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Securitizing energy:
Prospects and challenges for the Philippines

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Introduction: Demand outlook

The Philippines as a net energy importer renders it susceptible to oil supply disruptions, oil price fluctuations, and geopolitical dynamics affecting energy exporting countries.[2] Data from 2017 puts the imported energy source of the country at 49 percent, which is oil and coal imports comprising the bulk of energy generation.[3] This is further compounded by the fact that as of August 2017, the Philippines has the highest kilowatt per hour (kwh) cost in Southeast Asia "in terms of commercial and household rates at 7.49 per kwh and 8.90 per kwh, respectively."[4] In addition, the Philippines has one of the highest power rates across the three sectors of the industry—generation, transmission, and distribution.[5]

The Department of Energy (DOE) estimates that there will be a 6 percent annual increase in electricity demand from 2016 to 2040. This is spurred by the rising real income per capita of the average Filipino and the robust performance of the service sector.[6] This means that the electricity output of the country currently at 13,390 megawatts (MW) as of 2016 has to produce 49,287 by 2040 to meet the Philippines' energy demands, broken down as follows: 25,265 MW for baseload, 14,500 MW for mid-merit and 4,000 MW for peaking. An added complication is that additional infrastructure capacity is needed to sustain the growth of the economy. By DOE estimates Luzon will start to need additional capacity by 2023. In 2016 and 2017, Visayas and Mindanao needed additional capacity respectively.[7]

In May 2018, a presentation delivered by Undersecretary Jesus Cristino P. Posadas at the University of the Philippines enumerated the possible energy prospects of the country, with an estimated potential of 4,777 million barrels of fuel oil equivalent, 2.4 billion metric tons of coal, and various renewable energy (RE) sources. In 2015, the share of RE in the Philippines' gross generation of energy was at about 25 percent (20,963 gigawatt hours (GWh) out of 82,413 GWh), comparative to the European Union at 16.7 percent. Nonetheless, the foreseeable future for the country projects that its energy needs will be met by fossil fuels, specifically oil and coal,[8] which in 2016 constituted almost the entire 44.7 percent (10.8 percent coal and

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[2] Sahara Piang Brahim, "Renewable Energy and Energy Security in the Philippines," *Energy Procedia* 52 (2014): 480–486. 481.

[3] Jesus Cristino P. Posadas, "Energy Security in the Philippines" (PowerPoint presentation, Securitizing Energy: Prospects & Challenges for the Philippines, University of the Philippines, Diliman, Quezon City, May 3, 2018).

[4] "Philippine Electricity Rates Still Highest in Southeast Asia", Department of Energy, Philippines, accessed April 27, 2018, https://www.doe.gov.ph/energists/index.php/83-categorised/electric-power-industry/12561-philippine-electricity-rates-still-highest-in-southeast-asia/.

[5] Department of Energy, *Power Development Plan 2016–2040* (Taguig: Department of Energy, 2016).

[6] Brahim, "Renewable Energy," 483.

[7] DOE, "Power Development Plan 2016–2040."

[8] Brahim, "Renewable Energy," 483.

33.5 percent oil) of imported energy source. In the same year, oil and coal contributed to more than half of the country's gross generation of power (47.7 percent coal and 6.2 percent oil).

Renewable energy

The DOE has awarded a total of 877 RE projects with an equivalent potential capacity of 21,952.83 MW; hydropower and solar have the most awarded projects totaling 454 and 232; biomass and wind follows with 75 and 69 projects, respectively.[9] The passage of Renewable Energy Act of 2008 (Republic Act No. 9513) as well as the adoption of the National Renewable Energy Program (NREP) have prompted the aggressive RE development in the country—net metering, green energy option, and renewable portfolio standards (RPS) are among the RE policy mechanisms that provide a power of choice to consumers.

The geographical location of the Philippines creates an abundance of opportunity for the cultivation of geothermal energy. The country is currently third in the world in terms of generation capacity, only overtaken by Indonesia in 2015. Speaking at the same May 3rd lecture, Dr. Mario Aurelio, director of the UP National Institute of Geological Sciences (UP NIGS), pointed to anecdotal evidence that the decline of the geothermal sector is in part attributed to Philippine regulators' convoluted permitting process. According to Aurelio, there are too many steps needed before the permit is issued to explore and eventually generate power out of the geothermal system.[10] Improving the regulatory environ, therefore, must be one critical consideration in order to secure energy resources in the Philippines.

With regard to solar energy, it is clean but it has a relatively low capacity with respect to occupied area and this has implications for the economics of constructing a solar energy plant.

