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Mapping the Energy Sector Issues in the Philippines

Adoracion M. Navarro and Jethro El L. Camara

CONTACT US:

RESEARCH INFORMATION DEPARTMENT
Philippine Institute for Development Studies

18th Floor, Three Cyberpod Centris - North Tower
EDSA corner Quezon Avenue, Quezon City, Philippines

publications@pids.gov.ph
(+632) 8877-4000

https://www.pids.gov.ph

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Adoracion M. Navarro
Jethro El L. Camara

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

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Abstract

Given the frequent observation that the Philippine energy sector is complex, this study provides a structured review of issues in the sector. The structured review method is usually employed to systematically introduce readers to the complexities of a broad topic, such as the convolutions of a problem, the intricacies of a theme or sector, or the conjectures about a new trend or technology. The study starts with a discussion of the physical flows of energy via a Sankey diagram of energy flows in the Philippines, and then proceeds to describe the upstream oil, gas, and coal industry, the downstream oil industry, the renewable energy development industry, and the electric power industry. The discussion includes the market structure, regulatory framework, and issues in each industry. As the analysis shows, structuring the understanding of the energy sector by component industry is a useful approach to untangling the complexities of the sector. As part of the concluding remarks, the study claims that another useful approach is to look at problems in the energy sector as cross-cutting concerns or cutting across several industries, such as the energy affordability problem. All the issues identified in the study can be considered future research areas by public and private entities interested in Philippine energy sector research because all those issues are affecting the country's energy security. Nevertheless, what may be considered as priority future research areas at present are energy affordability concerns and issues that can be addressed by amending the EPIRA.

Keywords: energy, upstream industry, downstream oil industry, renewable energy, electric power industry, energy security, energy affordability, clean energy transition

Table of Contents

1. Introduction **1**
1.1 Objectives 1
1.2 Research method 2
2. Physical flows of energy **2**
3. Upstream oil, gas, and coal industries **4**
3.1 Upstream oil and natural gas 4
3.2 Upstream coal 5
3.3 Current issues in upstream oil, gas, and coal industries 6
4. Downstream oil industry **8**
5. Renewable energy industry **9**
5.1 Biofuels industry 10
5.2 Renewable energy in power generation 12
6. Electric power industry **14**
6.1 Structural overview of the industry 15
6.2 Power generation 18
6.3 Power transmission 20
6.4 Distribution 21
6.5 Wholesale Electricity Spot Market 25
6.6 Bilateral Contracting Market 25
6.7 Retail electricity supply market 28
6.8 Current issues in the industry 29
7. Conclusion **32**
Bibliography **34**

List of Tables

Table 1. Summary of awarded and registered RE projects as of December 31, 2022 13
Table 2. Market concentration per grid, 2022 19
Table 3. Installed and dependable capacity per technology, 2022 20
Table 4. Transmission charges per grid, November 2023 21
Table 5. Total energy consumption (GWh) by type of customer, Philippines, 2018-2022 21

List of Figures

Figure 1. Sankey diagram of energy flows (in million tons of oil equivalent) in the Philippines, 2020 3
Figure 2. The electric power industry in the Philippines: Pre-restructuring 16
Figure 3. The electric power industry in the Philippines: Post-restructuring 17
Figure 4. Distribution utilities by type per grid, Philippines 23
Figure 5. Electricity consumption by type of distribution utility per grid, Philippines, 2020 24
Figure 6. Supply-demand profile of distribution utilities, Luzon, 2020-2030 26
Figure 7. Supply-demand profile of distribution utilities, Visayas, 2020-2030 27
Figure 8. Supply-demand profile of distribution utilities, Mindanao, 2020-2030 27
Figure 9. Supply-demand profile of distribution utilities, Philippines, 2020-2030 28
Figure 10. Generation Rate, DU Average vs Retail Weighted Average, July 2022 to September 2023 29
Figure 10. Household electrification (%) by major island region, Philippines, 2023 32

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Adoracion M. Navarro and Jethro El L. Camara*

1. Introduction

This study is basically a structured review of issues in the energy sector, which is being undertaken in response to the frequent observations by Philippine policymakers that the energy sector is complex. Indeed, understanding the complexities of the energy sector is challenging and it requires knowledge in engineering, economics, and business. Basic engineering concepts on physical energy flows therefore need to be presented to policymakers in a straightforward manner to explain what the energy subsectors are and how they relate to each other. Economists' theoretical frameworks (e.g., incentives theory to analyze competition and industrial organization theory to analyze markets) also need to be used in framing and interpreting firm and consumer behavior so that overviews without oversimplification can be generated for policymakers. Moreover, the big geopolitical, technological, and economic issues affecting energy trends, and the consequential energy trends influencing geopolitical, technological and economic decisions, need to be uncovered.

This study is expected to be relevant to Philippine policymakers because the organized presentation of policy issues can help them prioritize the needed actions. It is also expected to be relevant to policy researchers in identifying issues that need to be articulated more fully in future studies to help policymakers understand the issues better. One should note, however, that the Philippine energy sector is dynamic and energy policy developments are moving. It is therefore to be expected that the list of issues produced in this study is not an exhaustive listing.

1.1 Objectives

This research generally aims to describe the Philippine energy sector in a structured way and determine the issues affecting the attainment of the energy sector objectives.

Specifically, the research aims to:

a. explain the Philippine energy subsectors based on an understanding of the physical flows of energy, from primary energy sources, secondary or transformed energy, and final energy for end-users' consumption;

b. describe the market structure in selected industries under the energy sector and clarify the regulation and governance mechanisms in these markets;

c. articulate the issues in the sector and chart future areas of policy research.

* Philippine Institute for Development Studies Senior Research Fellow and Research Analyst, respectively. Email addresses: anavarro@pids.gov.ph, jcamara@pids.gov.ph.

1.2 Research method

This research employs the structured review method. Conducting a structured review of issues or challenges is usually employed to systematically introduce readers to the complexities of a broad topic, such as the convolutions of a problem (e.g., corruption), the intricacies of a theme or sector (e.g., financial economics or financial sector), or the conjectures about a new trend or technology (e.g., big data). For instance, Bardhan (1997) used this method to give a critical review of corruption and development. The study discussed the ways corruption damages the economy, why and how corruption differs across societies, and the policy issues related to these. Its approach is analytical and speculative because of the absence of empirical data on corruption in the 1990s.

Another example is Haruna (2019), which reviewed the issues in the financial market-monetary policy nexus in developing countries and emerging economies. The review covered an eight-year period right after the 2018 global financial crisis and relied on 130 peer reviewed articles in the Journal of Economic Literature Classification System. As part of the outputs, the study discussed the research areas that have received great attention and those that have received little interest. It then highlighted future research areas such as macroprudential policy tools, non-bank financial institutions, and corporate governance.

When big data became a trending topic, Kalra, Yadav and Chauhan (2014) was one of the studies that attempted to make understanding the new trend less overwhelming. The study first defined what big data means and discussed dimensions such as volume, velocity, variety, variability, and complexity. It then summarized the issues and challenges that companies face when tackling big data, arguing that appropriate solutions will follow as users become aware of these challenges.

