

AEC BLUEPRINT 2025 ANALYSIS

AN ANALYSIS OF THE ASEAN COOPERATION IN ENERGY

Foreword

The following report is part of a series which attempts to provide a detailed analysis on the ASEAN Economic Community (AEC) Blueprint 2025. Each report will cover a single element of the blueprint, providing a comprehensive look at past achievements, present problems, and the

future plans of the AEC. Special attention will be placed upon the strategic measures outlined in the AEC Blueprint 2025. This report aims to provide insight into the viability surrounding regional economic integration under the AEC.

ASEAN Energy Cooperation

The energy sector is of the utmost importance in driving the development of ASEAN economies and the AEC. It is crucial that ASEAN member states are able to guarantee energy security for the region as it can be expected that robust economic performances by each individual country and ASEAN as a whole will mean that consumption of energy will increase quite significantly. Given that each ASEAN member state has its own strength in terms of energy supply (with the exception of Singapore), ASEAN countries have been engaged in regional cooperation to develop their energy sector and to ensure energy security across the region to fully support the economic development and business activities. The reasons for this are elaborated by Nicolas (2009): (i) production of energy by one country may affect other countries as seen in the construction of dams for hydropower electricity in the Greater Mekong Sub-region (GMS); (ii) distribution of

gas through pipelines across the region that may allow for more efficient distribution, lowering transmission costs and price for the consumers; and (iii) depletion of fossil fuel (non-renewable) and environmental impacts are better dealt with through regional cooperation and initiatives.

Different from the previous AEC blueprint, in the new blueprint energy is under the new pillar: enhanced connectivity and sectoral cooperation. Energy security will greatly support economic and business activities in region, and ASEAN needs to look at not only the traditional forms of energy, but also the renewable and clean energy, and nuclear energy as an alternative to the increasing demand for affordable energy. This report aims at analyzing the progress made in ASEAN energy cooperation and what ASEAN collectively needs to do to expedite the implementation side of the blueprint.

A. Targets under the AEC 2015 Blueprint

Under the AEC Blueprint 2015, energy cooperation was a part of the ASEAN infrastructure cooperation. While there was no definite strategic measures for energy cooperation, ASEAN member states agreed to work on:

- i. Securing reliable supply of energy including bio-fuel which is crucial in supporting and sustaining economic and industrial activities
- ii. Collaborate in the Trans-ASEAN Gas Pipeline (TAGP) and the ASEAN Power Grid (APG) projects that would optimize the region's energy resources for greater energy security
- iii. Involve the projects listed in point (ii) in terms of investment (including financing) and technology transfer
- iv. Develop interconnected networks of electricity grids and gas pipelines which offer significant benefits both in terms of security flexibility and quality of energy supply

The work on ASEAN energy cooperation has been greatly guided and implemented by the ASEAN Centre for Energy (ACE). The Centre was established in January 1999 as an independent intergovernmental organization within the ASEAN structure to represent the ASEAN member states' interests in the energy sector. The Center ensures that integration of the each member states' energy policies is in line with economic growth and environmental sustainability through provision of relevant information and expertise. The Governing Council of the ACE consists of Senior Energy Officials from member states and a representative of the ASEAN Secretariat as an ex-officio member.

To guide its activities and support the implementation of the AEC Blueprint 2015, ACE published the ASEAN Plan of Action for Energy Cooperation (APAEC) 2010-2015. The APAEC 2010-2015 focuses on initiatives that support development ASEAN energy infrastructure and enhance energy security through integrated

development and energy policies. The seven key initiatives include APG, TAGP, coal and clean coal technology, energy efficiency and conservation, renewable energy, regional energy policy and planning, and civilian nuclear energy.

