAN is not mandated, so-called opt-in and opt-out options for AMS give them the flexibility to choose to or abstain from cooperating in specific forms on certain thematic areas. In other words, "opt-in" means that individual AMS can join regional cooperation initiatives in ASEAN, while "opt-out" means that an AMS can choose to leave a specific regional cooperation initiative in ASEAN that would otherwise include all AMS.

This section describes options for regional cooperation in detail and qualitatively assesses them against three criteria. The extent to which each criterion can be qualitatively assessed varies from option to option, which is why the analysis of some options focuses on, e.g., effectiveness but less so on efficiency. The criteria are effectiveness, efficiency and political acceptability.

Criterion 1 Effectiveness: Effectiveness refers to how an option potentially supports RE deployment nationally and/or could help speed up RE deployment. The criterion also encompasses effectiveness in achieving the aspirational regional RE target.

Criterion 2 Efficiency: Efficiency refers to the appropriateness of an option to lower the cost of supporting RE deployment. It also considers the administrative burden of implementation and/or ease of implementation of an option, and if there are synergies within the existing ASEAN structure.

Criterion 3 Political acceptability: Political acceptability refers to the acceptability of an option by AMS and ASEAN institutions.

4.1 Regional RE Cooperation Options for AMS

There is a wide range of options for AMS to cooperate regionally on RE. These can be grouped both by thematic focus and by the degree of collaboration they entail.

4.1.1 Option 1: Exchange of Best Practices for RE Deployment among AMS

To facilitate the effective development and implementation of policy frameworks for renewables, it is essential that knowledge about the experience of neighbours and countries in the region is shared. By spreading knowledge on all aspects of implementing RE policies – from their design to their implementation – lessons can be drawn and more effective and stable frameworks for RE investments can be built. In the context of regional cooperation within ASEAN, AMS can exchange knowledge regarding the design of RE policies. Exchanges may encapsulate regulatory, policy, legal, technical or financial aspects of RE support and deployment (e.g., RE integration into grids and markets, financing mechanisms for renewables, the design of instruments that support the development of renewables [support schemes, FiT, auctions], or the monitoring of RE projects).

There are different ways in which the exchange of knowledge among AMS can be promoted. First, it is important to structure the available knowledge. This can be achieved by suggesting to AMS that they report on their experiences in a specific format that can easily be understood by other countries in the region. Second, it is important that knowledge and lessons be made available. The role of ACE as a knowledge hub or repository would be key.

ACE can gather input from AMS and make it available to other interested parties in a reader-friendly format. Finally, it is important that knowledge is not only shared passively but that experts from different countries effectively enter a dialogue on lessons learnt.

Gaining first-hand insights from counterparts in other countries on questions such as how to accelerate the deployment of renewables or how to ensure that projects are effectively built can speed up the process of reaching the indicative regional RE target. This exchange on best practice can take place in sub-regional (i.e. bringing together a small group of AMS) or regional forum (including all AMS). Such knowledge exchange meetings can take place on a regular basis (i.e. every two to six months) and can entail different levels of public servants participating in the meetings. The advantage of such regular meetings is that participants will become acquainted with their peers and their respective policy backgrounds, which will in turn enable them to build trust. This is key to making such meetings as effective as possible. In addition, future meetings could be further enriched by inviting external speakers to provide analysis and insight, if needed.

Of course, knowledge exchange on RE policies and deployment already takes place in ASEAN under the APAEC, e.g., in the context of the RE Sub Sector Network (RE-SSN). Knowledge exchange is also at the heart of European regional cooperation initiatives, as shown in the box below.

Experiences in the EU

In the EU, the "CA-RES" program (Concerted Action on the RES Directive 2009/28/EC) provides a forum for European Member States to exchange good practice examples, facilitate mutual learning, and speed up the implementation of RE policies. Another example is the "Renewable Energies Transfer System" (RETS), which aims to increase knowledge and competencies of local and regional policymakers (especially in small, rural regions) in RE systems to facilitate greater deployment of RE policies.

Assessment

This option can benefit from the high political acceptance, both by AMS and ASEAN, since it does not imply a direct interference on national policy but fosters mutual learning between more advanced AMS and those in the early stages of RE deployment.

This option can facilitate the achievement of national RE targets, and therefore be effective, since getting acquainted and learning from the best and worst practices can help AMS adjust their RE policies and support schemes. This adjustment can then lead to RE target achievement at the national level, and the consideration of a more ambitious course of policy action toward a level compatible with the 23% aspirational target at the regional level. Strengthening online exchanges via platforms, online conferences and webinars could mitigate additional administrative costs that the party organising the meetings would incur by hosting frequent exchanges.

4.1.2 Option 2: AMS to Mutually Peer-Review Their National RE Plans

An important second option is for AMS to look at the activities of their peers. The exchange of best practice knowledge and experience among AMS can indeed best be leveraged if regional and/or bilateral, transparent or confidential reviews of planned contributions to the ASEAN RE target are carried out. The prerequisite, however, is that such plans are in place. A bilateral, transparent review of AMS' RE plans would mean, for example, that two AMS analyse each other's RE plans. In confidential meetings, the first findings of the mutual review might be discussed among the relevant Ministries from the two countries. Points to be discussed may include:

- the process that led to target setting
- the degree of ambition of the planned contribution
- the ways in which utilities and other key stakeholders are involved in the transition to renewables
- the technologies that are relevant for each country and the sectors that are expected to contribute the most to the target achievement
- the measures presented to reach the national contribution

The decision on which country's plan should be reviewed could either be arrived at systematically or be taken based on preferences. Once both countries have discussed their review and finalised the collaborative report, it may then be published so that other AMS can learn from it. The mutual agreement on the final report and the confidentiality at the initial stage of the review increases trust among the participating AMS. It can also ensure that the review genuinely promotes regional cooperation rather than creates tensions. Mutual peer-reviews between two or more countries may be more acceptable to AMS, as a first step, than a centrally coordinated review of national plans and pledges. Technical and financial resources need to be made available by each AMS to carry out such a mutual review. In addition, a common template for the report and fixed timeframes should be agreed upon to ensure the reports produce comparable results and that the process is implemented properly.

Assessment

This option can facilitate the achievement of national RE targets, and therefore be effective, since these reviews act as a non-binding yet still stock taking, monitoring mechanism for AMS to check progress, detect gaps that may have gone unnoticed in domestic reviews, and have the option to adjust the reviewed plans accordingly.