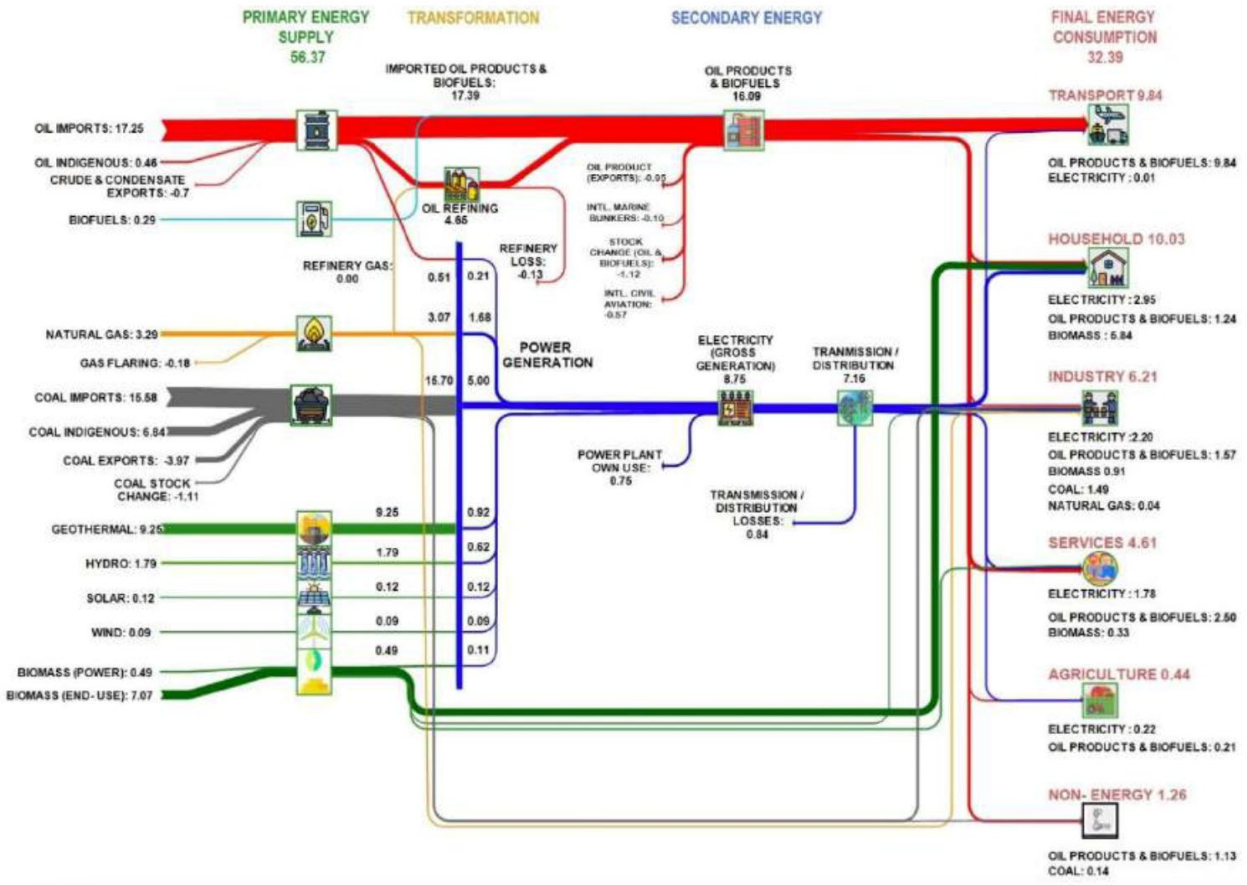
These examples demonstrate that a structured review of issues is a useful tool for comprehending difficult concepts and discerning structures, relationships, and roles so that these can serve as organized inputs to problem-solvers or policymakers in the public and private spheres. The review method being applied in this study does the same. In a structured manner, this study explains concepts on energy forms and energy subsectors through what is called a Sankey diagram of energy flows, and clarifies competition and regulation in energy industries in the various stages of energy flows by tracking the market structures and regulatory and governance mechanisms. The expected impact is that this structured approach would aid Philippine policymakers in analyzing problems and challenges that cut across subsectors and industries, such as the high price of electricity, energy insecurity, and clean energy transition.

2. Physical flows of energy

The physical flows of energy establish the interrelationships between subsectors and markets. A better understanding of these interrelationships can lead to a better understanding of the Philippine energy sector objectives like the broader goal of ensuring energy security and specific goals on reducing the price of electricity and advancing the clean energy transition. Figure 1 below shows

the Sankey diagram of energy flows in the Philippines as of 2020. Sankey diagrams[1] are a useful tool to visualize energy flows and depict energy balance.

Figure 1. Sankey diagram of energy flows (in million tons of oil equivalent) in the Philippines, 2020



Source: DOE (2021a).

On the leftmost side is primary energy supply comprising of fossil fuel (oil, gas, coal) and renewable (geothermal, hydro, solar, wind, and biomass, including biofuel[2]) energy resources. These are either indigenous resources or imported. A small volume of the indigenous resources are exported, such as crude, condensate, and coal. In 2020, the total primary energy supply in the Philippines was 56.37 million tons of oil equivalent (MTOE).

Transformation of energy happens to convert the primary energy supply to energy that can be traded to meet intermediate demand (e.g., bulk refined petroleum and biofuels demand of retail pumps, and wholesale electricity demand of distribution utilities and retail suppliers). The

[1] The Sankey diagram is named after Matthew Henry Phineas Riall Sankey who introduced its use in 1898 to depict steam flows and the energy efficiency of a steam engine. The defining characteristic of the diagram is that the width of the line represents the volume of the flow.

[2] Biofuels like ethanol and biodiesel are types of biomass.

transformation processes include oil refining and electric power generation. This can be seen in the middle part of the Sankey diagram in Figure 1.

On the rightmost side is final energy consumption, which consists of the final energy use by various sectors, such as households, transportation, industry, services, and agriculture. The DOE also categorizes under end-use consumption some volumes of non-energy use, specifically the use of coal and oil as raw materials or feedstock for manufacturing synthetic or chemical products. In 2020, the final energy consumption in the Philippines was 32.39 MTOE. This is less than the primary energy supply because of exports and losses that occurred during primary energy development, transformation, and distribution. The net accounting includes exports of crude, condensate, and coal, as well as gas flaring, oil refinery losses, power plants' own-use energy, transmission losses, and distribution losses.

3. Upstream oil, gas, and coal industries

The upstream part of the Philippine energy sector had traditionally been discussed as consisting of oil, gas, coal and geothermal resource exploration and development. But since the enactment of the Renewable Energy Act in 2008, the regulatory framework for geothermal resource development has changed. In what follows, the focus of discussion is the upstream industry for fossil fuels, the basic regulatory framework for which has barely changed since the 1970s. The discussion of geothermal resource development is covered in Section 5.

3.1 Upstream oil and natural gas

Participating in the upstream oil and natural gas industry in the Philippines involves competitive auction or limited competition via direct negotiation. The primary guiding legislations are Presidential Decree (PD) 87, PD 1459, and PD 1857. PD 87 or the Oil Exploration and Development Act of 1972 provides that public bidding be the default mode for the exploration, extraction, and development of petroleum resources; direct negotiation can be resorted to in specific instances.[3] The auction is not a price auction but an awarding system based on set criteria, a system that is sometimes called "beauty contest auction" in economics. The criteria are usually legal qualification, work program, technical qualification, financial qualification and the highest ranked applicant for contract award is selected.

Aside from crude oil, natural gas is covered by the regulatory framework for petroleum service contracts because natural gas is a form of petroleum and can occur in association with deposits of crude oil. PD 1459, decreed in 1978, authorizes the Secretary of Energy to enter into petroleum service contracts and re-negotiate existing ones subject to limitations. RA 7638 or the DOE Act of 1992 supports this as the law mandates the DOE to "establish and administer programs for the exploration, transportation, marketing, distribution, utilization, conservation, stockpiling and storage of energy resources of all forms", among other functions (RA 7638, Section 5.c). PD 1857,

[3] For instance, under the DOE's circular DC 2023-12-0033, an operator of a petroleum service contract with potential output that would last beyond the remaining production term of the contract may apply for direct negotiation for a development and production contract provided that the application is made before the expiration of the current term.

decreed in 1983, amended certain sections of PD 87 and provided new incentives to petroleum service contractors.

The DOE implements a service contract system for the exploration (also called "prospecting"), development and utilization (also called "exploitation") of oil and gas resources through the Philippine Conventional Energy Contracting Program (PCEP). Petroleum service contracts need to be defined over large service areas or service blocks because the activities involve large-scale capital-intensive operations, especially prospecting, over extensive areas. The modes of competition for petroleum service contracts are as follows: (a) prospective participants can bid for pre-determined areas published by the DOE; and (b) applicants can nominate areas of interest and, upon approval by the DOE, publish these during a 60-day challenge period. Challengers will have to beat the original proponent based on the criteria set by the government. The pre-determined areas and nominated areas can be onshore and offshore and up to the country's exclusive economic zone.

The current round of PCECP started in 2018 and offered 14 pre-determined areas, with Area 6 and Area 7 being in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) (DOE 2018 and 2021a). As of December 2020, there were 19 active service contracts, consisting 7 contracts in the production phase, 7 contracts in the exploration phase, 4 contracts under force majeure, and 1 contract under consideration. New exploration activities are needed to increase the oil reserves from 48.7 million barrels (or 6.8 MTOE) in 2022 to up to 116 million barrels (or 16.2 MTOE) by 2040. Natural gas reserves, particularly the ones in the Malampaya gas field, are currently getting depleted but new exploration activities can be targeted to attain proven reserves of 5.9 trillion cubic feet by 2040 (DOE 2021a).

The government participates in oil and gas exploration and development through the state-owned Philippine National Oil Company (PNOC), specifically through its subsidiary PNOC-Exploration Corporation (PNOC-EC).[4] The PNOC-EC is currently either the operator or partner in eight eight petroleum service contracts covering an aggregate area of 57,630 square-kilometers (km^2) (PNOC-EC 2023).

3.2 Upstream coal

The Philippine coal contracting system also involves competition, under the legal framework provided by PD 972 or the Coal Development Act of 1976, as amended by PD 1174. PD 972 allows both bidding and negotiation for developing prospective coal production areas. The bidding system is also through submission of applicants of their qualifications and the government's evaluation of these using set criteria. Under Section 8 of PD 972, coal operating contracts are to be approved by the President.

DOE Circular DC 2017-09-0010 guides the current PCECP for coal. Under this PCECP, 4 private companies applied for 6 coal areas, with 2 companies getting interested in 2 areas each, and the state-owned PNOC-EC nominated 2 coal blocks. The DOE also reports that there are 17 coal regions in the country with a total coal resource potential of 2.4 billion metric tons (or 1,266.7

[4] PNOC has two subsidiaries, the PNOC-EC and the PNOC-Renewables Corporation.

MTOE). Developing these would necessitate large investments. For instance, the existing and new exploration coal contracts need a total investment of PHP12.9 billion for the exploration of 288 million metric tons of coal reserves, and the coal contracts under development and production need PHP643.2 billion total investment to produce an additional 282 million metric tons of coal (DOE 2021a).

