CIGS seminar on energy and environment

Energy Outlook and Challenges of ASEAN

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ASEAN Overview

ASEAN, consisting of 10 nations, can be considered as a community of opportunities. Its total trade was $2.6 trillion in 2013, of which 25% was intra-ASEAN trading. It is a young society with a population of 625 million. The GDP of the total area grew with an annual rate of over 5% during the last 10 years, and is projected to grow with the same rate during the following couple of years. In 2015, the leaders of ASEAN nations declared what is known as the ASEAN Economic Community, which strives to set ASEAN as a single market and a production base for making it more economically diverse in terms of interacting with the global society.

ASEAN is also full of challenges. The biggest one is that more than 50% of its population lives in rural areas. Among them, 20% that amounts to nearly 100 million people do not have access to electrification.

ASEAN Centre for Energy (ACE)

ASEAN Centre for Energy (ACE) was established under the framework of ASEAN Summit. There are actually three arms under the ASEAN Secretariat. One talks about the political and security issues. The other is the economic community council and the third one is the social culture. The energy part of it sits in the second pillar and all the ministers come together to hold the ASEAN Ministers of Energy Meeting (AMEM). Just below that is a platform consists of all the Senior Officers Ministries of energy (SOME) in the 10 nations. ACE is sitting under the platform of SOME, and reports to the Governing Council that consists of the Secretary-Generals of the Ministries of Energy of the 10 nations. There are seven areas of focus under ACE.

ACE collaborates and does collaborations with many partners. One of it is basically through conducting capacity building in various areas of energy such as the energy challenges, renewable, energy efficiency, and so on. The collaborations are basically information exchange. Information exchange between our dialogue partners and international partners who have known a little bit better than us, who are well ahead of us, to sit down and build good practices and exchanges and these are done through workshops and things like that. ACE also conducts

a little bit of the strategy and the analytics that can actually inject into the need of the ministers on certain areas of common challenges that are done within ASEAN.

There are some programs ongoing. The first is a mitigation cooperation program through a platform called ASEAN+3. China, Korea, and Japan are closest neighbors to ASEAN and for the last 12 to 13 years, Japan has been a fantastic partner with ASEAN on this platform. The second is the energy efficiency and conservation program with ECCJ, the Energy Efficiency Council and Conservation Centre of Japan.

ACE has partnership with Germany as well. It is a technical cooperation together with the German financial, Ministry of Finance. During the past 3 years, cooperation on the renewable energy support has been conducted.

Recently, ACE signed a cooperation program with Canada on nuclear energy utilization. ASEAN is thinking of nuclear, how to do it? The first government that will go nuclear is Vietnam. They've already signed some Memorandum of Understanding with Japan and Russia and they most probably has its aims in 2027-28, they may be the first nation in ASEAN to actually go nuclear. Followed by perhaps will be the countries like Malaysia, Indonesia, Thailand. They are all watching and wanting to learn, but one of the major issues is public acceptance and building trust that you are capable of having a safe generating unit.

Energy Mix in ASEAN

The total primary energy supply (TPES) in ASEAN was 238 million tons of oil equivalent in 1990, 386 million tons in 2000, and 618 million tons in 2013. The number in 2010 is about 1.6 times as big as that in 1990, and the one in 2013 is also roughly 1.6 times of the one in 2010. The increase is slowing down but the rate is still very high. Another feature is that the sum of Indonesia, Malaysia, and Thailand occupies almost 70% of the total primary energy of ASEAN. So, what these countries actually plan and strategize and move will change the landscape of the ASEAN pie. We always look for leadership in each region and some of these nations would need to take up the leadership in driving the change or the transition of energy that is required as we move forward to a better and a cleaner environment.

The TPES of ASEAN in 2035 is projected to be 2.7 times of the data in 2013. The projection suggests to meet the large demand through increasing coal utilization. It's already happening. Even though the current decision will influence at least a 40-year timeframe and the coal is polluting, the principle of the Levelized Cost of Electricity (LCOE) will lead ASEAN to a coal-centered energy mix. At the meanwhile, the share of renewable energy will keep to around

10% of TPES during the following 20 years. The traditional biomass will play a similar role with other renewable energy due to that 20% of the population do not have access to electricity, while the share will decrease consistently. Developing nations in ASEAN have different challenges from developed nations.

Electricity Mix in ASEAN

For power generation, the renewable energy occupies 25% of the total installed capacity and 21% of total electricity generation, but most of them comes from hydro power of varies sizes. Geothermal in some countries such as Indonesia, Vietnam and the Philippines has been utilized. The Variable Renewable Energy (VREN) including wind and solar, which is actually intermittent and inconsistent and difficult to control, is still very small.

The electricity demand is projected to increase with an annual rate of 5.8% during the next 20 years. Depending on the projection, the fossil fuel will still be dominated until 2030s even though the renewable energy will increase steadily and nuclear will appear in the fleet from 2020s. The share will be 75% to 80%. As a result, ASEAN will become a net importer of gas.