In terms of efficiency, the result of this option largely hinges on whether the review resulting from this process leads to, for instance, the removal of red tape to pave the way for lower transaction costs for project developers, or promotes the convergence of previously disparate regulations applied by AMS. However, potential administrative costs resulting from the mutual peer-review process should also be taken into consideration. The political acceptance of this option depends on whether mutual peer-reviews are more acceptable to AMS as a first step than a centrally coordinated review of national plans and pledges. This option, however, does imply conducting a concrete assessment of another AMS' policies, which, if perceived as a form of interference instead of a way to complement existing domestic monitoring processes, can experience lower political acceptance than option 1.

Mutual peer-reviews among AMS are a potential concept for the region, such as processes within the Asia-Pacific Economic Cooperation (APEC). APEC Peer Reviews on Energy Efficiency (PREE)[18] is a mechanism assisting APEC economies achieve their regional goal of reducing energy intensity (energy per unit of GDP) by at least 45% by 2035. These reviews produce recommendations, which the reviewed APEC economies can then decide whether or not to adopt since the review is non-binding. Implementation costs and who bears them are important issues to AMS that determine whether this option bears a positive impact in terms of efficiency. In terms of political acceptability, this option would not be accepted if only implemented on a country-to-country basis among AMS. If ACE receives the mandate to conduct these, or if it is a group of chosen experts, then the option would be acceptable.

4.1.3 Option 3: AMS to Provide Recommendations on Other AMS' National RE Plans

In this option, based on the assessment by other AMS of countries' national RE plans, peers could provide either public or confidential recommendations. Recommendations could address any issue mentioned in the peer-review process (i.e. level of ambition, selected measures, etc.). However, they should focus on reaching the regional ASEAN RE target in an efficient and collaborative manner, rather than addressing wider energy policy issues to ensure political acceptance of these recommendations.

The drafting of suggestions and recommendations by some AMS for their counterparts could be implemented as part of the peer review process detailed in option 2. Like option 2, responsibilities regarding how and by whom technical and financial resources will be provided should be defined and a template and timeframe agreed upon.

Experiences in the EU

In the EU, a mechanism of peer-review has been put in place for countries' economic policies (so called "European semester"). It has been discussed as an option for the Integrated Energy and Climate Plans EU Member States need to prepare by 2019, as foreseen in the current EU legislative proposals for the Energy Union Strategy.

Assessment

The scope of regional cooperation with option 3 can be considered wider than in option 2. The results in terms of its effectiveness, efficiency and political acceptability are similar to those expected in option 2. Stronger positive effects in the first two criteria can be expected, since option 3 calls for concrete recommendations for improving AMS´s national RE plans. These stronger effects could, however, be balanced out if this option is perceived as more ´intrusive´ than the previous one. However, the difference in cooperation intensity between these two options is not major, thus options 2 and 3 could be integrated if they were to be implemented.

[18] The work is carried out by a Review Team of experts from other member economies and international institutions. The Review Team visits the economy and interviews a range of people knowledgeable on energy efficiency issues. The PREE identifies and provides technical support to members for implementation of PREE energy efficiency recommendations. Take from: APEC, 2017

4.1.4 Option 4: Open National Support Scheme to Other AMS (Cooperation on RE Support Schemes)

Energy markets alone cannot deliver the desired level of renewables, meaning that national support schemes may be needed to overcome this market failure and spur increased investment in renewable energy. Support schemes for RE aim to turn investment into RE capacities, which is a prerequisite to reach the aspirational regional RE target. As support schemes are usually financed nationally, either through a levy or through taxes, support payments are ´closed´, i.e. limited to the geographical borders of the given nation. However, an AMS may choose to open (parts of) its own domestic RE support scheme by allowing foreign RE projects (i.e. those built in another AMS) to have access to its national support scheme.

This would mean that an RE installation from country A might be financed by country B. For example, if country B has set up a system in which developers of renewable energy projects may receive support in the form of feed-in tariffs or another type of support, this incentive could be made available to projects that are constructed in country A. Electricity produced by the installation could be imported to country B, for example.

One option is to open a unilateral support scheme (i.e. just one of the two countries open the support scheme). In this instance the other country could contribute to the support payments. In a mutually opened scheme, in which the cooperating countries both open their domestic support schemes to one another, it is important to align a few elements of both schemes. In both cases, countries would define how the renewable energy produced by the supported projects is allocated to their respective national RE targets.

For example, two AMS decide to mutually open their (separate) RE auctions[19] to projects from the other country. Country A organises an RE auction, and projects from country B can participate. If their bids are successful, they would receive support from country A's RE support scheme. The same would happen if country B organises an RE auction. In a "mutually opened" auction, each country defines the design elements of their own auction (e.g. auction volume, technologies to be auctioned, timing of the auction). Agreement on basic parameters (not specific details) is necessary: the opening should be comparatively reciprocal".

The main advantages of opening a national support scheme (which might cause some political and public hesitance) is that both countries can use each other's RE potential effectively by investing in installations where most resources are available, regardless of the location. In doing so, they can mutually realise their planned contribution to the aspirational regional target.

[19] The term 'auction' or 'tender' refers to a competitive mechanism to select bids for the procurement of a product such as electricity (kWh) or capacity (kW). In the case of RE auctions or tenders, the product is a given volume of RE electricity (kWh) or capacity (kW), and the price is the payment to be made to successful bidders. In an auction or tender, the selection process of projects is designed to create competition among project developers (i.e. auction participants). For more information on RE auctions, please visit the AURES website: http://auresproject.eu/about-auctions

Experiences in the EU

Countries like Germany have started to open their RE auction scheme, and the legislation in place at the EU level provides for "cooperation mechanisms" under the Renewable Energy Directive (art. 6, 7, and 11 of REDI). Germany and Denmark signed a cooperation agreement on photovoltaic (PV) installations in July 2016. This means installations from Denmark were eligible for an auction implemented in Germany, and vice versa. In October 2016, Germany's Federal Network Agency (BNetzA) launched the pilot cross-border auction for ground-mounted photovoltaic (PV) installations with Denmark. PV installations located both in Germany and in Denmark submitted bids in the context of the first such cross-border auction in Europe. The auction covers a total of 50 megawatts (MW). On November 2016, the Danish Energy Agency launched an opened pilot auction for PV installations. The auction covered a total of 20 MW. Installations located in Germany could be awarded funding for 2.4 MW.