In addition to the AEC Blueprint 2015, ASEAN cooperation in energy was also outlined in the Master Plan on ASEAN Connectivity (MPAC) 2011-2015. ASEAN connectivity focuses on development of physical connectivity, institutional connectivity and people-to-people connectivity across the region. As outlined in the MPAC 2011-2015, strategy 7 under development of physical connectivity is to prioritize the processes to resolve institutional issues in ASEAN energy infrastructure projects. This strategy aims at expediting the completion of the TAGP and APG through addressing the technical and legal issues through harmonisation of standards. The proposed key actions under the MPAC 2011-2015 include:

Area	Progress
<ul style="list-style-type: none"> i. Form a model for ASEAN Joint-Venture gas pipeline company ii. Adopt common technical standards for design, construction, and maintenance of infrastructure iii. Adopt business model for TAGP iv. Implement regional safety/security plan for TAGP infrastructure v. Optimize and operationalize TAGP vi. Study the feasibility of extending the TAGP to BIMP-EAGA 	<ul style="list-style-type: none"> i. Harmonize legal and regulatory framework for bilateral and cross-border power interconnection and trade (2008-2010) ii. Harmonize common technical standard codes or guidelines of the ASEAN interconnection projects: planning and design, system operation, and maintenance (2008-2012) iii. Identify and recommend financing modalities for realizing the APG (2008-2011) iv. Implement various bilateral/multilateral interconnection projects and reporting progress to Heads of ASEAN Power Utilities/Authorities (HAPUA) Council and ASEAN Senior Officials Meeting on Energy (SOME), ASEAN Ministers on Energy Meeting (AMEM) (2008-2015)

B. Significant Achievements To Date

- Energy cooperation in ASEAN has been progressing well, considering the different policies and laws in the member states, and the large amount of investment needed to develop the infrastructure. Given the three guiding strategic plans above (AEC Blueprint 2015, APAEC 2010-2015, and MPAC 2011-2015), the analysis below will look at the more concrete progress under this initiative.

Area	Progress
ASEAN Power Grid (APG)	<ul style="list-style-type: none"> By end of 2015, 6 out of 16 power interconnection projects for APG have been implemented. These projects connect Singapore and Malaysia, Thailand and Malaysia, and via Thailand to Cambodia, Lao PDR and Vietnam. Six projects under the APG are under construction to be completed by 2017. The HAPUA renewed their commitments to aim for sub-region multilateral electricity trading by 2018.
Trans-ASEAN Gas Pipeline (TAGP)	<ul style="list-style-type: none"> The TAGP Master Plan under the first APAEC (1999-2004) was concluded by the ASEAN Council on Petroleum (ASCOPE), which is expected to lead to an enhanced regional energy security framework. Thirteen projects have been completed and four planned cross-border projects are to be implemented in the future. Progress of the TAGP infrastructure development includes (i) the new B17 joint development area gas pipeline to Kerteh, Malaysia, which would expand the total pipeline from 3,270 to 3,673 km; (ii) development of four LNG terminals in the Philippines; (iii) ongoing development of Singapore's LNG infrastructure and additional regasification facilities; and (iv) expansion of capacity of the Map Ta Phut LNG terminal in Thailand.
Energy Efficiency and Conservation (EE&C)	<ul style="list-style-type: none"> The APAEC 2010-2015 aims at regional energy intensity reduction by at least 8% (2005-2015) and ASEAN is on track of achieving that target. ASEAN energy intensity was reduced by 7.4% by end of 2013. To support this, member states are continuously working on compilation of energy intensity data and information on EE&C policies, regulatory frameworks, policy instruments, targets, and actions plans through ACE. The ASEAN Standards Harmonisation Initiative for Energy Efficiency (ASEAN-SHINE) program has progressed well. This includes development of regional roadmap for minimum energy requirements for air conditioners and mutual recognition agreements for energy performance testing. In working with dialogue partners, the ASEAN-Japan Energy Efficiency Partnership Program (AJEEP) and the ASEAN-Japan Pilot Project on Energy Efficiency Market Transformation with Information Provision Scheme (AJ-EMTIPS) have been implemented.
Clean Coal Technology and Renewable Energy (RE)	<ul style="list-style-type: none"> ASEAN has committed to de-carbonising its energy system, that is to aim for clean coal technology of producing energy, and at the same time, intensify the development of renewable, cleaner resources of energy. Between 2006 and 2014, installed power capacity from renewable sources had more than doubled, bringing the total installed power capacity to 197,581 MW, with 26.1% contribution from RE. Overall in that period, it represents 28,000 MW of new renewable power capacity built, with a compound annual growth rate (CAGR) of 10.25%. Lao PDR and Vietnam have performed well in the use of renewable energy sources. Lao PDR has relied on hydro power mostly in meeting its national power demand. Vietnam increased its renewable power capacity to 12 GW between 2006 and 2014, much higher than the average in the rest of ASEAN of 1.76 GW.

