



## ASEAN-U.S COOPERATION ON RENEWABLE ENERGY: ASEAN'S RESPONSE TO CLIMATE CHANGE PHENOMENON

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### *Abstrak*

*Perubahan iklim telah menjadi salah satu isu yang paling banyak diperbincangkan dalam Perhimpunan Bangsa-bangsa Asia Tenggara (ASEAN). ASEAN sendiri sebagai salah satu kawasan yang paling berpengaruh berusaha memerangi perubahan iklim dengan pengembangan energi terbarukan dan penciptaan standar kehidupan di dalam wilayahnya. Untuk mengejar ambisi ini, ASEAN bekerjasama dengan Amerika Serikat (AS) sebagai salah satu partner dialog ASEAN di dalam implementasi ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025. Tulisan ini menggunakan metode penelitian kualitatif melalui analisa data sekunder untuk menjelaskan bagaimana kooperasi ASEAN-AS membantu ASEAN untuk memerangi perubahan iklim. Berdasarkan penelitian, ditemukan bahwa kerjasama dalam hal energi terbarukan antara ASEAN-AS berpotensi untuk membantu ASEAN mengejar ambisinya dalam hal perencanaan investasi, serta pertukaran teknologi dan informasi.*

**Kata Kunci:** *APAEC 2016-2025, energi terbarukan, kerjasama energi terbarukan antara ASEAN-AS, perubahan iklim*

### **Abstract**

Climate change phenomenon has become one of the major issues discussed in the Association of Southeast Asian Nations (ASEAN). ASEAN as one of the most influential regions in the world tries to combat climate change by developing renewable energy and creating a better living in the region. To pursue its ambition, ASEAN cooperates with United States of America (U.S) as one of its dialogue partners following the implementation of the ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025. This paper is using qualitative research method through secondary data analysis to explain how ASEAN-U.S cooperation on renewable energy helps ASEAN to combat climate change. Throughout the research, ASEAN-U.S cooperation on renewable energy is potentially beneficial and helpful for ASEAN to pursue its ambition in terms of investment provision and technology and information exchange.<sup>1</sup>

**Keywords:** APAEC 2016-2025, ASEAN-U.S Cooperation on Renewable Energy, climate change, renewable energy

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## Introduction

In the 21<sup>st</sup> century, scientists agree that climate change is happening and primarily driven by human activities. Climate change can be defined as “a systematic change in the long-term state of the atmosphere over multiple decades or longer” (Public Health Institute & Center for Climate Change and Health, 2016). Basically, climate change occurs and endangers human survival because it causes changes in the Earth’s energy balance. The changes in the Earth’s energy balance can be seen by observing how much energy from the sun that enters the Earth and its atmosphere is released back into space. By this means, the Earth can gain energy when the energy released back into space is imbalance with the energy that enters the Earth and its atmosphere, thus making the temperature of the Earth rises.

Scientists believe that the emergence of the climate change phenomenon has been predicted since about 200 years ago when the Industrial Revolution started. Industrial Revolution has led to the massive use of technology which contributes large quantities of greenhouse gasses (GHG) into the Earth’s atmosphere. GHG itself acts as a greenhouse which has the ability to hold the sun’s energy and heat from reflecting back into space. By this means, when the concentration of GHG rises, the energy and the heat trapped in the atmosphere would rise as well, which then leads to the rising of Earth’s temperature. GHG is varied and each variation has different ability to trap heat (known as global warming potential). Moreover, each variation has a different half-life within the atmosphere. By this means, each variation of GHG needs a different period of time to fall to half of its original value.