Assessment

If AMS within a region jointly use their RE potential by allocating RE support according to resource availability in a wider geographical region, support costs, capital expenditures, and fuel imports may be lowered. This option can therefore have a positive effect in terms of efficiency. The opening of national support schemes to other AMS could also facilitate target achievement at the national level (electricity from these projects would count towards a country´s RE target). This option could also contribute toward the regional aspirational target, if for instance it allows AMS to raise their policy ambition by realising the benefits of cooperation with regard to specific technologies of interest and/or to jointly test new support scheme elements (e.g., the introduction of auction schemes for specific technologies).

There is some familiarity with the cooperative elements of this option, best exemplified by the Lao PDR-Malaysia-Thailand-Singapore Power Integration Project (LMTS PIP) electricity trade project. Overall, this option needs to be further explored, as AMS' current support policies are highly diverse.

4.1.5 Option 5: Establish a Common Support Scheme for RE among AMS

The opening of a support scheme to projects from other countries is one step towards regionally aligned schemes, ensuring the efficient use of RE potential. Pushing this thought further, it is possible for two or more AMS to set up a common support scheme (e.g., a feed-in tariff or auctions) to support RE projects together. In the case of a joint RE auction, two or more AMS conduct a joint auction and agree on a common auction design (and commonly co-finance the RE project). This means that they would together define important elements of auctions for RE (see box on the next page).

Auctions for RE

Auctions are market mechanisms aimed at procuring a good or product at the lowest possible price. In the case of RE auctions or tenders, the product is a given volume of RE electricity (kWh) or capacity (kW), and the price is the payment to be made to successful bidders. In an auction or tender, the selection process of projects is designed to create competition among project developers (i.e. auction participants). Several countries procure electricity from renewables via power purchase agreements (PPA). A PPA-auction determines who will be the counterpart of the (often state-owned) utility or regulator, and for which price the electricity is contracted. Technology-specific auctions for RE have been implemented in five ASEAN countries, including auctions for solar PV, biomass and geothermal power.

Important elements to define in an auction include:
- the volume to be auctioned;
- the technologies to be auctioned;
- how the projects should receive support (e.g., whether a FiT is auctioned),
- how the payments are settled,
- what should happen if projects are delayed

Installations from all participating countries can participate in the auction. Ultimately, the RE installations can be built in any of the AMS (wherever it is most cost-effective), and the electricity produced in these installations would count towards the collective target. Utilizing this option, cost reduction potential through the optimised use of RE resources will become available and gradual policy alignment a possibility. Investors will find it easier to invest in the region and have greater peace of mind if a common scheme is put in place.

Assessment

The effects of this option in terms of effectiveness, efficiency and political acceptability are similar to those expected in option 4. Stronger positive effects in the first two criteria can also be expected. Option 5 implies a more harmonised RE support scheme over a wider geographical area, which can lead to greater efficiency. A higher effectiveness can arguably be expected if these common support schemes pool resources from AMS that support RE projects. Gaining political acceptability for these options may be considerably more challenging than in Option 4.

4.1.6 Option 6: Sub-Regional Cooperation Initiatives on Specific Issues/ Technologies

Two or more AMS may choose to create sub-regional cooperation initiatives within ASEAN. Through these sub-regional initiatives, AMS could strengthen their work on specific issues and/or technologies that are particularly important for the participating countries. This means that a few countries could together define a topic of interest, such as "grid connection" or "rooftop solar", and then decide to reinforce the exchange of knowledge on this particular issue. With the establishment of sub-regional cooperation initiatives, AMS would opt-in to cooperate on certain thematic areas.

Experiences in the EU

In the EU, the Pentalateral Energy Forum (PLEF) is an intergovernmental initiative consisting of six full members (Austria, Belgium, France, Germany, Luxembourg and the Netherlands) and Switzerland as an observer country. It aims to enable electricity market integration in the region and improve security of supply. The main characteristics of the forum are its voluntary nature and pragmatic approach. It operates within the framework of existing legal and regulatory arrangements and with respect for national fuel mix choices [Umpfenbach et al., 2015].

Another example is the North Seas Countries' Offshore Grid Initiative (NSCOGI), which was formed in 2010/2011 by 10 countries around the North Seas represented by their energy ministries, supported by their Transmission System Operators (TSOs, organised in the European Network of Transmission System Operators for Electricity, ENTSO-E), their regulators (organised in the Agency for the Cooperation of Energy Regulators, ACER) and the European Commission. Its aim is "to evaluate and facilitate coordinated development of a possible offshore grid that maximises the efficient and economic use of those renewable sources and infrastructure investments" [Gephart et al., 2016].

Assessment

This option can have positive effects in terms of efficiency, since strengthened cooperation within a sub-regional initiative can lower costs if, as a result of it, a particular RE technology becomes more competitive. In terms of effectiveness, positive effects can also be expected, as it represents a step forward from purely national approaches that allows AMS to strengthen cooperation in areas important to them which, if successful, can serve as a stepping stone for more cooperation in other fora and/or toward a more regional level.

Having sub-regional cooperation initiatives on certain issues/technologies could be feasible. Examples of similar initiatives include the Lower Mekong Countries, where cooperation focuses mostly on hydropower and thermal, not only renewables, and the LTMS grid integration, which is part of the APG Programme. Regional RE cooperation could build upon these initiatives, and further initiatives draw from the experience gathered thus far.

Lao PDR-Malaysia-Thailand-Singapore Power Integration Project (LMTS PIP)

Figure 6. Lao PDR, Thailand, Malaysia and Singapore Power Integration Project (LTMS-PIP

A launching of the cross-border power trade project between Lao PDR, Thailand, Malaysia and Singapore (LTMS) is initiated as the first multilateral cross border power trade during a special Senior Officials Meeting on Energy (SOME) in Manado, Indonesia in December 2013. This plan's output is to transfer power of up to 100 MW from Lao PDR to Singapore via Malaysia and Thailand's transmission grid networks.