Natural gas

As for natural gas, gas-fueled power plants are more efficient and clean-burning in comparison to coal power plants.[11] The problem with natural gas for the Philippines actually arises from its external relations. According to Posadas, the DOE is following the Department of Foreign Affairs' moratorium on exploration in the contested territories in the West Philippine Sea, where the Malampaya gas field is closely located. In short, the Philippines is impeded from exploring possible gas fields near proven and existing gas deposits because of the territorial dispute with China. In addition, only the island of Luzon has gas-fueled power plants, but there has been no additional capacity installed from 2010 to 2015.[12]

In anticipation of the eventual depletion of the Malampaya gas field by 2024, the DOE has tasked the Philippine National Oil Company (PNOC) to build an integrated liquefied natural gas receiving and distributing facility with a reserve initial power plant capacity of 200 MW.[13] However, at the time of writing, there has been no announcement of possible alternative natural gas fields to replace the Malampaya gas field.

Nuclear energy

The Philippine Nuclear Energy Program Implementing Organization (NEPIO) was created in October 2016 through Department Order No. 2016-10-0013 to lead in the unified and coordinated efforts and activities relative to the conduct of various studies and research on nuclear energy development in the country.[14] Upon evaluation of the proposals for the possible rehabilitation of the Bataan Nuclear Power Plant (BNPP), the main challenges in developing nuclear energy arise from the country's geographical location which is frequented by earthquakes and volcanic eruptions.

[9] Posadas, "Energy Security."

[10] Mario A. Aurelio, "Notes on Philippines Energy Security: A Geoscientific Perspective" (PowerPoint presentation, Securitizing Energy: Prospects & Challenges for the Philippines, University of the Philippines, Diliman, Quezon City, May 3, 2018).

[11] Andrew Symon, "Fuelling Southeast Asia's Growth: The Energy Challenge." *ASEAN Economic Bulletin* 21, no. 2 (August 2004): 239–48, 241.

[12] DOE, "Power Development Plan 2016–2040."

[13] Posadas, "Energy Security."

[14] Ibid.

There are concerns about the status of Mt. Natib, the closest volcano to the nuclear plant, whether active or dormant. One of the issues concerning Mt. Natib is the fact that there is only one dataset available that provides the age of the volcano.[15] According to Aurelio, "[w]ithin the geoscientific community, determining the age of such features by sampling the latest ejecta of the volcanic edifice and determining the age."[16] If the volcano is not more than 10,000 years, then it is categorized as active. So far, the age of Mt. Natib as determined by geoscientists is 40,000 years, which is four times the threshold. Aurelio explained that those who were arguing that Mt. Natib is inactive based their arguments on this dating. The primary advantage of nuclear power is its high baseload capacity. This is power that is reliable and forms the base of the energy mix. However, there is a very high risk of disasters due to natural phenomena in the Philippines, such as earthquakes and volcanic eruptions.

Gas hydrates

Gas hydrates represent another major potential global energy source. But at the current rate of technology, it is still not in the energy mix of the Philippines. Aurelio describes gas hydrates as hydrocarbons trapped in ice formations or solid water cubes deep underneath the oceans, areas with very low temperature and high pressure, very deep into the sediments of the oceans, the water would be turned into solids, and inside the solids would be the hydrocarbons.[17] The idea is to recover the hydrocarbons from the ice formations or from the cubes to turn into a direct source of energy. So far research shows that the amount of gas derived from a cube—a given volume—will multiply about 163 times its size once it is released. However, the exploration of such a resource is limited to capable, developed countries.

In terms of the potential for exploration, the Philippines can employ the same technique used in conducting exploration of traditional petroleum oil and gas, which means conducting surveys, seismic reflection gathering, interpreting, and processing, using expertise already developed in the Philippines. Another question would be on how to maximize the benefit of such resources. The nature of gas hydrates, as they are contained in ice cubes, requires one to release the gas in order to take advantage of them. They exist in high pressure and low temperature conditions which means that there will be consequences when one attempts to release the gas. At present, there is no guarantee about the percentage of the gas that could be recovered, as there is no technology yet that gives quantifiable measurement on the extraction ratio. As it stands today, the economic viability of gas hydrates to produce energy is still under question, but there are countries that are well-advanced in the exploration and are moving towards exploitation.[18]