As of December 2020, there were a total of 32 coal operating contracts under the PCECP for coal, consisting of 22 contracts in the development and production stage and 10 contracts in the exploration stage. Moreover, the DOE monitored the coal-related activities of 50 small-scale coal miners, 59 coal traders, and 302 coal end-users (DOE 2021a).

3.3 Current issues in upstream oil, gas, and coal industries

In what follows and in the succeeding sections, the listing of issues serves as a guide for sifting through the current and evolving discussions of concerns by Philippine energy stakeholders, such as those mentioned in legislative investigations, regulatory hearings, and news articles, and is not intended to be an exhaustive listing of issues. Focus group discussions held on December 14 and 15, 2023 aided the final selection of issues that are highlighted in this study.[5]

In the upstream oil, gas, and coal industries, the current issues are as follows.

a. The country cannot optimize energy resource exploration in our exclusive economic zones because of hurdles to maritime activities in the West Philippine Sea. In 2014, former President Benigno Aquino III issued a moratorium on exploration because of the Philippines' pending arbitration case against China on disputes regarding maritime entitlements in portions of the South China Sea. The international arbitral tribunal ruled in favor of the Philippines in 2016. Former President Rodrigo Duterte then lifted the moratorium in 2020 and firms with service contracts resumed preparations for exploration activities. But in April 2022, the DOE asked the firm conducting oil and gas exploration in offshore areas near Palawan to suspend its operation. Shortly thereafter, it became the government's position that firms should suspend exploration activities pending the go signal from the cabinet's security cluster (formally named the Security, Justice and Peace Coordinating Cluster of the President's cabinet). The security cluster's apprehension is in turn due to the continuing multiple presence of China's vessels in the West Philippine Sea. Nevertheless, President Ferdinand Marcos included in his 2023 State of the Nation Address a statement saying that oil and gas exploration in other parts of the country would be pursued.

b. Investment uncertainty currently hounds petroleum service contracts due to the lack of definite decision on the inclusion of the income tax in the calculation of the 60 percent profit share of the government. This stems from the 2015 decision of the Commission on Audit (COA), which it upheld in 2018, to exclude income taxes in the 60 percent share

[5] In the focus group discussions (FGD), the authors presented to FGD participants the discussion of the structures per energy industry or subsector and the preliminary list of issues. They then asked the participants to comment on the structures and validate, negate or add to the list of issues.

calculation in the case of the Malampaya natural gas contract. The conflict stems from the COA's application of PD 87, which states that the contractor's service fee "shall not exceed forty percent of the balance of the gross income after deducting the Filipino participation incentive, if any, and all operating expenses…" (PD 87, Section 8, item k-2). As income tax is not an operating expense, the inclusion of this in the 60 percent share unduly increases the contractor's share to beyond forty percent, the COA argued. The contractors and the DOE, on the other hand, have been defending the inclusion of income taxes based on PD 1459, which specifically stated that in petroleum service contracts, "the share of the Government, including all taxes, shall not be less than sixty per cent of the difference between the gross income and the sum of operating expenses and such allowances as the Secretary of Energy may deem proper to grant"(PD 1459, Section 1, item a). The contractors filed arbitration proceedings before the International Chamber of Commerce (ICC) in Singapore and the World Bank Group's International Center for Settlement of Investment Disputes (ICSID); the ICC had already ruled in favor of the contractors but the ICSID has not yet released a decision. The case is also currently under examination by the Philippine Supreme Court due to the petition for certiorari that the contractors filed. In the meantime, the DOE tries to minimize the uncertainty faced by potential investors by including in its model petroleum service contract a caveat that the interpretation on the inclusion of the income tax in the government share may change if the applicable laws, rules and regulations change. Specifically, the model contracts states that "The Philippine Income Tax shall be part of the Government Share subject to applicable laws, rules and regulations" (DOE 2019, Section 11.01).

c. The petroleum service and coal contracting process for areas in BARMM has been suffering delays. It was only on July 6, 2023 that the Intergovernmental Energy Board's "Circular Prescribing the Guidelines on the Petroleum Service Contracts and Coal Operating Contracts in BARMM" was issued. The circular provides the framework for the joint award by the national government and the BARMM of petroleum service and coal operating contracts in the BARMM areas.

d. The natural gas reserves from the existing Malampaya gas field are nearly depleted and the country faces the risk of high prices of imported liquefied natural gas (LNG). The commercial reserves of Malampaya is expected to last until 2027 only and imported LNG will have to be relied on to fuel the generating plants that rely on Malampaya, at least until additional reserves are discovered. The sufficiency of gas supply can be resolved by the timing of investments on and operations commencement of LNG facilities. But the prospect of high prices is in the horizon given that global competition for natural gas is recently increasing as a result of more countries opting for natural gas as bridge fuel in the clean energy transition. Asia in particular is already facing high prices as European demand competed against Asian demand when the Russia-Ukraine war disrupted international gas trading.

e. The midstream to downstream natural gas legislative framework is still missing. For the further development of the upstream natural gas industry, the midstream to downstream industries must be developed as well. The accommodation and utilization of LNG imports

also need clearer governance mechanisms. Permitting guidelines and investment incentives in various parts of the natural gas supply chain need to be clarified.

f. The general shift away from coal and toward cleaner options, starkly communicated by the government through the moratorium on greenfield coal power plant projects, has introduced investment uncertainty in new exploration and development because of the risk of upstream coal projects being stranded. However, this risk is not imminent because, at least in the short to medium term, there is adequate market for newly developed coal as signaled by the country's high dependence on coal imports for its existing coal-fired power plants.

g. The opposition of environmental groups to fossil fuel resource extraction or importation projects signals either the ineffectiveness of communications campaign or inadequacy of compensation mechanisms and preparations on the ground, or both. For instance, residents and church leaders are opposing a coal mining project in Brgy Ned, Lake Sebu, South Cotabato due to the environmental destruction that the project brings and the purchase of land at a price lower than what the residents will need to buy land for relocation (Saludes 2022).

4. Downstream oil industry

The discussion here covers only the oil industry and not the natural gas and coal industries. In the case of coal, the major use of it is midstream and that is for power generation, which is discussed in Section 6. The non-energy use of coal in the manufacturing sector is only a small portion of the total coal volume and any issue related to this type of use is better discussed in manufacturing-related policy papers. In the case of natural gas, there are no final use products yet at the household or enterprise level but developing the value chain downstream is part of the government’s roadmap for natural gas.

The downstream oil industry is a competitive and deregulated industry. Price deregulation started in 1998 through RA 8479 or the Downstream Oil Industry Deregulation Act. As of end-2021, 400 firms are participating in the market. Petron Corporation has the largest share at 19.2 percent, followed by Pilipinas Shell Petroleum Corporation at 15 percent, and Chevron Philippines (distributor of Caltex fuels) at 5.3 percent; numerous other firms comprise 60.6 percent of the market. These firms are distributing their products through 10,802 liquid fuel retail outlets spread across the archipelago. There is only one refinery in the country, owned by Petron Corporation, and, thus, the Philippines relies on imports not only for most of its crude oil requirements but also for refined petroleum products. Navarro (2023) provides further discussion on the history of the downstream oil industry and the results of improved competition after deregulation.

Some of the critical issues in the industry are as follows.

a. The high import dependence for crude oil and refined petroleum products of the Philippines contributes to its energy insecurity. Oil supply imports comprised 98 percent of the total oil supply in the country in 2021. Further exploration and development of indigenous oil reserves can reduce this dependence but the problems in petroleum service contracting, as discussed above, is delaying progress.

b. The country is highly dependent on the Middle East for oil imports, making it highly vulnerable to geopolitical risks in the region. Navarro et al. (2023) showed calculations using DOE data that the Philippines had been sourcing most of its crude oil imports from the Middle East. Oil imports from the Middle East as a proportion of total oil imports reached as high as high as 95.70 percent in 2021.

c. Price spikes or periods of high prices affect public sentiment and almost always lead to calls by certain stakeholders for the repeal of the downstream oil industry deregulation law. A recent example of this is the period of sudden increases and highly volatile prices in the aftermath of Russia's invasion of Ukraine in February 2022. Navarro (2023) opined that the calls for repeal of the deregulation law means that the background of the need for deregulation and the objectives of this policy are not well understood by the public and that the government needs to improve its communication campaign regarding this.

d. To reduce the price of oil products, the increased blending of biofuels into refined petroleum is being pushed but the biofuels industry has its own set of problems, as discussed in more detail in the next section.

5. Renewable energy industry

Renewable energy source development in the Philippines is primarily for biofuels production and electric power generation. The biofuels industry is intricately linked to the downstream oil industry because starting in 2007, the downstream oil industry was mandated to use blending of biofuels in the refined liquid petroleum being sold in the market. The regulatory environment, however, is different from the downstream oil industry, as discussed below.

Renewable energy for power generation is part of the electric power industry, which is discussed in the next section (Section 6). But renewable energy development needs to be discussed in more detail, as is done below, because the Renewable Energy Act of 2008 introduced new market mechanisms and regulatory structures that are not covered by the major electric power industry restructuring in 2001.