C. Current Issues and Challenges

- To expedite the interconnections of the ASEAN's electricity networks under the APG, several barriers need to be addressed, particularly in terms of technical, financial and institutional obstacles¹. The technical issues include those related to voltage, frequency and load changes (operational issues). The issues related to financing and investment mainly stem from the fact that investors have been focusing a lot more on expanding power generation capacities (doubled since early 2000s), while investment on the transmission and distribution side has not improved annually during the same period. On institutional barriers, more work needs to be done on harmonisation of standards and regulatory frameworks. This would also involve market design across ASEAN which depends on differences in policies and interests of stakeholders.
- Some of the issues faced by the TAGP² include technical, environmental, financial, taxation, jurisdictional, and organizational. These are due to the fact that ASEAN member states are in different levels of development and that aligning the overall regional TAGP strategy is quite challenging because of the different interests and regulations in each member state. The technical complexities are related to the constructions of the pipelines that start in different periods and are managed by different authorities. From the environmental point of view, gas pipelines could cause land degradation and may produce greenhouse gas. In addition, on-shore and off-shore construction activities such as drilling and transportation may have negative repercussions on the ecosystem. Financing the TAGP construction processes is another huge challenge and may require support from external entities. ASEAN is still in the early process of taxation cooperation and therefore aligning the regions' different tax treatment for the cross-border activities under the TAGP may not happen in the near future. Jurisdictional complexities arise from especially the off-shore constructions, which require extensive programme management particularly on sea territory that is under dispute: South China Sea. There are several pipeline projects in this area. Lastly, organizational challenges stem from the fact that the ASCOPE as the implementor of the TAGP consists of representatives from ten member states of ASEAN, each of whom may have different agenda and political interests that could affect the progress of the TAGP.
- While joint activities (mainly with Japan) have been implemented to improve EE&C in ASEAN, several challenges are still existing and need to be addressed³. Institutional regulatory framework for the implementation has not been fully developed, particularly to support energy efficiency efforts from both the supply and demand sides. The existing policies are mainly focusing on voluntary measures, therefore compulsory measures have not been enforced. This is apparent in the lack of uniformed energy standards in the transport, industry and building sectors across ASEAN. In addition, in some countries, the government still provide subsidies to consumption of fossil fuels, discouraging more efficient use of those fuels.
- With regard to developing and utilizing RE sources, the challenges may be larger as this would constitute a complete change of how energy is produced and consumed. A report by ACE-GIZ⁴ has outlined the possible challenges faced in going ahead with intensifying the development of RE sources in ASEAN. The report categorizes the challenges from different perspectives: those of the project developers, financing side, utilities, and authorities/regulators. The project developers usually lack the necessary technology to develop RE resource, and there are very few consultants who have the necessary know how. Reliance on international standards is usually the way out but given that different regions have different characteristics, this normally does not result in optimum output. In addition, ASEAN lacks regional regulatory framework to facilitate the development of RE sources, and any relevant activities are implemented on case-by-case basis. From the financiers' point of view, the main problem lies in their unfamiliarity with the RE technology and reliability, which discourages them from funding such projects and research. The existing power utilities' current priority is to ensure reliable supply of electricity to the consumers and therefore exploring RE sources is not their main agenda. In addition, little does development of the RE forms take into account the existing power grids,

¹ Southeast Asia Energy Outlook 2015 by IEA and ERIA

² Setiawan, Shahroom, Huang, Zahidah (2016)

³ Same Energy More Power, ADB 2013

⁴ Renewable Energy in ASEAN, ACE-GIZ 2015

making RE less attractive. The regulators are burdened with the responsibility to continuously secure supply of energy to the customers and there are more attractive (and definite) means to

achieve it than RE sources. In terms of evaluating and monitoring actual development of RE, coordination among the relevant authorities is still a challenge in many countries.