LTMS Power Integration Project (LTMS-PIP), as shown in figure 2, was intended to serve as a guide to complement existing efforts towards realizing the APG and the ASEAN Economic Community (AEC), by creating opportunities for electricity trading beyond neighbouring borders and is expected to help identify and resolve issues affecting cross-border electricity trading in ASEAN. LTMS–PIP considers each country's national development plan with the existing interconnection among the countries as well as associated laws and regulations in order to streamline the coordination and set up a feasible and workable plan for groups to pursue. LTMS-PIP Working Group (WG) and four Technical Task Forces (TTFs) were formed to study the technical, commercial, legal and tariff aspects of the project.

LTMS-PIP project is divided into two phases: Phase I: 2018 – 2019 (LTM-PIP) and Phase II: 2020 and beyond (LTMS-PIP). Phase I will be implemented by three countries: Lao PDR, Thailand and Malaysia (LTM-PIP). The project has power trading of up to 100 MW between Lao PDR and Malaysia via Thailand by utilizing existing network and interconnections. The signing of Cross Border Power and Transmission Agreement (CBPTA) is slated to occur at the 35th ASEAN Ministers on Energy Meeting (AMEM) in Manila, Philippines, September 2017 and the power trading will commence in January 2018. Phase II will have a possible expansion to include Singapore when the second interconnection cable between Singapore and Malaysia is back in service. This phase will get underway sometime after 2020.

4.2 Regional RE Cooperation with ACE as a Catalyst

Even though the main players in regional cooperation are the AMS, ACE's role as a catalyst for strengthened regional cooperation can also play a crucial role. As mentioned above, ACE is developing a high-performing institution and regional centre of excellence as a means to build a consolidated, focused energy policy agenda and strategy for ASEAN. As an ASEAN energy think tank, ACE assists ASEAN Member States by identifying innovative solutions for ASEAN's energy challenges regarding policies, legal & regulatory frameworks and technologies. ACE also implements relevant capacity development programmes and projects to assist the AMS in developing their energy sector. ACE also assists SOME and the SSNs in carrying out their activities.

In general, all of the above-mentioned options can receive support in some form from ACE, e.g., through facilitating the knowledge exchange between the AMS, organising meetings, providing input, selecting outside experts, etc. In the following sections, the focus will be explicitly on what role ACE could play as a catalyst for regional RE cooperation. To further strengthen regional cooperation and the implementation of ACE's business plan concurrently, the following options should be considered:

4.2.1 Option 1: Provide Guidance for Development of National RE Targets and Action Plans

Option 2 of the previous section (AMS to mutually peer-review their national RE plans) requires that RE plans be put in place. In this context, ACE could define standards and/or templates to provide guidance to AMS in the development of their national RE targets and actions plans. A template could then outline what would help AMS better set their targets and design their action plans. This guidance can help AMS to provide an adequate level of detail in their policy planning required to effectively increase RES shares. Such plans, if following the same structure, can be more easily comparable. Action plans that are sufficiently detailed and comparable among AMS support the assessment of how large the RE gap is and how it could be closed. Elements that could be included in such plans, to make them as robust as possible, may be:

- Summary of RE strategy
- Renewable energy national contributions
  - o National renewable energy contributions in gross final energy consumption, incl. a table showing the base year, the planned 2025 contribution and planned RE shares in each of the years
  - o National trajectories per sector (electricity, heating and cooling, transport) and per technology
- Policies and measures for achieving the sectoral contributions
  - o Overview of main policies and measures to promote the use of energy from renewable resources, incl. overview table showing the legal basis of the instrument, type of measure, expected impact, targeted group/activity, existing or planned, start and end date, incl. summary of outcome of public consultation
  - o Measures to promote the use of energy from renewable resources in electricity (Detailed description of main measures, incl. support schemes, other financial measures and soft measures)
  - o Measures to promote the use of energy from renewable resources in heating and cooling (as above, but including addition information specific to heating and cooling (H&C), e.g., on Concentrated Heat and Power)
  - o Measures to promote the use of energy from renewable resources in transport (as above, but including addition information specific to transport, e.g., supply chain differentiation)
  - o Measures to address administrative barriers (incl. main barriers, assessment of rules governing authorisation, certification and licensing, discretionary decision taking, availability of information, etc., incl. summary of outcome of public consultation)

The development of such a structure could also be done in a participatory process with the AMS (e.g., in the RE-SSN) to ensure that all relevant elements are considered, that administrative burden for the AMS to create the plans is limited and that AMS create ownership for such templates.

Experiences in the EU

Under the current Renewable Energy Directive, EU member states are required to elaborate National Renewable Energy Action Plans (NREAP) outlining commitments and initiatives to develop renewable energy. The plans provide a detailed road map of how the member state expects to reach its legally binding 2020 target for the share of renewable energy in their total energy consumption. In the plan, member state sets out sectoral targets, the technology mix they expect to use, the trajectory they will follow, and the measures and reforms they will undertake to overcome the barriers to developing renewable energy [European Commission, 2017]. A new template for the period 2020-2030 has been suggested by the European Commission and is currently being discussed.

Assessment

This option can enjoy broad political acceptance, both by AMS and ASEAN, since it does not involve direct interference on national policy. That said, it still bears potential benefits in the form of guidance from RE experts at ACE in terms of supporting a robust development of RE plans (without prescribing its exact content, but tentatively the structure of the plans). This option can also facilitate the achievement of national RE targets, since guidance from ACE can help AMS better design national targets and plans, which are compatible with the aspirational 23% RE target and national circumstances. The effectiveness of this option will depend on AMS´ willingness to accept this guidance. Indeed, as AMS have sovereignty over their energy mix, national policy makers´ decisions will have priority over ACE guidance. To further increase political acceptance, ACE could offer "recommendations", since the word "guidance" could be perceived as a channel of potential interference sovereign affairs. The political acceptability of this option is, therefore, a matter of how guidance is framed

4.2.2 Option 2: Collect and Compare AMS National RE Action Plans

ACE may act as a repository of national plans and make the plans accessible to each AMS and the wider public (i.e. on a website). It could then compare the national plans: One challenge of creating national plans along the same structure is that some AMS may fill in the plan in a very comprehensive and detailed manner, whereas others might do so with much less detail. This in turn would decrease the comparability between the plans. I.e., this initial assessment of the plans can include an overview regarding to what extent the plans may cover. This could incentivise AMS to provide comprehensive and meaningful RE plans in terms of showing how the planned RE contribution would be delivered.