ASEAN Energy Blueprint

Every 5 years, a blueprint called the ASEAN Plan of Action for Energy Cooperation (APACE) is endorsed as a 5-year plan. There are 6 specific areas including ASEAN Power Grid, Trans ASEAN Gas Pipeline, Coal & CCT, Energy Efficiency & Conservation, Renewable Energy and Civilian Nuclear, and an integrated area of Regional Energy Policy and Planning, in the latest APACE that was endorsed in Kuala Lumpur in 2015. The mission of the plan is enhancing energy connectivity and market integration in ASEAN to achieve energy security, accessibility, affordability and sustainability for all.

The first area is ASEAN power grid. ASEAN nations intend to connect electricity grid among all member states. There is already a master plan that identifies where the connections will be. There will be 16 major connections. Basically now, the northern region is getting well connected. The connections in south and east regions have not been taken place. Currently, there are about 3500 megawatts of exchange, but they are only bilateral. Now a multi-lateral trade of 100 megawatts from Laos to Singapore is being tested. There is not technical barrier because all of the grids are connected vertically. But there are a lot of hurdles because all the countries in ASEAN are regulated market except for Singapore and the Philippines. So there are lots of in terms of regulatory framework, institutional setup, third party access, the commercial contracts that are required to integrate regulated market. These are all in discussion. The

experiences of Japan may be helpful to learn how the trading is done. The eventual plan of the ASEAN power grid is to connect all of them by 2025. There are 4000 megawatts exchanged currently, and eventually the capacity will be enlarged to over 30,000 megawatts.

The next one is the connectivity of the ASEAN Trans Gas pipeline. Today, we have got 13 bilateral connections among 6 countries. There are connections between Myanmar and Thailand, Malaysia and Singapore, Indonesia and Singapore, and Indonesia and Vietnam. Besides the pipelines, there is also a plan of re-gasification terminals because that the pipelines are not very practical for some regions and gas import in the future.

The other two related areas are renewable energy (RE) and energy efficiency (EE). ASEAN has committed to increase the share of RE in the total primary energy to 23% by 2025. But in the projection of business as usual, the share will be only 10% even in 2035. So there has to be a concerted plan to have policy and framework in place to ensure renewable energy uptake in the total primary energy. So, it is necessary to examine technology development and EE. The energy intensity reduction is set at 20% by 2020. It has been reduced by 9.5% from 2005. 11 more percent is needed to actually catch-up for these targets.

On coal, the cumulative annual growth rate of coal is 7% in business as usual case. This is the highest growth rate among all the energy units. Therefore, the clean coal technologies are very important for every country. Today, the cleaner coal technology basically means super critical and ultra super critical boilers. From our understanding, 1% improvement of the boiler efficiency translates to 2% reduction in CO2 emissions. The efficiency of a subcritical boiler is about 37-38% and that of the ultra-super critical boilers used in Japan can go up to 45%.

The first commercial nuclear power plant is targeted to be operated in 2028 in Vietnam. Whether that's achievable or not, there are issues of capabilities, capacity and the strength for regional cooperation. Therefore, information exchange is very important. It has to be done on a transparent manner. If any catastrophic disaster is going to happen, everyone else is quite aware of it. Of course, this is a big concern because our closest neighbor, Fukushima has happened in 2011, and this has created a lot of thoughts to the ASEAN nations as well. Governments have actually stopped discussing nuclear programs for the last few years and now they are slowly re-starting. What Japan does in the next few years is very important to ASEAN because the experiences on driving people from a non-acceptable stage to be more acceptable to nuclear energy will be valuable.

Energy Challenges in ASEAN

It is important to consider the economic prosperity, social development and environmental preservation background for discussing the challenges of energy generation and utilization combined with sustainable energy development in ASEAN. Challenges come from three areas.

The first area is accessibility and affordability. 56% of ASEAN people are actually living in the rural areas, and most of them use traditional biomass. Therefore, the first priority is to ensure the ASEAN people actually electrify. At meanwhile, an appropriate incentive scheme is necessary for supply affordable electricity; no matter it will be RPS or FIT.

The second area is energy security that is necessary for every country. The optimal energy mix of a certain nation should be examined based on affordability and sustainability according to its development stage. The market integration and regional connectivity of gas and electricity shown in the blueprint is an important issue to improve energy security. Some certain parts of ASEAN have more renewable energy resources but the load centers are in different areas. If they are interconnected very well and can be injected into the bigger grid, the grid could include more RE to replace fossil fuels. The policy makers also must pay attention to establish regulatory and institutional frameworks.

The third area is sustainability. Technology is the main factor that is going to change our aspect of bringing cleaner energy. ASEAN is relying on more developed countries to bring their technologies into the area. At the same time, the knowhow and the requirement for the support system to make the technology sustainable over a long period has to be developed within ASEAN. There are also non-technical issues in terms of capacity building such as information exchange, database, R&D aspect and so on. ASEAN at some point needs to go into the development design of other technology issues that suits their countries.