D. Plans under the AEC 2025 Blueprint

Under the new blueprint, the region's cooperation on energy is more comprehensive and has taken into account components from the APAEC and MPAC. The coverage therefore of the areas of cooperation is far larger than what the previous blueprint had envisaged. For the period 2016-2025, ASEAN's energy cooperation has taken the theme "enhancing energy connectivity and market integration in ASEAN to achieve energy security, accessibility, affordability and sustainability for all."

The strategic measures are based on the APAEC 2016-2025 which will be implemented in two phases: 2016-2020 and 2021-2025, and they include the following:

- i. APG: initiate multilateral electricity trade in at least one sub-region in ASEAN by 2018
- ii. TAGP: enhance connectivity within ASEAN for energy security and accessibility via pipelines and regasification terminals
- iii. Coal and clean coal technology: enhance the image of coal in ASEAN through promotion of clean coal technologies (CCT) as well increase in the number of

CCT projects by 2020

- iv. EE&C: reduce energy intensity in ASEAN 20 percent as a medium-term target in 2020 and 30 percent as a longer-term target in 2025, based on the 2005 level
- v. RE: increase the component of RE to a mutually agreed percentage number in the ASEAN Energy Mix (Total Primary Energy Supply) by 2020
- vi. Regional policy and planning: better profile the ASEAN energy sector internationally through an annual publication on ASEAN Energy Cooperation
- vii. Civilian nuclear energy: build capabilities on nuclear energy, including nuclear regulatory systems, amongst officials in ASEAN member states

The APAEC seems to be the main document used as a roadmap for the ASEAN as it was formulated by the ACE which represents the interests in ASEAN member states in the regional energy cooperation. It is expected that dividing into two implementation periods will allow for greater flexibility in adjusting the implementation side and in monitoring the progress.

E. AEC 2025 Blueprint Analysis

- Energy cooperation, as other sectors under infrastructure, is a backbone of the development of AEC. The issue with energy is not only financing but also sustainability as the currently mostly consumed form of energy is the fossil fuel, which is non-renewable and will be depleted in the near future. In addition, there are many environmental dimensions to it as well. Therefore, clean and renewable forms of energy may be the answer for the future demand for energy. Some analyses on the progress on each area in the blueprint are as follows:

Issues	Current Status and Development
1 ASEAN Power Grid (APG)	
<ul style="list-style-type: none"> Initiate multilateral electricity trade in at least one sub-region in ASEAN by 2018 	<ul style="list-style-type: none"> The APG development and administration is carried out by the HAPUA, who have divided ASEAN into three sub-regions (Annex 1) to better manage the initiative. HAPUA's strategy is to expand the three sub-regions and eventually to fully integrate the APG system. Some progress of electricity trade in ASEAN is explained by Pranadi (2016)⁵. By end of 2015, the APG interconnection capacity was at 3,489 MW, which grew to 5,212 MW as of March 2016. The APGCC has established a task force to improve trade in the region for reporting to the SOME. Under the LTMS PIP, Lao, Thailand and Malaysia have signed an MoU to implement it, and the project is called the LTM project, which is the first multilateral interconnection. Lao PDR's power supply is almost 100% hydropower, and the LTM project will expand its connection with Malaysia through Thailand (Thailand will not utilize any of the electricity transmitted). Currently, the three countries are negotiating the tariffs involved. Integration of the APG system will be very useful particularly to remote or border areas with difficult access from the national transmission lines or grids, and it may be more economical to import from the neighboring country.
2 Trans-ASEAN Gas Pipeline (TAGP)	
<ul style="list-style-type: none"> Enhance connectivity within ASEAN for energy security and accessibility via pipelines and regasification terminals 	<ul style="list-style-type: none"> Under the management of the TAGP by ASCOPE, the Malaysian PETRONAS has been appointed to lead the task force for the development of the TAGP. Between Malaysia and Thailand, the Trans Thailand-Malaysia (TTM) gas pipeline is an important part of the TAGP project. The TTM pipeline system is made up of onshore and offshore gas pipelines, which consist of a 277-km natural gas pipeline from the Malaysian-Thai Joint Development Area (MTJDA) to the TTM Gas Separation Plant (GSP) in Songkhla, Thailand; a 98-km sales gas pipeline from the TTM GSP to the state of Kedah, Malaysia; and a 239-km LPG pipeline from the TTM GSP to the state of Penang, Malaysia. To date, the TAGP connections are bilateral, with pipelines linking Singapore-Malaysia, Myanmar-Thailand, West Natuna-Singapore, West Natuna-Duyong, South Sumatra-Singapore, Malaysia-Thailand, and Singapore-Malaysia. As of end 2015, thirteen connections have been established with pipeline connections totaling 3,631 kilometers which allows for transmission of gas among ASCOPE member states. The last connection completed was the pipeline from Block B17 in the MTJDA to Kerteh, Trengganu, Malaysia in April 2015. One focus of the TAGP project is the use of liquefied natural gas (LNG) as an option for gas supply in the region, particularly for countries facing difficulty in installing physical pipelines. In this case, LNG would be supplied to regional regasification terminals (RGTs) acting as virtual pipelines. Four RGTs are currently operationalized, namely: (i) FSRU West Java in Indonesia; (ii) RGT Sungai Udang in Malaysia; (iii) Singapore LNG Terminal; and (iv) Map Ta Phut in Thailand.

⁵ How Electricity Trades Progress in ASEAN , ASEAN Center for Energy

3 Coal and Clean Coal Technology

- Enhance the image of coal in ASEAN through promotion of clean coal technologies (CCT) as well as increase in the number of CCT projects by 2020
- According to Suryadi and Velautham (2015), coal-based electricity generation is expected to grow from 47 GW in 2013 to 152GW in 2025 and to 261 GW in 2035. Coal is one energy source that is abundant in the region, particularly in Indonesia. Demand for energy in ASEAN will significantly increase and coal will play an important role in meeting that demand, and supplying to its neighbours as well since ASEAN is a net exporter of coal and natural gas. Both coal and natural gas are predicted to dominate electricity generation in 2035 with a combined share of 87%.
- The ASEAN Ministers on Energy have supported the development of high efficiency, low emissions (HELE) coal-fired power plants under the scheme to utilize clean coal technologies in electricity generation. With China, Japan and Korea under the ASEAN+3 framework, member states agreed to enhance cooperation in financing and developing technology programs, promoting policies on CCT, developing HELE coal-fired power plants, upgrading of low-rank coal, and promoting carbon capture and storage (CCS). This is consistent with ASEAN's commitment to reduce carbon emissions and to take into account environmental impacts of AEC development.