Assessment

A comparison of national RE plans and collecting key data could provide a basis for ACE to facilitate more regional cooperation efforts in the region – that build on the current level of ambition – to help steer toward achieving the regional aspirational RE target. This option can therefore be a first step towards more effective regional cooperation. However, if ACE was limited to solely collecting the plans and comparing their efficacy, ACE's influence on reaching the RE target would remain limited at best. Political acceptance of this option is feasible, since it does not house a measure that could be perceived as outside interference in sovereign affairs. The effect of this option on lowering the costs of supporting RE deployment is limited by the effects that the collection and comparison of RE action plans trigger at AMS level. This option´s effect is therefore difficult to determine or, at best, indirect.

4.2.3 Option 3: Review if National RE Action Plans Add Up to Regional Target

Once the plans have been collected and compared, a crucial second step would involve ACE conducting a review of the pledges to identify whether there is a gap between the nationally planned contributions and achievement of the aspirational target on a regional level.

This assessment can involve two steps: First, a review of the national RE targets (i.e. the national contributions to the regional aspirational target as shown in the national RE plans) and whether they would add up to the regional target. Second, a review of the implemented and planned policies and measures on national level to reach 23% RE in TPES by 2025. This second step is crucial as it shows whether there is a gap and how wide it is (compared to just collecting the national target figures. At a certain level, this review has been implemented by ACE through Energy Outlooks development, where it assessed the future energy projection including APAEC target achievement.

Assessment

Having national RE action plans would provide the basis for meaningful regional cooperation supporting the additional RE deployment necessary to meet the aspirational target of 23% RE in TPES. Since there are no binding national targets in ASEAN, a review system to check progress would allow ACE to detect gaps at an early stage, which would have a positive outcome in terms of effectiveness. The effects of this option in terms of efficiency are more indirect and depend on whether the review by ACE leads to concrete steps toward lowering costs. Whether this option is politically acceptable or not depends on its operationalisation. If the review leads to rankings of AMS showcasing their performance, some countries may deem this option too politically sensitive and withdraw from the process. This option can however receive political acceptance, both by AMS and ASEAN, if political sensitivities of AMS are addressed from the onset of the review process, by deciding if and how rankings should factor into the review.

AMS feel this option must be in line with ACE's mandate as a regional body. A key component to consider when implementing these options is to frame the process and its outcomes as a tool to support the collective achievement of the aspirational regional target, while avoiding prescribing measures to AMS.

4.2.4 Option 4: Make Recommendations to AMS Based on the Review of National RE Action Plans

Based on the review of the national RE plans, ACE may formulate specific recommendations to AMS. This may include recommendations on:

- the level of ambition,
- the measures presented to reach the RE shares,
- the sectoral distribution of the expected RE shares,
- specific regional cooperation opportunities with other AMS,

In addition, ACE may make AMS aware of best practices identified in specific RE plans. These recommendations may be received on a nominal basis or anonymously, i.e. they may or may not be published, depending on the circumstances. If published, such recommendations can create public pressure to revise the RE plans, though this would potentially undermine its political acceptability. Since the exchange of knowledge is a key aim, "naming and shaming" should not be the focus of such an exercise, thus such recommendations should most likely not be published.

Such recommendations could result in revised national RE plans that either lead to increased ambition levels by AMS and/or to a more substantiated plan to reach the envisaged RE shares.

In formulating recommendations, several steps are required:

1. Drafting of plans,
2. Collection of necessary materials,
3. Comparison and assessment of plans,
4. Provide recommendations and revisions

These steps can either be implemented once or the plans and reviews repeated, e.g., every two years. This would create additional costs for AMS and ACE, though it would further enhance and enrich the dialogue between AMS and ACE.

Steps 1 thru 4 can be seen as logical steps, and the role of ACE and regional cooperation would be greatly strengthened if all were implemented.

Assessment

The scope of regional cooperation with Option 4 can be considered wider than in Option 3. This option could significantly increase the effectiveness of regional cooperation as it would trigger an intensified dialogue between the AMS and ACE. Such an intensified dialogue would support the exchange of knowledge between ACE and the AMS and give ACE a prominent role in the regional achievement of the aspirational RE target. However, this option is more challenging in terms of political acceptability, as AMS may perceive very specific recommendations by ACE as outside interference as it pertains to their national energy policy. For this option it is thus extremely important for ACE to strike a good balance between making tangible and specific recommendations to AMS while at the same time respecting AMS' sovereignty over their national policies and energy mixes. Interestingly enough, for some AMS this option may be more acceptable than mutual reviews because ACE can be seen as an "objective" facilitator, rather than a foreign body representing individual interests.

4.2.5 Option 5: ACE to Create and Manage Regional Fund for RE Projects

ACE may set up a fund for RE projects if national plans do not add to up to the regional target. A fund could fulfil different functions, for example, by:

- providing investment guarantees to reduce investment risks and to, hence, attract additional investments and lower the cost of capital
- providing upfront investment support, i.e. paying part of the investment cost of RE plants, thereby lowering the overall investment need and lowering capital costs
- providing production support for RE plants (e.g., support payments kWh)

In addition to supporting "classic" RE projects, the fund could also support entrepreneurs, start-ups and cutting-edge technologies or be combined with innovative financing models such as crowdfunding.

In practical terms, an upfront template for project applications and a transparent set of selection criteria could help turn funding opportunities into concrete RE projects. As a prerequisite, a project could be eligible for the fund when improving security of energy supply within a region, e.g., a Concentrated Solar Power or hydro project with connection to more than one AMS (for instance by means of offering equal services across borders). The decision on the selection criteria should include AMEM and SOME, to meet the regional preferences and to provide legitimacy to the process. This fund would therefore identify and provide financing to "projects of common RE interest". Funding in the context of the Paris Agreement and the Green Climate Fund could be sources to further explore.

A next possible step for ACE to explore this option in terms of:

- the aim of the fund,
- the exact funding mechanism (i.e. what should be supported), one such example is to utilise the fund to enhance AMS' electrification ratio, in which the fund could be used for RE projects in rural areas
- potential selection mechanisms and criteria,
- possible funding sources (GCF, etc.),
- possible legal constructs.

Experiences in the EU

For the development of the EU internal energy market, some significant grid expansion projects are defined as "projects of common interest" or PCI. These are grid expansion projects which upon realisation will bridge gaps in the infrastructure of the European power system and as such will contribute to the improvement of the security of supply and the development of renewable energy in the EU. Other criteria for PCI are the economic, social and ecological benefits of the projects, as well as their positive effects on the energy industry in at least two EU Member States [50Hertz, 2017].