Carbon dioxide (CO<sub>2</sub>) is known as one of the GHG with the greatest ability to warm the Earth to date. CO<sub>2</sub> is primarily produced from incomplete combustion of fossil fuels, such as coal, oil and gas that usually used for human daily activities and needs. In this era, almost every human activity and need can contribute to the increase of CO<sub>2</sub> production, such as the use of electricity, transportation and industrial processes. In fact, those three activities contribute more than 80% of CO<sub>2</sub> released into the atmosphere (Public Health Institute & Center for Climate Change and Health, 2016). Even though CO<sub>2</sub> is known as the most dangerous GHG in common, there are other GHG that might be emitted in smaller quantities than CO<sub>2</sub> but can trap more heat in the atmosphere. That other GHG include methane, nitrous oxide, black carbon, and various fluorinated gasses

which have higher global warming potential (GWP) than  $\text{CO}_2$ . By this explanation, it can be understood that the more GHG trapped in the atmosphere, the higher Earth's temperature could be, which then leads to the emergence of climate change.

The impacts of climate change have been perceived by the human being, both in world and region scopes. The impacts that perceived by each region in the world may be different depends on the condition of each region, such as existing health status, socioeconomic factors and environmental context (Overland, et al., 2017). One of the regions with high vulnerability to get affected by the climate change in Southeast Asia. There are four of the world's ten countries most affected by the climate change located in Southeast Asia, those are Myanmar, the Philippines, Thailand, and Vietnam. The vulnerability of Southeast Asia is caused by the concentrated population and economic activity of the region along the region's coastline. Regarding that, the most tangible consequence of climate change threatening the Southeast Asia region is the melting ice which leads to raising the sea levels. Rising sea levels are potentially causing problems for major coastal and estuary cities in the region, including Bangkok, Jakarta, Manila, dan Yangon. In response to this, ASEAN as an association that consists of countries of Southeast Asia has the responsibility to secure its member states from the threatening climate change impacts.

On climate change phenomenon, ASEAN has held several policies and acts to combat climate change in the region together with its member states. In this case, ASEAN believes that the effort of reducing GHG, such as  $\text{CO}_2$  is really important in order to prevent the Earth's temperature from rising. One of the ways to reduce the production of GHG is by transitioning the use of primary energy (such as coal, oil, and gas) to renewable energy (such as geothermal, hydropower, solar irradiance, and wind). By having potential resources for renewable energy development within each member state, ASEAN would be easier to pursue its ambition to provide affordable and clean energy for the people.

On 23<sup>rd</sup> September 2014, ASEAN has held the 32<sup>nd</sup> ASEAN Ministers on Energy Meeting (AMEM) in Vientiane, Lao PDR. The 32<sup>nd</sup> AMEM resulted an idea to endorse ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 themed as "*Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability and Sustainability for All*" (Zamora & States, 2015). The APEC 201-2025 aims to enhance multilateral electricity trading to accelerate the

realization of the ASEAN Power Grid (PAG), enhance gas connectivity by expanding focus of the Trans-ASEAN Gas Pipeline (TAGP) to include Liquefied Natural Gas (LNG) regasification terminals, and promote clean coal technology. Moreover, the APEC 2016-2025 also includes strategies to improve energy efficiency and increase the use of renewable energy resources.

Following the APEC 2016-2025, ASEAN conducts cooperation on energy with its dialogue partners, including the United States of America (U.S). ASEAN believes that U.S has the capacity and capability to help ASEAN in developing renewable energy since the U.S is one of the most developed countries in the world. In this case, ASEAN and U.S are cooperation in two kinds of cooperations, which are U.S-ASEAN Energy Cooperation Work Plan 2016-2020 and USAID Clean Power Asia. Furthermore, both cooperations have its own priority areas. U.S-ASEAN Energy Cooperation Work Plan 2016-2020 focuses on areas related to Energy Efficiency and Conservation, Renewable Energy, Power Sector, and Natural Gas, Petroleum, whereas USAID Clean Power Asia focuses on ensuring the investment in grid-connected renewable power. Through these renewable energy cooperations, ASEAN is expected to achieve its ambition to reduce the production of GHG which harms the environment and causes further problems in its region by the end of 2025 in accordance to the APAEC 2016-2025 targets.