5.1 Biofuels industry

The market structure in the biofuels industry can be characterized as competitive, and prices are not regulated but regular price monitoring is being done by the government. The industry was developed when RA 9367 or the Biofuels Act was enacted in 2007.[6] The law mandated the blending of biofuels in liquid fuels for motors and engines and created the National Biofuels Board (NBB), chaired by the DOE. Currently, the mandated ethanol blend for gasoline is 10 percent (called E10 blend), and the mandated biodiesel blend for diesel is 2 percent (called B2 blend).

Biofuel producers, which supply the procurement needs for bioethanol and biodiesel of oil companies, need to get accreditation from the DOE and maintain quality standards per the Philippine National Standard (PNS) for biofuels. As of September 30, 2023, the accredited biofuel producers consist of 11 biodiesel producers with a combined capacity of 617.9 million liters per year, and 13 bioethanol producers with a combined capacity of 466 million liters per year (DOE 2023a and 2023b).

Although quality is regulated, pricing is not. But biofuel producers need to report their weekly pricing to the DOE. Given that local biofuel production is heavily influenced by the availability of feedstock, the biofuel price is linked with the fluctuations in sugar prices in the case of bioethanol and coconut prices in the case of biodiesel. The Sugar Regulatory Authority (SRA) publishes the bioethanol reference price, which is the basis of the NBB in publishing the monthly price index for bioethanol every first day of the month as mandated by the DOE Department Circular 2011-12-0013. Biodiesel pricing uses crude coconut oil price as reference and the government relies on the industry's self-monitoring of price through the price monitors of the United Coconut Association of the Philippines.

The following are some of the issues in the biofuels industry:

a. Domestic ethanol supply cannot meet demand because of insufficient feedstock (molasses and sugarcane juice), in turn due to the sugar industry's competitiveness problem. The competitiveness of the sugar industry is declining because of the reduction in sugarcane areas and the decline in productivity, among other issues. The insufficiency of feedstock is driving domestic ethanol prices up. The United States Department of Agriculture-Foreign Agricultural Service (USDA-FAS) and Global Agricultural Information Network (GAIN) forecasts Philippine sugarcane production to remain low and feedstock supply for fuel ethanol production to remain limited (USDA-FAS and GAIN 2023).

b. Imported ethanol is cheaper than domestically produced ethanol but the price differential cannot be fully internalized as a gain from trade because under RA 9367, oil companies can only import ethanol when local supply is projected to be insufficient. The NBB determines the adequacy of local production by requiring all producers and distributors of biofuels to submit information on their inventory, actual sales, and projected sales. As long as the domestic cost of producing ethanol remains elevated and not at par with that of

[6] The law mentions the title "Biofuels Act of 2006" but the law was actually approved in January 12, 2007.

imported ethanol, the consumers are deprived of lower prices arising from the market interactions.

c. Theoretically, the higher price of domestic ethanol relative to imported ethanol is supposed to encourage more investments in ethanol production. Huge investments in ethanol plants had actually been made, but through the years, underutilization of production capacity despite huge demand for ethanol had been a problem.[7] In 2022, the 13 ethanol distillers had a total rated capacity of 466 million liters, but produced only 374.78 million liters, which means the capacity utilization rate was 80.4 percent (USDA-FAS and GAIN 2023, citing DOE and SRA as source of basic data). The underutilization of existing capacity despite large demand for ethanol is in turn due to the limited availability of feedstock, as mentioned in item (a) above. Yet the importation of molasses for local ethanol production is not allowed under current rules. Relaxing the import restriction can be a solution, but allowing this can be challenging for the government as the SRA will have to be effective in monitoring the utilization of imported molasses for biofuels production vis-a-vis other uses such as food and non-fuel alcohol production. The industry associations involved in the supply chain for biofuels in fact have diverging viewpoints on this, as can be gleaned from their recent pronouncements--the Ethanol Producers Association pushes for allowing the importation as it forecasts a shortage of molasses (Rivera 2023), but the Philippine Sugar Millers Association opposes this and is saying there is no national emergency because "local molasses production is on the upswing" (Lagare 2023).

d. Other agriculture products such as cassava, sweet potato, nipa, and corn are technically eligible as feedstock for fuel ethanol but using these raises other concerns. For example, the existing ethanol plants are equipped to process molasses and sugarcane juice only and to be able to use other kinds of feedstock, these existing plants need to be reequipped with other technologies (corn processing and fermentation technologies in the case of corn). Moreover, food security concerns may arise when other kinds of feedstock deemed important as food source, such as corn and cassava, are diverted to biofuel production without the concomitant increase in crop production.

e. There are proposals to increase the mandatory blending requirement to reduce prices under the current high-price environment for fossil fuel, but there is no guarantee in the future that the net effect will be positive as local biofuel prices had historically been higher than international prices. DOE representatives said that a proposal to increase the mandatory blending of biodiesel to B3 (3% biodiesel mix) and a proposal that oil companies' voluntarily increase their ethanol blending up to E20 (20% ethanol mix) are being reviewed.[8]

f. The mandatory sustainable aviation fuel phase-in will start in 2027, in accordance with the International Civil Aviation Organization (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation. The Philippines is a member of the ICAO. However,

[7] In biodiesel, there is also overcapacity of plants but there is abundant supply of coconuts in the Philippines at present and any future increase in demand and consequent rise in capacity utilization can likely be accommodated by feedstocks.

[8] In discussion with FGD participants on December 15, 2023.

the issue of fuel supply availability and the price effect of the mandatory utilization on the traveling public have yet to be studied by the Philippine government.

5.2 Renewable energy in power generation

The market structure for renewable energy (RE) development for electric power generation is competitive, but the mode of competition varies between RE resources that have pre-determined areas for development and what is called "emerging RE" in RA 9513 or the Renewable Energy Act of 2008. The competition for service contracts in pre-determined areas involves selecting bids for the contracts through established criteria (i.e., beauty contest auction) and the competition in emerging RE development evolved from the “first come, first served” allocation of feed-in-tariffs (capacity-based and time-bound price guarantees) to what is now called the “Green Energy Auction”.

RA 9513 provides the overall regulatory framework for RE development for power generation. It also repealed Section 1 of PD 1442 or the Geothermal Resources Exploration and Development Act and introduced a new contractual system for the award of geothermal contracts. Under PD 1442, the government used to hold primarily the right to explore and develop geothermal resource areas and indirectly exercised this right through bid out or negotiated service contracts provided that the contractor’s fee did not exceed 40 percent of net operating revenues. RA 9513 defined geothermal resource as a mineral resource, thereby allowing 100 percent foreign stake in the exploration and development, and set the government share to 1.5 percent of gross income. In other types of RE, RA 9513 set the government share to 1 percent of gross income.

The awarding system for geothermal service contracts, as well as other types of RE with pre-determined areas for development (i.e., RE utilizing hydro, wind, and ocean technologies), is through what is called Open and Competitive Selection Process (OCSP) for RE contracts. Various guidelines were issued through the years and these were consolidated in 2019 through DC 2019-10-0013 or the Omnibus Guidelines for RE Contracts. There had been four rounds of OCSP already—the first one was in 2009, the second in 2015, the third in 2021, and the fourth in 2023. The guidelines also allow direct application for RE contracts in pre-determined areas where there is failed OCSP and in areas outside the pre-determined areas but identified by the RE contract applicant as suitable for exploration and development and then verified with or confirmed by the DOE. Direct application is also allowed for RE operating contracts or service agreements between the DOE and developer for biomass, solar, and other RE resources that need not go through the pre-development stage. RE projects for own use by firms or RE projects with no commercial purposes are not covered by the contracting system but these need to register with the DOE. Table 1 below summarizes the awarded and registered RE projects as of December 31, 2022.

Table 1. Summary of awarded and registered RE projects as of December 31, 2022

Technology	Projects with Installed Capacities			Projects under Development		
	Installed Capacity (MW)			Potential Capacity (MW)		
	Commercial	Own-use	Number of Projects	Commercial	Own-Use	Number of Projects
Hydropower	1,129.32		68	12,270.95	1.56	364
Ocean	0		0	24		8
Geothermal	1,931.67		12	870.60		24
Wind	442.90	0.01	9	45,631.18		133
Solar	1,283.37	6.43	75	21,413.65	1.07	232
Biomass	594.23	183.36	52	186.23		25
Total	**5,381.49**	**189.90**	**216**	**80,396.61**	**2.63**	**786**

Source: DOE-Renewable Energy Management Bureau (2023).

RA 9513 also established feed-in-tariff (FIT) system, where fixed tariffs for specific types of emerging RE (wind, solar, ocean, run-of-river hydro, and biomass) are paid to developers. The funding for this is collected from all end-users of electricity as FIT-Allowance (FIT-All) or a uniform charge applied per kilowatt-hour billed. The FIT system also involves the priority dispatch in the grid of all power generated by these RE resources. The FIT system was replaced by the Green Energy Auction in 2022 to take advantage of the declining cost of RE development. Under this setup, qualified suppliers offer to supply a specified volume of electricity generation through auction. They offer a green energy tariff that should not exceed the reservation price. The ERC includes the green energy tariff in the computation of the FIT-All. The initial guidelines for the Green Energy Auction were released in 2020 and then revised in 2021. The first round of auction was conducted in June 2022 and the second round, in July 2023.