The European Commission has drawn up a list of 248 projects, which may benefit from accelerated licencing procedures, improved regulatory conditions, and access to financial support totalling € 5.85 billion from the Connecting Europe Facility (CEF) between 2014 and 2020. So far, the majority of projects involve electricity and gas transmission lines. However, this framework could also be used to explicitly support regional RE deployment (requiring a redefinition of the current eligibility criteria, which so far focus on "the timely development and interoperability of priority corridors and areas of trans-European energy infrastructure") [Gephart et al., 2016].

Assessment

This option could have positive results in terms of effectiveness because it would directly finance RE projects that in turn help the region gain ground on reaching the aspirational regional RE target. Positive effects could also be observed in terms of efficiency if the funding provided can help lower risk for investors, and therefore the cost of capital for RE projects. Political acceptance is feasible since it does not entail a measure that could be perceived as outside interference of national affairs. An important question one may ask is, of course, where the funding would come from. If it was paid for by international climate financing mechanisms, it would most likely be welcome (and much less so, if paid for by ASEAN countries).

Attention must be given to the management of the fund: if it is perceived as inefficient, AMS may choose to withdraw their participation. There also runs the risk, no matter how small, of funding being allocated for something other than RE project development in a case of "pork barrel spending". To tackle this potential problem and confer the fund with more legitimacy, a common board might be established to govern it. A common regulation and transparent criteria on how the fund is managed and how projects are selected would also be needed.

5 Conclusion and Recommendations

Credit: GIZ

5 / Conclusion and Recommendations

This study aimed at taking stock of and providing a gap analysis on regional RE cooperation in ASEAN. It also assessed several options for regional RE cooperation for AMS and with ACE as a catalyst. Based on this thorough assessment, conclusions and recommendations are presented below.

Regional cooperation for RE can be understood as the purposeful collaboration of AMS on issues related to the deployment of RE; it may encompass both the cooperation between two or more AMS, and the cooperation among all AMS. Against the backdrop of AMS' full decision-making power regarding their national energy mixes, regional cooperation may help bridge gaps between the ASEAN aspirational RE target of 23% by 2025 and the sum of the national efforts.

As AMS are responsible for their national energy mixes, regional RE cooperation in ASEAN cannot be imposed by any political, legal or institutional instance above the AMS. Opt-in and opt-out options can provide AMS the flexibility to choose their level of participation in cooperating on certain thematic areas related to RE deployment. These opt-in/opt-out options can improve the flexibility of RE cooperation and thus improve political acceptability for closer cooperation among AMS with different energy mixes.

Regional cooperation, also in the field of RE, is non-binding and should continue to remain so. However, things likely won't move forward by solely relying on AMS initiative. Although AMS initiative for regional RE cooperation increases ownership of the efforts agreed upon, it alone is not enough to achieve the desired level of RE deployment.

While the regional RE target of 23% in TPES by 2025 is aspirational in nature, it is worth assessing in detail the level of achievement of this aspirational target. Current RE deployment at AMS (in terms of installed capacity) is not in line with the level of ambition expressed in their national targets, which suggests there is a gap between RE targets and deployment at the national level. National targets also show a considerable degree of divergence.

Based on the assessment of the options we present our main recommendations to advance regional RE cooperation in ASEAN below:

As a starting point, it is recommended to pursue a gradual rather than disruptive approach towards deeper regional RE cooperation, allowing the region to build on the existing foundation from which to move forward. Building on successful existing activities, such as the exchange of knowledge and experience, both bilaterally and within the framework of the RE-SSN, helps usher in greater trust and bipartisanship. These two elements are important conditions in the ASEAN context to move forward with the discussion and implementation of further cooperation.

It is recommended to intensify capacity development, e.g., in RE finance or RE R&D, which would help level the playing field in RE development across AMS. Knowledge-exchange brought about by ACE could be further strengthened beyond the work of a single SSN by establishing connections between SSNs, i.e. between RE-SSN and REPP-SSN and / or HAPUA. Meetings and, if possible, joint projects at the working level (e.g., by focal points), can allow for the discovery and use of synergies in terms of topics, actors or sub regions relevant for RE. This is especially important in the area of RE deployment, as it not only depends on a support scheme and other investment conditions, but also on ensuring adequate grid and market integration.

In addition, It is recommended to further explore undertaking a mutual review by AMS of RE policies (including recommendations) that is introduced by ACE. An important requirement for this is political buy-in by AMS. Thus, it is important to carefully communicate to AMS what the objectives and scope of the review are, how the costs of the review will be born, and how information will be distributed . It is important to have a mutual agreement on the publication of the final report of the review, all while maintaining confidentiality throughout the initial stage of the review, to increase trust among the participating AMS. In addition, exploring with AMS the option to develop RE plan templates and plans (incl. collection of plans, comparison, review and recommendations), supported by ACE, could facilitate the review and comparison of RE policies.

Establishment of a fund targeting RE deployment in ASEAN should also be further explored. The fund's objectives, funding sources, administration and eligibility criteria, among other operational aspects, need to be discussed with AMS to determine viability.

The remainder of the options (e.g., the opening or establishment of a common support scheme like a FIT or auction) could be further discussed with AMS, although they appear to much less in the short- and mid-term than in the options listed above. Nonetheless, further discussion of these options with AMS would get them more acquainted with the potential depth and intensity of regional cooperation. Indeed, there is seemingly great interest by AMS in exploring these options, even if they might not be feasible in the short-term.

In addition to relying on AMS initiative for regional cooperation, external catalysers could accelerate the strengthening of regional cooperation. AMS initiative for regional RE cooperation increases ownership of the efforts to move toward the indicative regional RE goal. However, additional efforts beyond the initiative of member states can facilitate and accelerate these developments. Partnering with international organisations, dialogue partners and non-ASEAN actors is, for example, a promising way to accelerate the achievement of the regional 23% RE target. Sustainability is key in partnering with external parties, so that support is not given on a stop-and-go basis. These partners could support ASEAN on topics such as technology transfer and financing. It also holds true that achieving the target could entice other parties to invest in ASEAN, for instance within the framework of the UNFCCC. It is also necessary to differentiate and align between areas for cooperation and activities.