## **Drivers for ASEAN to Combat Climate Change by Using Renewable Energy**

### ***Harmful Impacts of Primary Energy***

Since the Industrial Revolution began, the use of technology is increasing time by time because it makes human activities become easier. Despite the use of technology is beneficial, it can be detrimental to human life when it uses fossil fuel to operates. Fossil fuel is known as primary energy, including oil, gas, coal, and etc. The use of primary energy is harmful to the environment because of the GHG (such as CO<sub>2</sub>, methane, nitrous oxide, black carbon, and various fluorinated gases) it released into the Earth's atmosphere could lead to the climate change phenomenon. The GHG that has the ability to trap heat and energy within the atmosphere rises the temperature of the Earth and endanger human survival.

The impacts of primary energy use that leads to climate change phenomenon can be perceived in all around the world, including in the ASEAN region. As for the impacts from this phenomenon in the ASEAN region are as follows:

1. Sea-level rise

Sea-level rise is one of the most harmful impacts of primary energy use that leads to climate change in the ASEAN region. It is threatening the region because the most of ASEAN member states are non-landlocked countries. Those non-landlock countries could shrink because of the sea-level rise, especially those countries with long coastlines and/or significant low-lying areas (Overland, et al., 2017). Among the world's 25 cities most vulnerable to sea-level rise, there are seven cities located in the Southeast Asia region, more precisely located in the Philippines. However, it is expected that Indonesia would be the most vulnerable country to coastal flooding which would effects 5.9 million people every year by 2100 (Overland, et al., 2017). Furthermore, Singapore is also threatened by the rising sea level, since this country is flat and low-lying (30% of the country has five meters or fewer elevations) (Overland, et al., 2017). In long-term estimation, the sea-level rise in the ASEAN region could be worst when the ice on the South Pole melt along with the extreme climate change.

2. Extreme weather events

Climate change phenomenon that caused by imbalance of heat and energy that released into the Earth's atmosphere and released back into space creates extreme weather events in the Earth. ASEAN has already perceived the impacts of the extreme weather events in some parts of the region, including largest cities in ASEAN region, such as Bangkok, Manila, dan Jakarta. One of the most extreme weather events happened in ASEAN region was Cyclone Nargis that killed over 138.000 people in Myanmar in 2008 (Overland, et al., 2017). Furthermore, in 2013 ASEAN region experienced Typhoon Haiyan which happened in the central Philippines province of Leyte. This disaster killed at least 10.000 people and led to extensive economic damage (Overland, et al., 2017). By this means, extreme weather events can be categorized as one of the most harmful impacts for human survival in the Earth, since it is able to kill thousands of people and create economic damage to the country.

### 3. Haze

Transboundary haze originating from fires has become an issue discussed in ASEAN since it affects the air quality (pollution from the haze) and creates health issues. In ASEAN region, the most known transboundary haze is the haze from agriculture-related fires around East and South Sumatera dan some parts of Kalimantan. The haze originating from fires can be easily spread through the air and effects neighboring countries, such as Malaysia and Singapore where are located near to the fire areas. Haze pollution becomes problematic because it has real impacts on the ASEAN region, especially in the economic and health areas. In response to this, ASEAN member states signed the ASEAN Agreement on Transboundary Haze Pollution in 2002. However, the agreement is yet not enough to fix the transboundary haze problem because it is able to cause a dispute between countries at a certain level, as what happened between Indonesia, Malaysia, and Singapore in 2013. In the dispute, Indonesia argued that Malaysian and Singaporean companies with plantation in Indonesia were among those who started the fires (Overland, et al., 2017). Therefore, it is better to prevent the haze originating from fires by trying to reduce harmful GHG released into the Earth's atmosphere.