4 Energy Efficiency and Conservation (EE&C)

- Reduce energy intensity in ASEAN by 20 percent
- Under EE&C, there are several initiatives or projects coordinated by ACE. The first is the ASEAN Energy Management System (AEMAS). The objectives of the ASEAN Energy Management System (AEMAS) project are (i) to empower energy managers further so that they can have the know-how in applying policies to reduce consumption of energy in their organizations, and (ii) to promote energy considerations to be incorporated in the overall management policies. The AEMAS project trains and certifies managers in charge of energy utilization who are expected to implement sustainable energy management systems within their organizations or industries.
- The ASEAN-Japan Energy Efficiency Partnership (AJEEP) consists of two schemes: (i) forming a platform for businesses to find opportunities in implementing energy efficiency through application of effective/ advanced technologies and products under an energy conservation policy or legal framework and energy management system; and (ii) contributing to the achievement of the energy intensity reduction target for ASEAN by narrowing the gaps and EE&C capacities among member states. The Energy Conservation Center of Japan (ECCJ) has supported capacity building in Cambodia, Lao PDR and Myanmar on establishment of energy management system, energy conservation policy and energy conservation act and on the actual implementation with cooperation with the ASEAN Supporting Group.
- Under the ASEAN Standards Harmonisation Initiative for Energy Efficiency (ASEAN-SHINE), member states are working towards increasing the market share of air conditioners (ACs) with higher efficiency through harmonisation of test methods and energy efficiency standards, adoption of common minimum energy performance standards, and change of consumer preference towards energy efficient ACs. This is because inefficient ACs has been one of the sources of environmental problems for their high greenhouse gas emissions. This initiative is funded under the EU SWITCH - Asia affiliated program.
- Supported by the government of Korea under the ASEAN+3 cooperation

4 (cont) Energy Efficiency and Conservation (EE&C)

framework, member states are working to implement Clean Development Mechanism (CDM) projects in energy to reduce greenhouse gases (GHG) emissions and promote sustainable development in the ASEAN+3 region. The overall objective is to strengthen the ASEAN+3 cooperation in GHG mitigation, capacity building and information sharing, and developing business opportunities on GHG mitigation. This programme started in 2007, and since 2013 it has been renamed the ASEAN+3 Mitigation Cooperation Programme.

- The Energy Efficiency Market Transformation with Information Provision Scheme (EMTIPS) is under the ASEAN-Japan cooperation. The EMTIPS program is a platform to accelerate energy efficiency market transformation in ASEAN by means of providing appropriate information to consumers. The objectives of the EMTIPS include harmonisation through discussion and tangible steps, exchange of ideas on measures to promote energy efficiency products, capacity building, and sharing and utilization of tools and outcomes.

5 Renewable Energy (RE)

- Increase the component of RE to a mutually agreed percentage number in the ASEAN Energy Mix (Total Primary Energy Supply) by 2020

- To promote development and utilization of renewable energy, ACE⁷ has cooperated with the Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, a development implementation agency from Germany, under the Renewable Energy Support Programme for ASEAN (ASEAN-RESP). The RESP serves as a platform that provides a directory on RE activities in the region, and a database of reports and studies. The main objectives of the ACE-GIZ cooperation include: (i) adoption of regional RE guidelines by ASEAN specialized energy bodies; (ii) development and promotion of RE through policies to establish access to RE sources and conditions for grid integration of RE; and (iii) formation of focus groups by the ASEAN RE Sub-Sector Network (RE-SSN) to work on elements of RE in the region. These all support the implementation of Area 5 of APAEC 2010-2015, which is on RE.

6 Regional Policy and Planning

- Better profile the ASEAN energy sector internationally through an annual publication on ASEAN Energy Cooperation

- With regard to regional energy policy and planning, the work by member states is still in the early stage. The level of integrated policy and planning is quite low at this point and more discussion and negotiation must be done. Basically, higher level of integrated policies can be attained through improvement of data and analysis on ASEAN's energy policy and planning, greater collaboration with dialogue partners and international organisations, enhancement in the resilience and emergency preparedness in energy infrastructures to mitigate the impact of climate change and natural disasters, and more effective management and implementation of the APAEC 2016-2025.
- One ongoing initiative under regional policy and planning is the Energy Supply Security and Planning in ASEAN (ESSPA). With support from Japan to the ACE, the initiative aims at developing the ASEAN Energy Database to maintain consistent annual historical energy data of member states. The Institute of Energy Economics of Japan (IEEJ) provides capacity building focusing on technical knowledge on energy demand, supply and outlook for ASEAN.