RA 9513 also introduced the renewable portfolio standards (RPS), or the setting of a minimum percentage of power generation from eligible RE sources and requiring all electric power industry participants (distribution utilities, retail electricity suppliers, and directly connected customers) to source their power requirements from RE. In 2018, given the government's aspirational target of 35 percent RE in the power generation mix by 2030, the RPS annual incremental requirement was set at 1 percent for on-grid participants and 1 percent for off-grid participants (i.e., the participants were required to increase their sourcing from RE by 1 percent every year). However, the roll-out of RPS off-grid was delayed due to capacity-building challenges and the pandemic. In 2023, given the government's aspirational target of 50 percent RE in the mix by 2040, the RPS annual incremental requirement was set at 2.52 percent on-grid, and in the case of off-grid RPS, the National Power Corporation-Small Power Utilities Group is tasked to prepare a multi-year RPS compliance plan.

Other measures introduced by RA 9513 include: (a) the green energy option program, a voluntary program whereby end-users consuming an average monthly peak demand of at least 100 kilowatts (kW) can opt to exclusively source energy from qualified RE suppliers; (b) net metering, where participants with own RE facilities can inject power into the grid and have their contribution deducted from their power bills (or what is also getting known as "prosumers", consumers who

also produce); (c) renewable energy market, which is a market for trading of RE certificates; and (d) the setting up of a trust fund for renewable energy development.

To accelerate the development of RE resources, transmission capacity has to be expanded. For this reason, the DOE spearheaded the identification of what came to be known as Competitive Renewable Energy Zones (CREZs). CREZs are not necessarily pre-determined areas for OCSP, but areas that can be promoted to attract RE developers and therefore need to be considered in transmission capacity planning. For example, CREZs for offshore wind development prospects imply that the transmission network needs to be expanded offshore.

The issues in renewable energy development for power generation include the following: non-readiness of the transmission network or the power grid to deal with variability in both the supply and demand side; grid congestion near the bodies of water that were identified as suitable for floating solar systems; backlogs by the National Grid Corporation in system impact studies for RE projects; uncertainty in planning for the CREZs given the unresolved transmission constraints; continuing problem of slow permitting process and right-of-way acquisition; slow growth of net metering participants, which is indicative of the grid not being ready for the influx of prosumers; delay in the commercial operation of the renewable energy market; and delay in the operationalization of the Renewable Energy Trust Fund. The guidelines for the Renewable Energy Trust Fund were in fact issued only in 2018, ten years after the enactment of RA 9513. The guidelines were enhanced in 2022 to include the procedures for fund sourcing, accounting, and audit. But as of this writing, the operating manual that was promised in the latest RE Act implementation status report has not yet been issued.

6. Electric power industry

The electric power industry is structured around the necessary institutions needed to generate, transmit, and distribute electricity to consumers.[9] In this section, to preface the complex issues surrounding the power industry, it is appropriate to discuss its general structure, especially its evolution from a vertically integrated electric power system to an unbundled and privatized industry, and provide the problems that compelled the government to undergo restructuring. We also describe the industry's major subsectors, generation, transmission, and distribution, as well as the markets for electricity currently consisting of the wholesale electricity spot market, the bilateral contracting market, and the retail electricity supply market. After these, we elaborate on the issues that can be gleaned from looking at the operations of the industry and the regulatory mechanisms present therein.

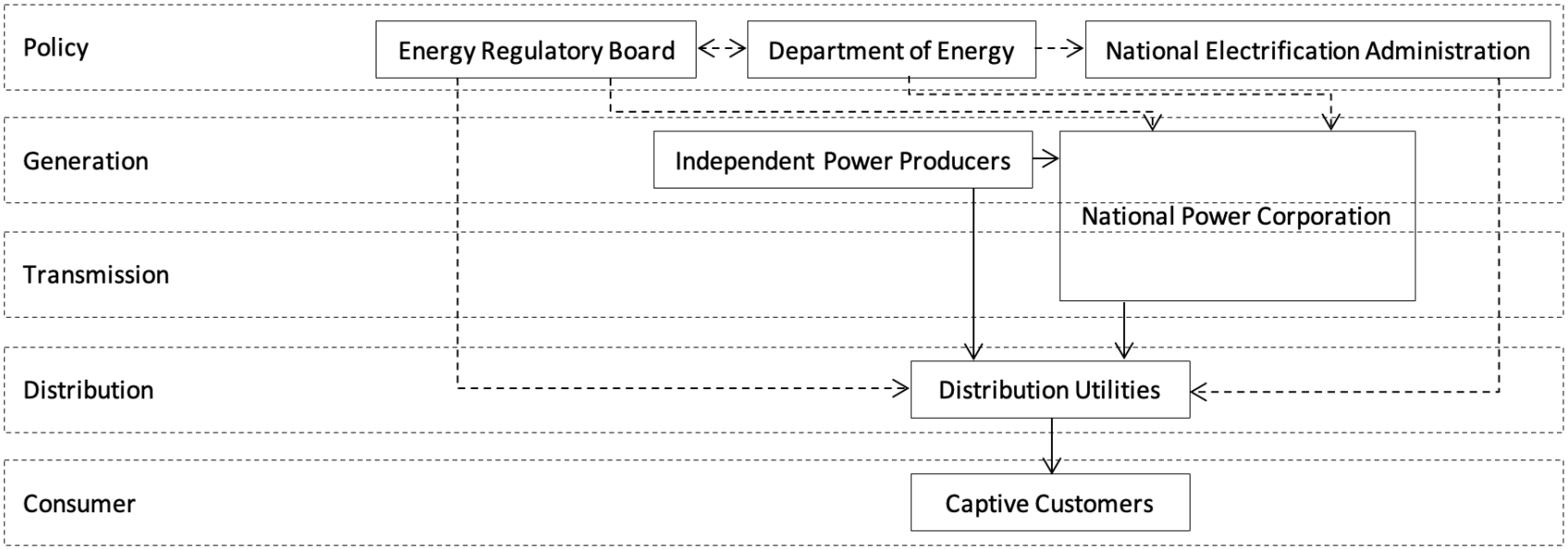
[9]At its core, the electricity that we consume today requires the following components: generators to produce electricity from other forms of energy, transmission lines to connect generation facilities to inhabited locations, and distribution networks to transform and provide electricity to consumers (Biggar and Hesamzdeh 2014). Hence, electricity markets are constrained by the technical limits of electric power generation, transmission, and distribution.

6.1 Structural overview of the industry

Like many vertically integrated electric power systems around the world, the Philippines used to rely for most of its generating capacity and all its transmission needs from a monopoly, the National Power Corporation (NPC), which was mainly responsible for providing uninterruptible electricity to all its consumers. Figure 2 below describes the electric power industry before it was restructured in 2001. At the policy level, there were three institutions: the independent Energy Regulatory Board (ERB) which regulated distribution utilities through Executive Order 172, Series of 1987, the Department of Energy (DOE), which coordinated the overall exploration, development, utilization, distribution, and conservation of energy through Republic Act (RA) 7638, and the National Electrification Administration (NEA), which monitored and financed electric cooperatives (ECs), a type of distribution utility (DU), through RA 6038. In the generation subsector, the country's capacity was produced mostly by the NPC. Independent Power Producers (IPPs) augmented the capacity produced by the NPC beginning in 1989. The NPC was also in charge of the whole transmission network. As we will discuss later, the NPC was also the system operator, or was responsible for the settlement of balances between the supply and demand for electricity. It was also the supplier of wholesale electricity to DUs except for the IPPs that sold to them directly. Finally, the DUs around the country were responsible for providing electricity to end-users in their respective captive markets (KPMG International 2013).

The dominant role of the NPC in the industry caused significant problems when it not only failed to effectively perform its responsibilities, but also became financially distressed, resulting in the interruption of service for consumers. The Senate Economic Planning Office (SEPO 2006) showed that in 2000, the NPC had a forced outage rate of 8.71 percent and an availability factor of 72.05 percent for its power plants and incurred a loss of 12.96 billion Philippine Pesos (PHP). This implies that the NPC was not only unable to always keep its plants at full capacity, but it also continued to spend more than it earned. To resolve these problems, the government, through RA 9136, also known as the Electric Power Industry Act of 2001 (EPIRA), restructured the whole industry and in the process unbundled the generation and transmission subsectors, privatized the transmission monopoly, and opened the generation market to competition. This effectively removed most of the responsibilities from the NPC as the dominant supplier and sole grid operator in the industry, and transferred and distributed these responsibilities to other entities, where competition and regulation is used to ensure their productivity and sustainability.