### 4. Food Security

Considering that the ASEAN region's workforce is largely engaged in agriculture, forestry, and fisheries, food security becomes one of the threatening consequences in the region. The sectors mentioned before are very vulnerable to climate change impacts. It is predicted that by 2100 ASEAN region could get 50% decline in rice yields and 6.7% fall in GDP (Overland, et al., 2017). The chance of declining in rice yields could happen because ASEAN agriculture sector is at risk from droughts and flooding. Moreover, scholars believe that the fisheries sector could also be threatened in some ASEAN member states if the impacts of climate change are not solved properly. Therefore, ASEAN needs to take the impacts of climate change seriously and try to prevent the further impacts, such as the food security.

## **Abundant Renewable Energy Resources in ASEAN Region**

Unlike primary energy, renewable energy (also known as secondary energy) is cleaner, more friendly to the environment, and more affordable. Renewable energy uses energy



sources that are continually replenished by nature (United States of America-Department of Energy, 2001). Those energy sources include the sun, the wind, water, the Earth's heat, and plants which can be turned into usable forms of energy by renewable energy technology. Renewable energy technology is also known as “clean” or “green” technology since the technology produces few pollutants.

ASEAN region has abundant renewable energy resources which are varied in each member state. There are hydropower, solar irradiance, wind, bioenergy, and geothermal energy, in particular. Each member state has its own renewable energy specialty based on the amount of the source available within the state. In fact, hydropower in the ASEAN region is known as one of the best hydropower potentials in the world. However, the hydropower remains untapped in countries such as Myanmar and Lao PDR. Regardless it remains untapped, Myanmar and Lao PDR have taken it into account and include hydropower development in their national energy plan. Besides, ASEAN other renewable energy resources have significant potential. ASEAN has a very strong solar irradiance (power from the sun) which is over 1.500-2.000 kWh per square meter annually on average. Thus, allow for capacity factors of 20% and above (Overland, et al., 2017).

ASEAN wind resources are more modest than the solar irradiance. Some ASEAN member states where are located along the coasts and inland have speeds between six and seven meters per second on average. Thus enable capacity factors well into the high 30s or beyond. Those countries are including Vietnam, Thailand, Indonesia, and Myanmar. Furthermore, Indonesia and the Philippines have a big geothermal potential, which is known as one of the bests in the world. Besides, ASEAN also has a big bioenergy supply potential which is spread all over the region. It is estimated that the bioenergy can meet the double demand expected by 2025.

With abundant renewable energy resources, ASEAN would be easier to provide affordable and clean energy for the people, which is also friendly to the environment. Thus, would make the result of the ASEAN's efforts to combat climate change become more significant. However, it is also important for ASEAN to cooperate with its dialogue partners on developing renewable energy within the region, considering that ASEAN needs more financial, technical and mechanical support. By cooperating with its dialogue partners, including the U.S, would make ASEAN become easier to ensure that its targets can be achieved by 2025 based on APAEC 2016-2025. Moreover, achieving the targets

by 2025 is very possible for ASEAN, since U.S as one of ASEAN's dialogue partners really understands about the conditions within the ASEAN region.

### **ASEAN-U.S Cooperation on Renewable Energy Following APAEC 2016-2025**

#### ***ASEAN Plan of Action on Energy Cooperation (APAEC) 2016-2025***

With bringing a theme of “Enhancing Energy Connectivity and Market Integration in ASEAN to Achieve Energy Security, Accessibility, Affordability and Causes for All”, APAEC 2016-2025 is determined to develop secondary energy to ensure the community of ASEAN survival. Considering the economic and demographic growths in the ASEAN region that led to the double demand of energy, ASEAN started to find a way to meet the demand without harming the environment by developing renewable energy. Regarding this, ASEAN finally implements the APAEC 2016-2025, which is signed on 23<sup>rd</sup> September 2014 in the 32<sup>nd</sup> ASEAN Ministers on Energy Meetings (AMEM) held in Vientiane, Lao PDR. This APAEC 2016-2025 is in fact the 4<sup>th</sup> APAEC held by ASEAN after the APAEC 1999-2004, the APAEC 2004-2009, and the APAEC 2010-2015.