⁶ Energy Efficiency and Conservation, ASEAN Center for Energy

⁷ ASEAN-RESP Phase II , ASEAN Center for Energy

7 Civilian Nuclear Energy (CNE)

- | | |
|--|--|
| <ul style="list-style-type: none"> • Build capabilities on nuclear energy, including nuclear regulatory systems, amongst officials in ASEAN Member States | <ul style="list-style-type: none"> • Based on experience of advanced economies in utilizing nuclear energy to generate electricity, ASEAN member states have also started to look into the possibilities of utilizing nuclear as an alternative source of energy. While the risk is quite well known (particularly through damage in the reactor), nuclear energy is relatively clean to the environment and is able to generate large amount of electricity, and thus if managed well, could be an answer to ASEAN's increasing future demand. ASEAN has established the Nuclear Energy Cooperation Sub-Sector Network (NEC-SSN)⁸ to coordinate the cooperation and facilitate information sharing, technical assistance, capacity building, and education in nuclear power generation. • The ASEAN+3 Human Resource Development (HRD) in CNE is supported by Korea and aims at promoting safe use of nuclear energy through development of nuclear energy policies, and strengthening policy dialogues on the development of CNE. The Government of Canada has provided support to ASEAN on nuclear and radiology security, focusing on pre-feasibility study on nuclear power plants, safe transportation of nuclear materials, and development of legal, regulatory framework, codes and standards. |
|--|--|

F. Conclusion: Moving Forward with the AEC 2025 Plans

- Energy cooperation is very important for the realization of the AEC, and therefore member states need to take this very seriously. While fossil fuel is still widely utilized, given that it is non-renewable, ASEAN must put greater priority on sources of energy that are more sustainable and more friendly to the environment in the longer run. This includes greater cooperation and more intensive discussions on integrating and harmonizing the regulations concerning the ASEAN energy sector.
- ASEAN has pledged to increase the share of RE to 23 percent in the total energy generated in the region by 2025, and at the same time, reduce the emission of GHG by 20 percent and energy intensity also by 20 percent during the same period. These would require common and joint efforts by all member states in (i) collaborating with dialogue partners and international organizations to tap into their expertise, and (ii) implementing the APAEC 2016-2025 consistently to achieve the desired targets. Member states also should consider providing incentives to entities that have utilized renewable and clean energy sources for their electricity needs and made efforts to improve energy efficiency and reduce negative impacts to the environment.
- The main initiatives under the ASEAN energy cooperation: APG and TAGP must continue as they are currently the key responses to ASEAN's demand for energy and electricity in the shorter term. Completion of the two initiatives will allow for better distribution and trade of energy and electricity that are very important in supporting economic and business activities across the region. Member states will have to address the existing barriers that have hampered the cross-border completion for APG and TAGP.
- In the development of other sources of energy, ASEAN has ventured into developing civilian nuclear energy as an alternative way to generate electricity, which is understandable since nuclear energy is relatively clean and environment friendly so long as it is well managed and the technology used is safe. In this case, ASEAN needs to ensure maximum support from the more advanced economies with long experience in nuclear energy development and utilization. However, another source of energy can be considered: geothermal⁵. Currently, three ASEAN countries have developed their geothermal power plants: Indonesia, Philippines and Thailand. Particularly Indonesia and Philippines are

⁸ Civilian Nuclear Energy, ASEAN Center for Energy

located in the volcanic lines in the Asia Pacific region, which are abundant source of geothermal energy. The geothermal potential of Indonesia is 29 GW (40% of total global geothermal resources) and that of the Philippines is 4 GW. Other member states have strongly considered developing their

geothermal power plants as well. Greater cooperation among ASEAN members may ensure greater use of geothermal source to generate electricity in large amount to support the realization of the ASEAN Community.