6 Annexes

Credit: GIZ

6 / Annexes

6.1 Annex 1: Input from Focus Group Discussion (FGD)

A Focus Group Discussion (FGD) was implemented in the framework of a half-day workshop in July 2017 in Singapore with ASEAN RE Sub Sector Network (RE-SSN) focal points. The aim of the focus group discussion included the following objectives:

- AMS to share their understanding and expectations of regional RE cooperation
- Identify promising options for strengthen regional RE cooperation in ASEAN
- Assess options of regional RE cooperation and need for ASEAN
- Explore how supporting actors (i.e. ACE) could act as agents of change and advocate collaborative efforts

Following the presentation of objectives for the discussion, the first session focused on understanding and taking stock of regional RE cooperation in ASEAN. Session 1 included a group exercise on participants' understanding of regional RE cooperation, and a world café on the status quo and potential challenges of regional cooperation.

a. Understanding about and expectations of regional cooperation

Input from AMS

Goals of regional cooperation:

- Contributing to reaching the 23% regional target. Regional cooperation should be to facilitate reaching both regional and national RE targets
- Learning from each other and other regions. Learning as a goal should aim at knowledge and experience sharing in terms of technology exchange and capacity development.
- Promoting energy security.
- Having unified data on RE across AMS was another key goal of regional cooperation.

Examples of regional cooperation from participants' work included:

- Common work on studies such as the ASEAN Energy Outlook,
- Trainings (e.g. "Train the Trainer" project)
- The RE-SSN
- ASEAN Energy Awards

b. High level assumptions on the status quo of regional RE cooperation in ASEAN

Input from AMS

Hypothesis 1: APAEC aspirational target of 23% RE in TPES by 2025 should continue to be based on optional, non-binding commitments between AMS and with actors such as ACE, AMEM, SOME.

- Regional cooperation, also in the field of RE, is non-binding and should continue to remain so.
- The RE target for 2025 does not assign a specific RE share to be achieved by each country.
- The REmap analysis is a source indicating which RE shares are compatible with the RE target for 2025 at the national level, albeit in a non-binding manner.
- The regional RE target in TPES should be collectively achievable, and that each country should decide on its own roadmap for how to deploy RE.

Hypothesis 2: In addition to relying on AMS initiative for regional cooperation, external catalysers could accelerate strengthening regional cooperation

- AMS initiative for regional RE cooperation increases ownership of the efforts to move toward the regional RE goal.
- Additional efforts beyond the initiative of member states can facilitate and accelerate these developments
- Partnering with international organisations and non-ASEAN actors is considered important for reaching the regional 23% RE target.
- Sustainability in partnering with external parties is key so that support is not given on a stop-and-go basis.
- Bilateral cooperation is sometimes needed, but regional cooperation could be more efficient and suitable for certain issues, such as grid cooperation.

Hypothesis 3: Most RE cooperation relies on bilateral agreements between AMS now.

- Bilateral agreements are the main form of regional cooperation in ASEAN today. Examples mentioned were an agreement on geothermal energy between Indonesia and the Philippines and agreements on electricity transfer between Lao PDR and Thailand. Often, these agreements do not specifically target renewable energy but electricity trade or transmission in general.
- The area of knowledge exchange appears to be an exception with more multilateral activities – often prompted by ACE – taking place.
- Bilateral agreements are more prevalent than multilateral ones due to the ease and practicality of implementing agreements with one counterpart rather than several.

Hypothesis 4: National RE policies are not aligned with the regional target.

- The regional aspirational target for RE is not generally considered by policy-makers in AMS.
- It is important for each country to be able to define RE targets nationally, both in terms of the level of ambition and the unit of measurement.
- Differences in defining RE targets made it more difficult to compare across countries and pin down the size of the gap toward the achievement of the regional target.

c. Challenges/barriers of existing regional RE cooperation efforts

Input from AMS

Political barriers

- While there are considerable policy differences in RE deployment in the region, e.g., electricity subsidies, there is also an awareness of the different levels of development across AMS.
- In the case of electricity subsidies, participants agree that subsidies need to be phased out, though this needs to be done gradually, since other policy objectives at AMS need to be taken into consideration.
- Fossil fuels in some AMS, which are currently cheaper than RE technologies, are a barrier (not only to regional cooperation, but to RE deployment in general).
- The regional framework in ASEAN should be based on 'learning from each other', e.g., knowledge sharing among AMS on a more technical level.

Legal barriers

- Legal barriers, e.g., such as different tax, investment, or environmental policies, are not perceived as playing an important role in preventing regional RE cooperation.
- Legal barriers not only prevent regional cooperation, but also RE investment.

Technical/financial barriers

- There is a lack of capacities and financial means to implement regional cooperation. Lack of capacities extends to the implementation of national RE projects (no dedicated staff available, for instance).
- Funds are already insufficient for the proper implementation of bilateral agreements for some AMS.
- Lack of electricity infrastructure – that is to say interconnections but also reinforced national girds – was seen as potentially hindering cooperation. In the Laos Thailand Malaysia Singapore interconnection pilot (LTMS), each interconnection has its own bilateral agreement instead of an overarching common one.
- Market structures differ heavily across AMS. While the effort to further collaborate between these markets is driven by the top level, the working level needs to sort out cooperation step by step.
- The definition of common standards for electricity will also be key in the development of the ASEAN power grid.
- Another potential barrier mentioned was soft skills and knowledge, which should be addressed through capacity development.

In Session 2, options for regional RE cooperation in ASEAN were assessed, on set of options targeting regional cooperation among AMS, and one focusing on the role ACE could serve as a catalyst of regional cooperation in ASEAN.

Regional RE cooperation options for AMS

Option 1: Exchange on best practices for RE deployment among AMS

- This option can enjoy a high political acceptance, both by AMS and ASEAN, since it does not imply a direct interference on national policy, but still fosters mutual learning between more advanced AMS and those in earlier stages of RE deployment.
- This option can catalyse the achievement of national RE targets, and therefore be effective, since getting acquainted and learning from best and worst practices can help AMS adjust their RE policies and support schemes.
- The effectiveness of this option depends on how intense the exchange is, and to which extent national policies are improved based on this best practise exchange.
- Strengthening online exchanges via platforms, online conferences and webinars could mitigate additional administrative costs that would result in more frequent exchanges.