The APAEC 2016-2025 has seven programme areas, including ASEAN Power Grid (APG), Trans-ASEAN Gas Pipeline (TAGP), Coal and Clean Coal Technology (CCT), Energy Efficiency and Conservation (EE&C), Renewable Energy (RE), Regional Energy Policy and Planning (REPP), and Civilian Nuclear Energy (CNE). Renewable energy programme area is made to address the challenges of sustainable energy growth and climate change by diversifying and Using indigenous energy sources efficiently at the national level (Zamora & States, 2015). In this case, ASEAN member states have implemented several renewable energy initiatives which are based on policies to reduce oil consumption and mitigate the environmental impacts of fossil fuel use, including climate change.

The development of renewable energy in each ASEAN member state plans to cover hydro, geothermal, solar photovoltaic, solar thermal, wind, bio-energy, ocean energy, fuel cell, hydrogen, and coal liquefaction. However, ASEAN is facing challenges to realize the plans, since ASEAN need more technology transfers and partnerships to success the plans on renewable energy development. By this means, ASEAN needs to cooperate with other countries which are more developed than the member states to fulfill the needs. Realizing the lack of ASEAN's capability and capacity on renewable energy



development, ASEAN then holds several cooperations with its dialogue partners, including U.S. The cooperations between ASEAN and U.S itself aim to reduce the environmental impact of energy Use in ASEAN region.

### **United States-ASEAN Energy Cooperation Work Plan 2016-2020**

Considering that ASEAN needs more supports on the deployment of renewable energy in its member states, ASEAN is cooperating with the U.S on the development of renewable energy. In fact, ASEAN and U.S have been cooperating on energy issues since 2006, which was started under the 2006-2011 Plan of Action to Implement the ASEAN-U.S Enhanced Partnership and continued with 2011-2015 Plan of Action to Implement the ASEAN-U.S Enhanced Partnership. Since both of the Plan of Action to Implement the ASEAN-U.S Enhanced Partnerships have been done, ASEAN and U.S continue to cooperate on energy through U.S-ASEAN Energy Cooperation Work Plan 2016-2020. This energy cooperation reinforces the commitment to cooperate in accelerating the deployment of clean energy technologies in the ASEAN region and to support ASEAN institutional capacity building, in general (ASEAN Centre for Energy, 2016).

U.S-ASEAN Energy Cooperation Work Plan 2016-2020 has four main areas, including Energy Efficiency and Conservation, Renewable Energy, Power Sector, Natural Gas and Petroleum. Among those four main areas, this cooperation supports the renewable energy as its priority. ASEAN and U.S believe that renewable energy is really important to increase the diversity of energy supply and to reduce environmental impacts of primary energy use in the ASEAN region. According to the importance of renewable energy in ASEAN, this cooperation consists of four cooperative activities as follows:

#### **1. Hydropower Climate Change Risk Modeling**

Under this cooperation, U.S and ASEAN held the Hydropower Climate Risk Screening framework project which is a planning tool that is able to analyze climate-related risks for each hydropower plant and provides actionable recommendations to maintain stable and reliable power output under any climate condition. According to this project, U.S then develop and distribute a digital application-based or web-based tool to facilitate understanding and awareness of the detrimental impacts of climate change on hydropower in the ASEAN region. Moreover, the Hydropower Climate Risk Screening framework could be expanded to include suggestion on specific

design-related modifications to at-risk hydropower assets that own by ASEAN (ASEAN Centre for Energy, 2016).