Figure 2. The electric power industry in the Philippines: Pre-restructuring[10]

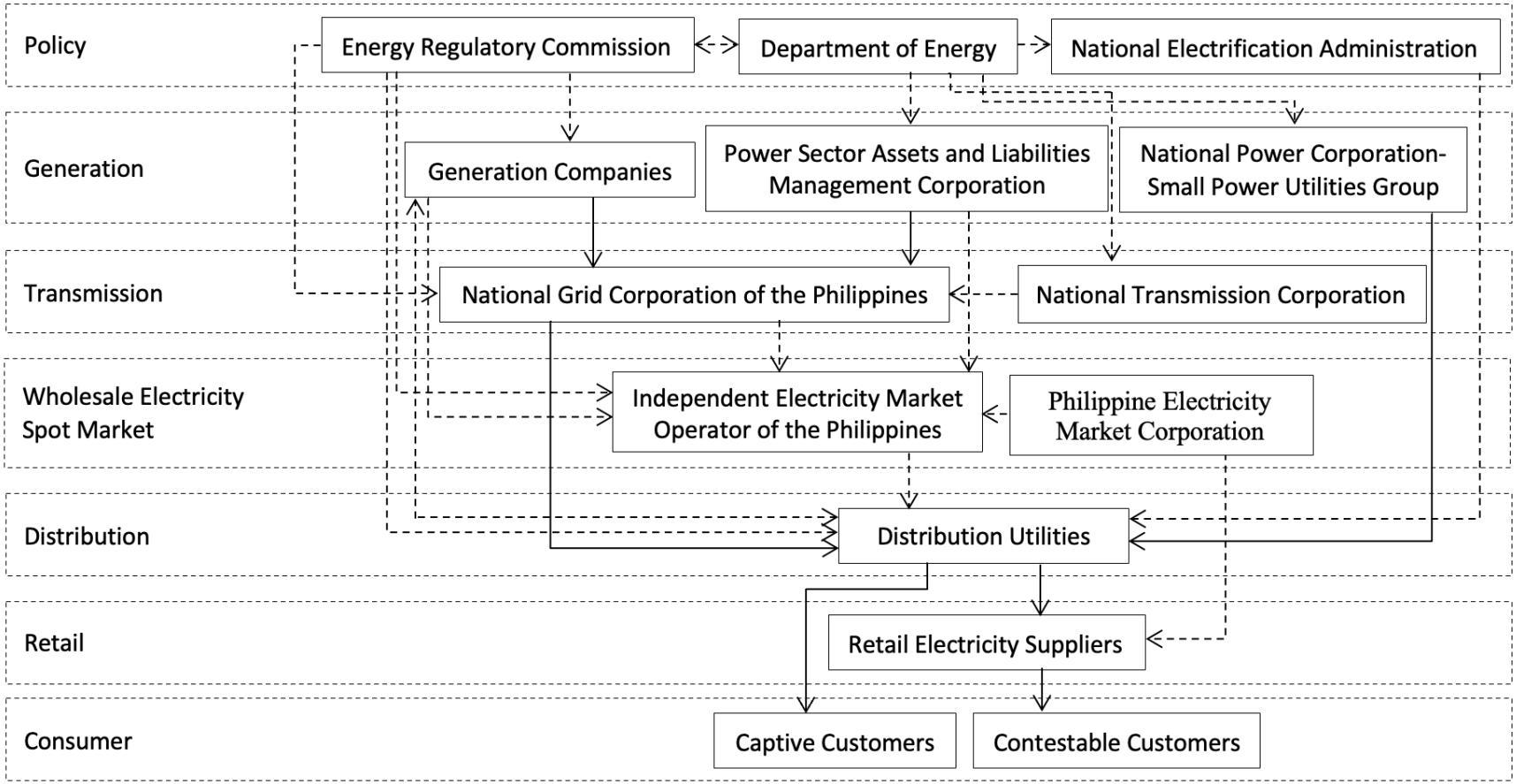


Notes: The dash boxes refer to the subsectors. The solid boxes refer to the entities. The dashed lines refer to the institutional relationships. The solid lines refer to the physical flows of energy.

Source: KPMG International 2013, with modifications.

[10]This figure is just a snapshot of the industry prior to the passage of the EPIRA. It is important to note that the industry also had changes other than the EPIRA (Navarro 2016; Bacon 2019), but for the purposes of this section, we are simplifying the discussion to the restructuring introduced by the EPIRA.

Figure 3. The electric power industry in the Philippines: Post-restructuring[11]



Notes: The dashed boxes refer to the subsectors. The solid boxes refer to the entities. The dashed lines refer to the institutional relationships. The solid lines refer to the physical flows of energy.

Source: ADB 2018; IEMOP 2021a; Navarro 2023.

[11]This figure is a snapshot of the industry at its current state. It is also important to note that the EPIRA did not happen overnight and required transition to implement the enacted reforms (Bacon 2019). In fact, the figure still shows the pending completion of the RCOA in the EPIRA, as retail competition has not reached the household level yet.

Figure 3 above presents the complex restructured industry at present. At the policy level, the three institutions essentially remain, albeit with expanded regulatory powers for the Energy Regulatory Commission (ERC), the former ERB. Its new powers include regulating transmission rates and the bilateral contracts between the generation companies (gencos) and the DUs. The NPC is now known as the NPC-Small Power Utilities Group (SPUG), where it remains in charge of missionary electrification for off-grid areas. Its generation assets, except the ones in SPUG areas, were transferred to the Power Sector Assets and Liabilities Management Corporation (PSALM), which is a government corporation created by the EPIRA and oversees the privatization of these assets. Its transmission assets are now owned by the National Transmission Corporation (TransCo), which is also a government corporation created by the EPIRA as a subsidiary of the PSALM. The TransCo and the PSALM entered into a concession agreement with the private National Grid Corporation of the Philippines (NGCP) for the operation, rehabilitation, maintenance, and expansion of the transmission system. In the restructured setup, gencos generate much of the country's generation capacity and sell these through the Wholesale Electricity Spot Market (WESM) or through power supply agreements with DUs. The NPC is also no longer in charge of settling balances for the supply and demand of electricity; the Independent Electricity Market Operator of the Philippines (IEMOP), governed by the Philippine Electricity Market Corporation (PEMC), is now in charge of that. With the implementation of retail competition and open access (RCOA), the DUs must allow retailers access to their distribution wires and allow qualified customers to switch to retailers for the end-use supply of electricity. Other customers are captive and receive electricity from the DUs (ADB 2018; IEMOP 2021a).

6.2 Power generation

In the industry, the power generation subsector is the first component for the physical flow of energy, where generation facilities transform other forms of energy to electrical energy. In the Philippines, power generation markets can be considered oligopolistic. Table 2 below shows the market concentration per grid and for the country. For all grids, there are many firms with a significant amount of market shares, with some almost reaching the maximum limit of market share allowed by the EPIRA (30% for each grid and 25% for the whole country). These firms are privately owned, except for the PSALM, which dominantly occupies the Mindanao power generation market with 21.30 percent share.

Table 2. Market concentration per grid, 2022

Firm	Installed generating capacity (MW)	Market share (%)
Luzon		
San Miguel	4,803.00	28.13
Aboitiz	3,180.64	18.63
FirstGen	2,513.05	14.72
DMCI	890.00	5.21
CBK Power Co. Lt.	797.78	4.67
AC Energy	731.25	4.28
Others	4,161.02	24.37
Total	17,076.74	100.00
Visayas		
FirstGen	865.24	25.65
GBPC	586.04	17.38
Aboitiz	532.90	15.80
SPC Power	316.20	9.38
AC Energy	177.68	5.27
Abrown	135.00	4.00
HSEC	108.12	3.21
Others	651.46	19.32
Total	3,372.64	100.00
Mindanao		
PSALM	895.01	21.30
Aboitiz	641.50	15.27
AC Energy	605.61	14.42
Alsons Power	475.69	11.32
FDC	405.00	9.64
San Miguel	312.88	7.45
CEPALCO	225.34	5.36
FirstGen	101.60	2.42
Others	538.41	12.82
Total	4,201.04	100.00
Philippines		
San Miguel	5,116.68	20.76
Aboitiz	4,355.04	17.67
FirstGen	3,479.86	14.12
AC Energy	1,514.54	6.14
PSALM	1,063.01	4.31
DMCI	890.00	3.61
CBK Power Co. Lt.	797.78	3.24
GBPC	586.04	2.38
Others	6,848.24	27.78
Total	24,651.19	100.00

Notes: MW – Megawatts. Information is based on ownership posted on the website of each respective entity.

Source: DOE (2023c).

Furthermore, these firms' fuel inputs are heterogenous with respect of the different types of technologies available (fossil fuels and renewable sources of energy), differing in both the capital needed to set-up facilities required for the technology and its respective unit costs. In 2022, coal remains the most utilized technology, providing 42.46 percent and 44.87 percent of the country's installed and dependable capacity. Table 3 below shows the installed and dependable capacity per technology.

Table 3. Installed and dependable capacity per technology, 2022

Fuel type	Installed capacity		Dependable capacity	
	MW	%	MW	%
Coal	11,684.00	42.46	10,927.00	44.87
Oil based	4,417.00	16.05	3,082.00	12.66
Natural gas	3,453.00	12.55	3,286.00	13.49
Geothermal	1,928.00	7.01	1,753.00	7.20
Hydro	3,781.00	13.74	3,527.00	14.48
Biomass	489.00	1.78	291.00	1.20
Solar	1,324.00	4.81	1,041.00	4.28
Wind	443.00	1.61	443.00	1.82
Total	**27,519.00**	**100.00**	**24,350.00**	**100.00**

Notes: MW – Megawatts.