Option 2: AMS to mutually peer-review their national RE plans

- Mutual peer-review processes were a concept not yet tested in ASEAN. Instead, the region has some experience with such processes within the framework of the APEC review process.
- The issue of implementation costs and who bears were raised. Budget and time allocation might be an issue in terms of the sustainability of such a peer-review process.
- In term of political acceptability, there was a general agreement this option would not be accepted if merely implemented on a country-to-country basis among AMS. If ACE gets the mandate to conduct these, or if it is a group of chosen experts, then the option would be acceptable.

Option 3: AMS to provide recommendations on other AMS' national RE plans

- The cooperation intensity separating options 2 and 3 was not significant, meaning Options 2 and 3 could be integrated if they were to be implemented.

Option 4: Open national support scheme to other AMS

- The region is unfamiliar with the opening of national support schemes, as they have only been tested in the EU (AMS' supporting policies and framework conditions are considerably different).
- The political acceptability of this option hinges on whether participating countries benefit from the drafting of a support scheme. A condition of mutually beneficial must be struck.
- This option could also be cost-effective if the opening of a support scheme helped improve security of supply. Overall, this option needs to be further explored, as AMS' current support policies are highly diverse.

Option 5: Establish common support scheme

- Establishing a common support scheme was not a very tangible option in the region, and that it was therefore too premature to consider its implementation.
- There is interest in gaining a deeper understanding on the opening of support schemes (option 4) and establishing a common support scheme (option 5).

Option 6: Sub-regional cooperation initiatives on specific issues/technologies

- Having sub-regional cooperation initiatives on certain issues/technologies was regarded as very feasible.
- Examples of similar initiatives include the Lower Mekong Countries, where cooperation focuses mostly on hydropower and thermal, not only renewables, and the LTMS grid integration, which is part of the ASEAN Power Grid (APG) Programme.
- Regional RE cooperation could build upon these initiatives, and further initiatives draw from the experience gathered thus far.

Regional RE cooperation options with ACE as a catalyst

Option 1: Provide guidance for development of national RE targets and action plans

- The assessment of this option was quite mixed, with some AMS saying the option could have a positive impact, while others remarked it would not be accepted.
- Transparency and clear communication with AMS regarding the scope and implications of the guidance is key.
- "Proposing recommendations" could be more acceptable wording.

Option 2: Collect and compare AMS national RE action plans

- Most participants believed this option was very much acceptable and within ACE's mandate. A comparison of national RE plans and collecting key data on them was also seen as proven to be effective.
- The comparison of national RE action plans could be a good option, though it might not be enough.
- The political acceptability of the option was likely to vary depending on whether countries were already doing well in terms of RE deployment.

Option 3: Review if national RE action plans add up to regional target

- This option was seen as being very much in line with ACE's mandate as a regional body.
- The option of doing rankings or ratings needs to be further discussed with AMS; some countries view rankings as acceptable to know where they stand in terms of the regional target.

Option 4: Make recommendations to AMS based on review of national RE action plans

- The option was deemed politically unacceptable by many of the participants. Peer-reviews by AMS were described as preferable by some AMS.
- Recommendations would however need to be factually supported and based on statistics.

Option 5. ACE to create and manage regional fund for RE projects

- Participants in general approved of this option.
- A common regulation and transparent criteria on how the fund is managed and how projects are selected would be necessary.
- A common board should be established to govern the fund. Even though the idea was regarded and premature, it was still deemed worth looking into.
- In addition to supporting "classic" RE projects, the fund could also support entrepreneurs, start-ups and cutting-edge technologies or be combined with innovative financing models such as crowdfunding.

In summary, participants expressed positive views of ACE as a potential catalyst of regional RE cooperation. One of its main purposes should be to act as a knowledge repository to spread best practice examples, e.g., on planning methods.

6.2 Annex 2: Activities with Dialogue Partners (DPs), International Organisations (IOs) and Academia

Table 3 Regional RE cooperation efforts with DPs, IOs, and academia (ACE 2015)

Cooperation effort
Activities with dialogue partners (DPs) and international organisations (IOs): 1. ASEAN-German Energy Program (AGEP) 2. Renewable Energy Support Programme for ASEAN (ASEAN-RESP) • ASEAN Renewable Energy Information Portal • Joint studies on Renewable Energy Support Mechanisms, Off-grid Rural Electrification, and Renewable Energy Technical Standards • ASEAN Renewable Energy Guidelines (online tool) to improve the implementation of renewable energy support mechanisms. • On-line ASEAN Renewable Energy Information Portal 3. RE-SSN initiative to harmonise standards/codes for solar photovoltaics 4. RE-SSN collaboration with IRENA for a joint initiative on the integration of RE into the regional power mix.
Activities with regional academia institutions: 5. RE-SSN collaborating with the Southeast Asian Collaboration for Ocean Renewable Energy (SEAcORE)

6.3 Annex 3: Bilateral Agreements on RE among AMS and DPs/Ios)

/ Table 4 Bilateral agreements on RE among ASEAN Member States and DPs/IOs [ACE 2017 based on input from RE-SSN]

Name of the Initiative	Countries Involved	Year	Main Topics	RE Technologies
Tidal Energy Pilot Project in Indonesia	Indonesia - France	2015 - 2017	Set-up pilot project	Tidal
Technical Cooperation Projects on Promoting Renewable Energy for Rural Electrification Development in Indonesia	Germany - Indonesia	2014-2018	Rural electrification	RE in general, but emphasis in solar
Environmental Support Program (ESP) – Phase III	Denmark - Indonesia	2013-2017	Technical assistance, pilot project	All RE technologies
The Pilot Case of Ethanol Production from Cassava	Thailand - Lao PDR		Policy, Market and Technological Barriers on biofuels	Biofuels
Technical Cooperation Development Study for Final Rural Electrification Plan	Lao PDR - China		Rural electrification	All RE technologies
MoU on RE and EE	Malaysia - Brunei		Policies & legislations, standards, best practices, RE & EE, business, trade & investments, financing, RE&EE trainings	All RE technologies
MoU on RE and EE	Malaysia - Cambodia		Policies & legislations, standards, best practices, RE & EE, business, trade & investments, financing, RE&EE trainings	All RE technologies
MoU on RE and EE	Malaysia - Kazakhstan	2017 signed	Policies & legislations, standards, best practices, RE & EE, business, trade & investments, financing, RE&EE trainings	All RE technologies
Project for Introduction of Clean Energy by Solar Electricity System	Philippines - japan		Policies & legislations, standards, best practices, financing, trainings	Solar technology

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