## 2. Geothermal Risk Reduction

Through this cooperation, ASEAN receives more investments in geothermal energy development considering that ASEAN is a region with the largest potential of geothermal power in the world. In particular, this program aims to support transformational impact through recommendations on changes to the regulatory frameworks in ASEAN member states. Moreover, this program works with Energy Ministers, Energy and Finance Regulators, commercial banks and insurance companies to create new schemes for co-sharing risks related to geothermal explorations and drilling (ASEAN Centre for Energy, 2016).

## 3. Off-Grid Renewable Energy

Considering that there are so many communities and islands in ASEAN powered by electricity generated from expensive and carbon-intensive diesel fuel, through this cooperation ASEAN would try to reduce the dependency on primary energy by developing renewable energy. Regarding the willing of ASEAN, U.S then assists ASEAN with renewable resources assessment which is scoping renewable energy systems and integration of renewable energy storage to offset diesel generation in some sites of ASEAN region. Moreover, in this cooperation, U.S also includes technical and economic analysis for high-penetration renewable energy and energy-efficient technologies. In this case, U.S could provide ASEAN with technical assistance, information on proven technologies, investment guidance and lessons-learned to support distributed renewable energy, including but not limited to, solar, wind, biogas, and storage (ASEAN Centre for Energy, 2016).

## 4. Finance Mobilization and Capacity-Building

In this program, ASEAN cooperates with U.S on assisting ASEAN member states to distribute finance for renewable energy investments; build capacity for renewable energy projects; identify, value, and allocate the risks of selected projects; make progress through development on renewable energy; and assure proper accounting and reporting of contingencies for proposed and accepted projects (ASEAN Centre for Energy, 2016). In brief, this programme aims to ensure that the finance mobilization for renewable energy investment would goes in a proper way to each

ASEAN member state and prevent corruption with proper accounting and reporting. With this programme, it is expected that ASEAN would make progress which is worth the investment (ASEAN Centre for Energy, 2016).

### **USAID Clean Power Asia**

Besides the U.S-ASEAN Energy Cooperation Work Plan 2016-2020, ASEAN also cooperates with the U.S through USAID by a programme namely “Clean Power Asia”. Clean Power Asia is a programme where U.S assists ASEAN’s power sector Using sustainable, efficient, and innovative technologies (USAID, 2016). To achieve ASEAN targets by 2025 as what written in the APAEC 2016-2025, ASEAN would get support in terms of investment from the U.S to increase the supply of grid-connected renewable energy. Moreover, this programme focuses on incorporating renewable energy into planning, promoting smart incentives, building an enabling environment for renewable energy policies and frameworks and mobilizing finance (USAID, 2016).

The enforcement of USAID Clean Power Asia is in fact based on the awareness that energy demand in ASEAN is estimated to increase in the future along with economic and demographic growths. In response to this, ASEAN takes actions to support low emission power system in order to make ASEAN become independent from the use of primary or conventional energy and meet the demand by developing renewable energy. Bearing in mind that the use of primary energy has detrimental effects to the environment, ASEAN aims to reduce the use of primary energy by cooperating with the U.S. ASEAN and U.S cooperate in this programme to accelerate the regional transition to a high performing, low carbon power sector which would be accomplished through areas as follows:

#### **1. Improving Power Sector Planning**

This area focuses to improve availability and quality of renewable energy data and tools for analysis, including technical and economic potential, renewable energy zone and grid integration studies. According to this, USAID Clean Power Asia cooperate with ASEAN to provide valid renewable energy resources data, including solar, wind, biomass, hydro, and other data, such as grid, infrastructure, environment, and geographic information system (GIS). As mentioned before, through this area, ASEAN and U.S would cooperate to provide renewable energy planning tools,

including but not limited to, software for integrated resource planning and climate change mitigation assessment, web-based decision-making tool, and GIS visualization dataset (USAID, 2016).