Source: DOE (2023c).

6.3 Power transmission

Electricity produced by generators must pass through a transmission network to reach DUs' distribution systems and large directly connected end-users . In the Philippines, the market for transmission capacity is a nationwide monopoly[12], where the exclusive right to operate and earn from transmission assets belongs to the NGCP through its concession agreement with the PSALM and the TransCo. As mandated by the EPIRA, the power transmission network was unbundled from the NPC's assets and privatized through a competitive bidding process.[13]

As a monopoly in the electric power industry, the NGCP is subject to ERC regulation. Its charges are also unbundled, and Table 4 below shows the components of the transmission rates passed on to consumers. In November 2023, the Philippines has an average transmission charge of PHP0.7957 per kWh, with power delivery charges making up around 60 percent of the costs and

[12] In other countries (e.g., Unites States, United Kingdom, and Germany), transmission capacity provision is provided by more than one company.

[13]Historically, the transmission network was unbundled from the NPC's assets first before it was privatized. The timeline for this is as follows: on June 8, 2001, the EPIRA was passed, creating the TransCo as a subsidiary of the PSALM and transferring the NPC's transmission functions to the TransCo. On February 28, 2008, the PSALM (managing the privatization of previously NPC-owned assets) and the TransCo (as the owner of transmission assets) awarded the grid concession to the consortium of the Monte Oro Resources Corporation, the Calaca High Power Corporation, and the State Grid Corporation of China, organized thereafter as the NGCP, and entered into an agreement with the NGCP. On December 1, 2008, RA 9511 was passed, formally granting the NGCP the legislative franchise to operate, rehabilitate, maintain, and expand the transmission network.

ancillary service charges making up around 34 percent of the costs. Power delivery charge is the cost of transmitting electricity through transmission assets, while ancillary service charge is the cost of maintaining the reliability of the transmission network.

Table 4. Transmission charges per grid, November 2023

	PDS	SO	MSP	CC/RSTC	AS	Total
Luzon	0.4905	0.0282	0.0017	0.0115	0.2385	**0.7704**
Visayas	0.3777	0.0264	0.0034	0.0177	0.4965	**0.9217**
Mindanao	0.5028	0.0283	0.0031	0.0348	0.2303	**0.7993**
Philippines	0.4760	0.0280	0.0021	0.0154	0.2743	**0.7957**

Notes: PDS - Power Delivery Service; SO - System Operator; MSP - Metering Service Provider; CC/RSTC - Connection Charges/Residual Sub-transmission Charge; AS - Ancillary Service (inclusive of VAT). Figures in PHP/Kilowatts per hour (kWh).
Source: NGCP (2023).

6.4 Distribution

As transmitted electricity approaches consumers, distribution utilities transformed it through voltage regulation up to the levels safe for end-use consumption. Distribution utilities are local monopolies, requiring the grant of franchise by the Philippine Congress. These are subject to regulation by the ERC in terms of distribution rates and quality of service (e.g., system losses, frequency of outage, and duration of outage). Because the RCOA has not been fully implemented, many end-users, primarily residential customers, have no choice but to take the prices that the distribution utilities charge. ERC's decisions on distribution utilities' rate applications are to safeguard the welfare of consumers while allowing reasonable returns for the utilities.

Table 5 shows that captive customers account for most of the total energy consumption. Their consumption increased from 60,121 gigawatt-hours (GWh) in 2018 to 63,873 GWh in 2022, while contestable customers' consumption increased from 17,628 GWh in 2018 to 21,510 GWh in 2022.

Table 5. Total energy consumption (GWh) by type of customer, Philippines, 2018-2022

	2018	2019	2020	2021	2022
Contestable Customer	17,628	19,464	17,463	19,592	21,510
Captive Customer	60,121	62,810	60,449	62,338	63,873
GEOP End User[14]	0	0	0	0	132
Total	**77,749**	**82,274**	**77,912**	**81,930**	**85,515**

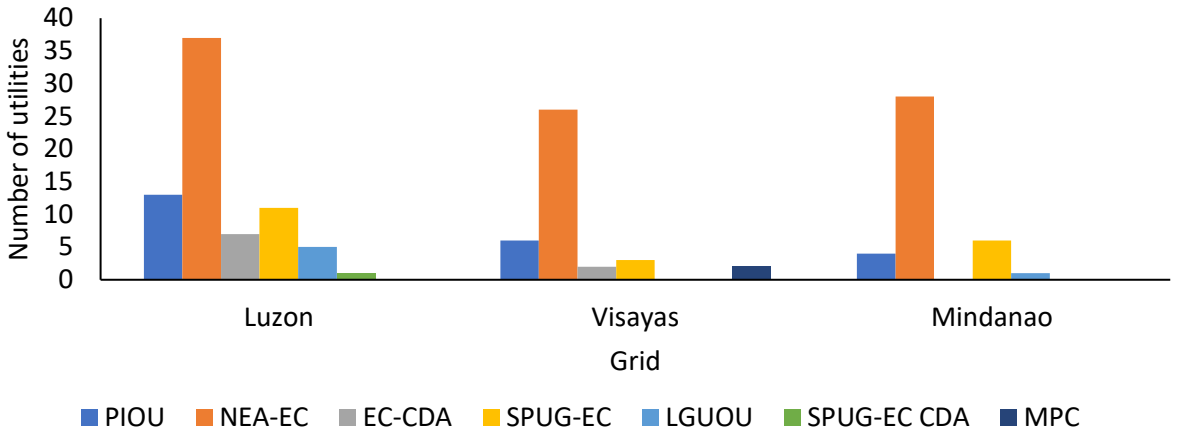
Notes: GEOP - Green Energy Option Program; GWh - Gigawatt-hour.
Source: PEMC (2023b).

Distribution utilities vary by type of ownership or legal structure. The categories are investor-owned-utilities, electric cooperatives, local government-run utilities, and NPC-SPUG utilities.

[14] The GEOP, instituted in 2021 with the promulgation of ERC Resolution No. 8 Series of 2021, allows customers to source their consumption from any supplier of their choosing but specifically from those with renewable energy. Thus, the GEOP end-users are somewhat similar with contestable customers except that the former source their supply from renewable energy suppliers.

Figure 4 below shows the number of distribution utilities per type and per grid. Majority of the utilities are cooperatives supervised by the NEA (37 cooperatives in Luzon, 26 in Visayas, and 28 in Mindanao). The second most numerous type of distribution utility is private investor-owned utilities (13 utilities in Luzon, 6 in Visayas, and 4 in Mindanao).

Figure 4. Distribution utilities by type per grid, Philippines

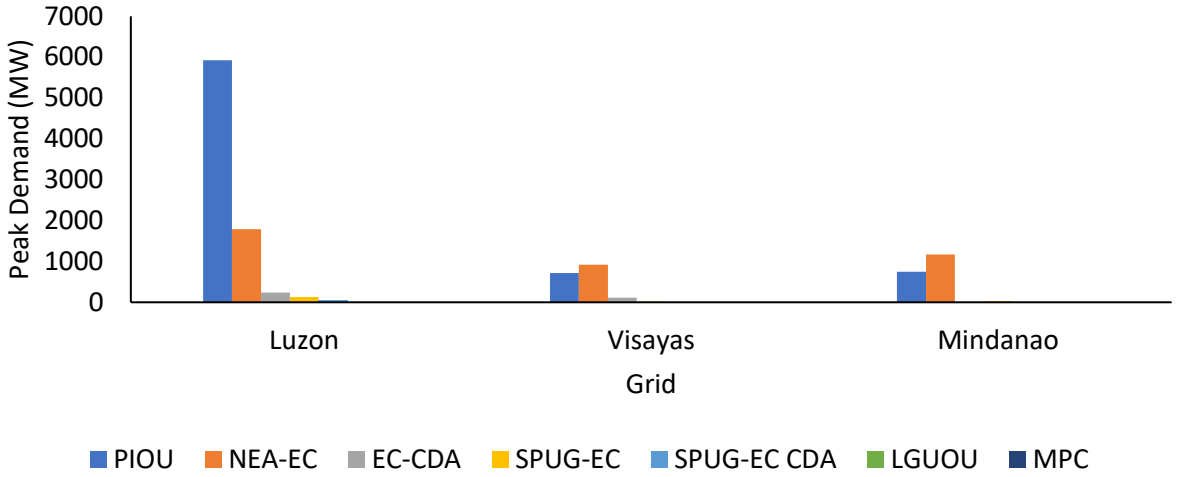


Notes: PIOU - Private Investor-Owned Utilities; NEA - National Electrification Administration - Electric Cooperatives; EC-CDA - Electric Cooperatives - Cooperative Development Authority; SPUG-EC - Small Power Utilities Group - Electric Cooperatives; SPUG-EC CDA - Small Power Utilities Group - Electric Cooperatives - Cooperative Development Authority; LGUOU - Local Government Unit-Owned Utilities; MPC - Multi-Purpose Cooperatives.