Capacity building

The Philippines' energy policy goals include making energy prices affordable and supplies secure, in the hopes of making the country competitive and attractive to business. Important as these may be, these are not the only considerations, as the country has commitments to limit its carbon footprint, being one of the most vulnerable countries to climate change. Given the resources available in the country (geothermal, hydroelectric, solar, and biomass), there is potential to increase the share of renewable energy. In order to meet the energy needs of the country, the notion of energy security should include dimensions related to availability, affordability, and environmental impact.[19] Increasing renewables also makes the country less vulnerable to price fluctuations of the oil market. The Philippines must take all of these into account in order for the country to meet its growing demands while being economically competitive and compliant to its international obligations. Therefore, an effective national strategic policy on energy should be holistic

[15] Aurelio, "Geoscientific Perspective."
[16] Ibid.
[17] Ibid.
[18] Ibid.
[19] Benjamin K. Sovacool. "Reassessing Energy Security and the Trans-ASEAN Natural Gas Pipeline Network in Southeast Asia." *Pacific Affairs* 82, no. 3 (2009): 467–86.

and forward-looking, emphasizing inclusive and sustainable growth.

Renewable energy in the Philippines is expensive. A contributing factor is the country's dependence on foreign technology[20] and high value of the materials used in production. In order to augment the cost of RE the government has to invest in the development of local technologies or establish financial and non-financial incentives for the incubation of private RE companies in the country.

The affordability of energy services is partially determined by the operation and viability of power plants.[21] In this aspect, under the "Build Build Build" project of the current administration, the construction of additional environmentally friendly power plants, specifically in Visayas and Mindanao, could help secure the country's energy needs. The age of the geothermal power plants in both Visayas and Mindanao have exceeded their economic life.[22] Because of their age the efficiency of these older power plants come into question.

One of the primary tenets of energy security is securing sufficient and uninterrupted access to fuel sources, with "relative independence and diversification of energy fuels and services."[23] Based on the Philippines' existing energy infrastructure and demand, it is heavily reliant on oil and coal imports. Coal is the most productive in terms of gross generation. Though it only contributes 22 percent of supply it accounts for 44.7 percent of the total energy output in 2016.[24] Even though the country has 13 coal basins with a combined potential of 2.4 billion metric tons, and 66 coal operating contracts, the coal in the Philippines is of lower quality and must be augmented with imported high grade coal for energy production.[25] The major drawback of coal is that it is highly pollutative, but it is one of the most economically viable options for energy generation. In order to maintain the momentum of the country's economic growth and the resulting energy needs of industries, coal power plants have become indispensable. However, this should only be considered as a short term stop-gap solution as better alternatives in technologies and sources of energy are explored.

Oil constitutes only 6.2 percent of the gross generation of energy in 2016. However, the bulk of energy supply imports is oil at 33.5 percent. One of the primary use of oil-based energy is diesel generators for isolated off-grid locations, which are expensive for poor rural communities and are environmentally unfriendly.[26] A "hybrid energy system" comprising of multiple sources of RE present the most viable option for off-grid electrification to provide continuous and affordable energy generation. This is in line with the DOE's plan that seeks to develop separate off-grid electrification to achieve total household electrification by 2023-2040.[27] In addition, since poverty eradication continues to be a policy agenda of the Philippine government, the energy strategy should focus on delivering energy for productive use to the last-mile poor.[28]

The Philippine government has created a mechanism to encourage investment in RE, such as the National Renewable Energy Program, launched in 2014, to lower the cost of investment for the private sector in RE by tax credits and cash incentives, and non-fiscal incentives such as the Feed-in-Tariffs (FiT) regime that promotes change of the energy mix towards renewables by "guaranteeing prices in the form of long-term contracts to RE producers, typically based on the cost of generation of each technology."[29] The weakness of this approach is that it concentrates on increasing megawatt capacity (the amount of power generated) without

[20] Brahim, "Renewable Energy," 484.
[21] Sovacool, "Reassessing Energy Security."
[22] DOE, "Power Development Plan 2016–2040."
[23] Sovacool, "Reassessing Energy Security," 471.
[24] Jesus Cristino P. Posadas, "Philippines Energy Plan 2017–2040," August 8, 2017, ACD Conference towards Energy Security, Sustainability and Resiliency, Be Grand Hotel, Bohol, PowerPoint Presentation.
[25] Posadas, "Energy Security."
[26] Fernando Roxas, and Andrea Santiago, "Alternative Framework for Renewable Energy Planning in the Philippines," *Renewable and Sustainable Energy Review* 59 (2016): 1396–404, 1397.
[27] DOE, "Power Development Plan 2016–2040."
[28] Roxas, "Alternative Framework," 1400.
[29] Ibid., 1397.

due consideration to how the power is used. Electrification projects should be complimented with programs that enable newly electrified communities with the means to use these resources in increasing their productivity.

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