Furthermore, this programme also provides renewable energy planning and analysis which is divided into three varieties, namely renewable energy planning and analysis for governments, for energy planners, and for project developers. The renewable planning and analysis for government focus on developing energy sector and climate change strategies plans, analyzing policy questions including energy access, rural electrification, and energy security. The renewable planning and analysis for energy planners focus on estimating technical renewable energy potential and supporting renewable energy target setting and scenario planning. Finally, The renewable planning and analysis for project developers focuss on supporting project feasibility studies and conducting site selection for the development of solar, wind, and other renewable energy technologies (USAID, 2016).

## 2. Fostering Supportive Policy Framework

In this area, U.S and ASEAN cooperate to improve grid-connected renewable energy development by analyzing barriers and policy impacts; facilitating the exchange of lessons learned and best practices, conducting stakeholder consultation; and developing pilot programmes. Moreover, the activities in this area are divided into three focused themes, which are Distributed Photovoltaics, Solar Farms, and Resource Complementarity. Those three focused themes would receive technical support for the development or improvement of policy and incentives, and regulations and standards (USAID, 2016).

## 3. Mobilizing Finance and Investment

This area focuses on supporting financial institutions, developers, and other stakeholders of renewable energy development to secure and reduce the cost of finance for renewable energy projects by helping to develop innovative business model, promoting standardized documentation and evaluation practices and approval processes for financing renewable energy projects and providing other advisory services (USAID, 2016). In brief, this area focuses to ensure that all renewable energy projects in ASEAN could receive definite funds. However, to ensure the funding of

renewable energy projects, the projects should be cost-efficient and run based on comprehensive policies and regulations to appeal to the commercial developers.

#### 4. Promoting Enhanced Regional Collaboration

This programme works with regional and international partners in order to share knowledge and lessons (USAID, 2016). ASEAN believes that cooperating with the U.S and works with regional and international partners is beneficial because it makes ASEAN become easier to develop renewable energy by coordinated efforts and knowledge sharing rather than doing it alone. In brief, ASEAN and U.S work with other regional and international stakeholders which have same system or idea on renewable energy development to make it easier to get knowledge (such as data related to renewable energy) and other supports (such as expertise, technical support, and etc).

### **Conclusion**

Climate change phenomenon has been a problematic issue all around the world, including in the ASEAN region. Climate change itself is basically happening because of human daily activities using technologies that need fossil fuel to operate. Fossil fuel which also known as primary energy (such as oil, gas, coal, and etc) is harmful because it has detrimental effects for the environment which then threatening human survival in the earth. Primary energy produces so much pollutant through its greenhouse gasses (GHG) which released into the Earth's atmosphere. The GHG has the ability to trap heat and energy from the sun within Earth's atmosphere, thus the heat and energy can't be released back to space. Therefore, the Earth's temperature is rising which then leads to climate change.

Climate change is threatening ASEAN region because most of the ASEAN countries are non-landlock states. By this means, those countries are threatened by the rising sea levels because of the melting ice in the South Pole. Moreover, climate change is also threatening because it can bring up extreme weather events, transboundary haze caused by fires, and food security caused by unstable environment causes. Considering the impacts of climate change, ASEAN as an association who embrace countries around Southeast Asia has a responsibility to take actions in response to the phenomenon. In this case, ASEAN has done several efforts to combat climate change, including developing renewable technology to reduce the production of GHG through the implementation of

APAEC 2016-2025. On doing such effort, ASEAN cooperates with its dialogue partners, including the United States of America.

ASEAN and U.S are cooperating in two kinds of cooperation, which are U.S-ASEAN Energy Cooperation Work Plan 2016-2020 and USAID Clean Power Asia. Through these cooperations, ASEAN could gain benefits from the supports that the U.S provides in terms of assessment, institutional building, capacity building, investment, technical support, data sharing, policy-making and frameworks, and etc. These cooperations would help ASEAN to achieve its targets easier by 2025 based on the APAEC 2016-2025. By this means, ASEAN is willing to take the responsibility to secure its member states from the negative impacts of climate change by promoting the use of renewable energy.

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