List of Abbreviations

ACE	ASEAN Centre for Energy
AEMAS	ASEAN Energy Management System
AJEEP	ASEAN-Japan Energy Efficiency Partnership Program
AMEM	ASEAN Minsters on Energy Meeting
APAEC	ASEAN Plan of Action for Energy Cooperation
APG	ASEAN Power Grid
ASCOPE	ASEAN Council on Petroleum
ASEAN-RESP	Renewable Energy Support Programme for ASEAN
ASEAN-SHINE	ASEAN Standards Harmonisation Initiative for Energy Efficiency
CAGR	Compound Annual Growth Rate
CCS	Carbon Capture and Storage
CCT	Clean Coal Technologies
CDM	Clean Development Mechanism
CNE	Civilian Nuclear Energy
ECCJ	Energy Conservation Center of Japan
EE&C	Energy Efficiency and Conservation
EMTIPS	Energy Efficiency Market Transformation with Information Provision Scheme
GHG	Greenhouse Gases
GMS	Greater Mekong Sub-region
GSP	Gas Separation Plant
HAPUA	Heads of ASEAN Power Utilities/Authorities
HELE	High Efficiency, Low Emissions
IEEJ	Institute of Energy Economics of Japan
MPAC	Master Plan on ASEAN Connectivity
MTJDA	Malaysian-Thai Joint Development Area
NEC-SSN	Nuclear Energy Cooperation Sub-Sector Network
RE	Renewable Energy
RGT	Regasification Terminal
SOME	ASEAN Senior Officials Meeting on Energy
TAGP	Trans-ASEAN Gas Pipeline
TTM	Trans Thailand-Malaysia

References

- ASEAN Secretariat (2008). ASEAN Economic Community Blueprint
- ASEAN Secretariat (2015). ASEAN 2025: Forging Ahead Together
- ASEAN Secretariat (2015). A Blueprint for Growth ASEAN Economic Community 2015: Progress and Key Achievements
- ASEAN Secretariat (2012). 4th ASEAN Energy Outlook
- ASEAN Secretariat (2016). Master Plan on ASEAN Connectivity (MPAC) 2025
- ASEAN Centre for Energy (2009). ASEAN Plan of Action for Energy Cooperation (APAEC) 2010-2015
- ASEAN Centre for Energy (2015). ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025
- ASEAN Centre for Energy, various information in the website: www.aseanenergy.org
- Asian Development Bank (2013). Same Energy, More Power: Accelerating Energy Efficiency in Asia
- International Energy Agency and Economic Research Institute for ASEAN and East Asia (2014). Southeast Asia Energy Outlook 2015
- Development in the Works: Trans-ASEAN Gas Pipeline (TAGP), in Petromin Pipeliner, July-September 2015
- Trans-ASEAN Gas Pipeline: Accelerating Gas Market Integration within the ASEAN Region, Anton Setiawan, Alya Shahroom, Ting Huang, Noor Syaza Zahidah, The Complexities of Programme Management: Case Study of the Trans-ASEAN Gas Pipeline, 2016
- Beni Suryadi and Sanjayan Velautham, Coal's Role in ASEAN Energy, in Cornerstone Journal, 2016
- Francoise Nicolas, ASEAN Energy Cooperation: An Increasingly Daunting Challenge, Institut Francais de Relations Internationales (2009)
- Phinyada Atchatavivavan, ASEAN Energy Cooperation: An Opportunity for Sustainable Regional Energy Development, Thachatat Kuvarakul, Renewable Energy for ASEAN, under ASEAN-RESP, ASEAN Centre for Energy and Gesellschaft fur Internationale Zusammenarbeit

Contributing Writer:



Dr. Bambang Irawan was formerly an Assistant Director at the ASEAN Secretariat, Jakarta, Indonesia. His portfolio covered cooperation and initiatives under the ASEAN finance integration. In his capacity, he coordinated activities and initiatives under financial services liberalisation, capital account liberalisation, capital market development, insurance and taxation.

Editor:

Jukhee Hong | Tunku 'Abidin Muhriz

Contact Details:

Please contact the CARI for information about this paper: enquiries@cariasean.org

Disclaimer:

Any analysis, opinion or editorial contained in this report is based on information sourced from or made available in the public domain. CIMB ASEAN Research Institute (CARI) assumes no liability and makes no guarantee, representation or warranty, whether express or implied, as to the adequacy, accuracy, completeness or reliability of any such information and analysis, opinion or editorial contained in this report. All readers are advised to conduct their own independent verification and/or evaluation of such information and analysis, opinion or editorial.