Source: Francisco (2022).

Meanwhile, Figure 5 shows the electricity consumption by type of distribution utility per grid. Even though PIOUs are lesser in number than NEA-ECs, PIOUs account for a larger volume of consumption. In 2020, PIOUs accounted for 7,387 megawatts (MW) of peak consumption, and NEA-ECs accounted for 3,873.53 MW of peak consumption.

Figure 5. Electricity consumption by type of distribution utility per grid, Philippines, 2020



Notes: MW – megawatts; PIOU - Private Investor-Owned Utilities; NEA-EC - National Electrification Administration - Electric Cooperatives; EC-CDA - Electric Cooperatives - Cooperative Development Authority; SPUG-EC - Small Power Utilities Group - Electric Cooperatives; SPUG-EC CDA - Small Power Utilities Group - Electric Cooperatives - Cooperative Development Authority; LGUOU - Local Government Unit-Owned Utilities; MPC - Multi-Purpose Cooperatives.

Source: Francisco (2022); DOE (2023c).

As public utilities, DUs are mandated to provide universal service to their coverage areas, including those considered unviable. Three institutions help the DUs in achieving universal electrification: the NPC-SPUG for missionary electrification in off-grid areas, the NEA for rural electrification by electric cooperaatives, and the PSALM as the administrator of the universal charge (UC). The UC is a levy charged to all consumers for financing the missionary electrification, among others. These are collected by the DUs and NGCP from end-users and then remitted to the PSALM for further distribution according to the universal service objectives in unviable areas. The UC exists because consumers in areas without access to electricity are often unable to pay for the true cost of electricity and suppliers can be incentivized to provide electricity in those areas through subsidies. In pursuing the social objective of universal electrification, the government facilitates the cross-subsidization of these areas by all electricity consumers (DOE n.d.).

6.5 Wholesale Electricity Spot Market

The discussions above focused on the major subsectors of the electric power industry. In this subsection and the next two subsections, we discuss relevant markets for electricity that are present in the restructured industry. First, is the WESM, which is a market for buying and selling of electricity at the wholesale level. Before, in the vertically integrated regime, all DUs must settle their procured supply with the NPC and, in some cases, the IPPs. This was changed with the introduction of the WESM, where settlements for electricity supply are done through an independent electricity market operator. In the WESM, different generation companies bid to supply at their offered prices given the information on demand, and the market operator determines the settlement prices and comes up with a dispatch schedule together with the grid system operator every five minutes.[15]

The WESM had a staggered implementation with respect to the three major grids. The WESM in the Luzon grid was launched on June 6, 2006, and in the Visayas, on December 26, 2010. WESM commercial operations in the Mindanao grid started only on January 26, 2023 (PEMC n.d.).

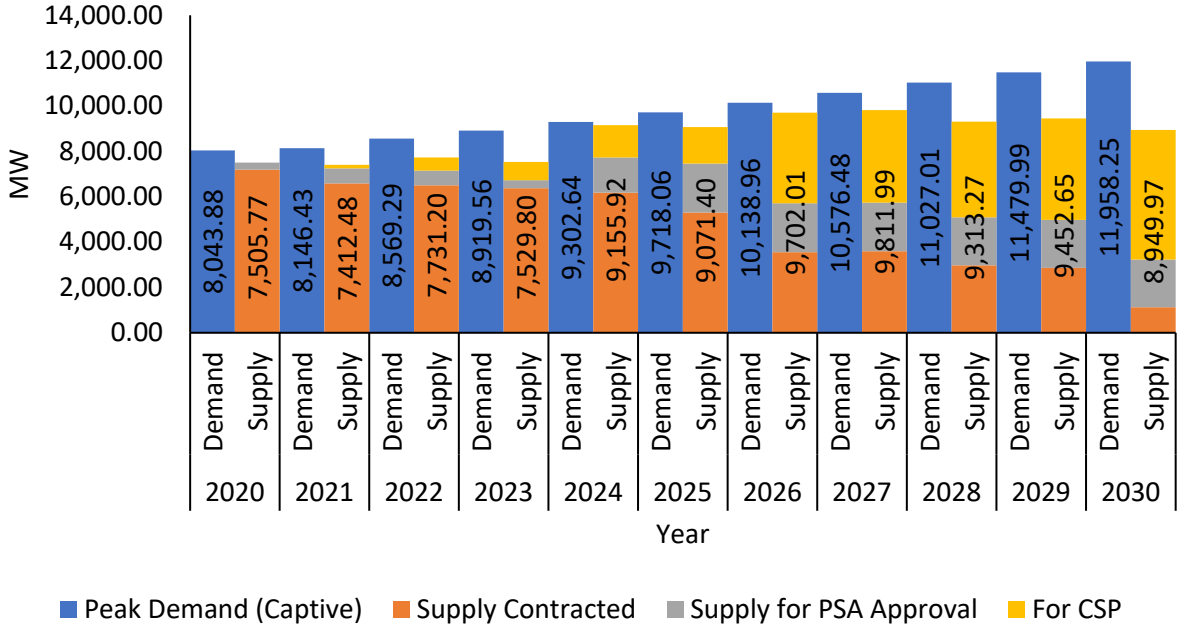
6.6 Bilateral Contracting Market

However, trading in the WESM comes with risks. Buying electricity from the spot market is subject to price changes every trading interval, which is currently every five minutes (IEMOP 2021b). To manage risks, DUs enter into longer term bilateral power supply contracts, called power supply agreements (PSAs), with gencos. Nonetheless, as these have implications over the price of electricity, the selection of supplier must be through a competitive selection process and the PSAs must be assessed and approved by the ERC.

Figures 6, 7, 8 and 9 show the supply-demand profile of distribution utilities per grid from 2020 to 2030 based on the DOE's distribution development plan for 2021 to 2030. In 2030, total peak demand for the three grids is expected to reach 17,882.77 MW, while supply already covered by bilateral contracts is 2,971.37 MW, supply for ERC approval is 2,354.72 MW, and supply for CSP is 7,659.03 MW (see Figure 9). DUs will still have remaining uncontracted requirements in 2030, which they could procure through additional PSAs or through the WESM. The figures also show the imbalances between the supply and demand for Visayas and Mindanao, where Mindanao has excess capacity in 2020, while Visayas has peak demand greater than its contracted supply.

[15]Pricing is determined through locational marginal pricing, where transmission losses and congestion are considered with the offers of generation. Prices also have lower and upper limits: generators can offer as low as -PHP10.00 per kWh and as high as PHP32.00 per kWh. Furthermore, if average prices of PHP9.00 per kWh or above are sustained for 168 trading intervals, prices will be capped at PHP6.245 per kWh until the average goes below PHP9.00 per kWh.

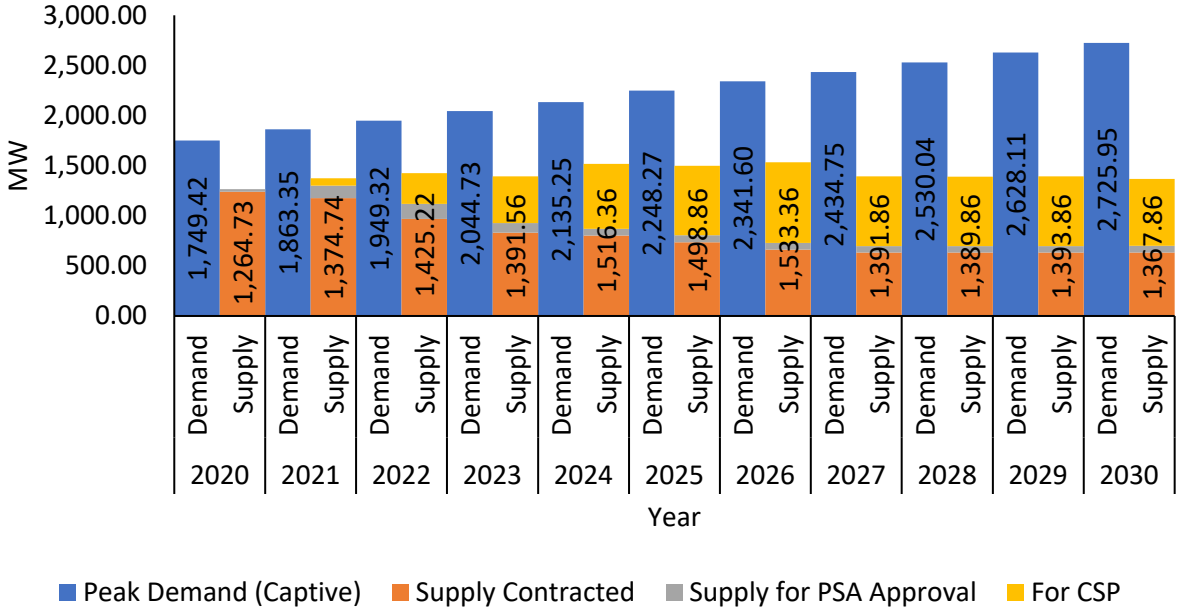
Figure 6. Supply-demand profile of distribution utilities, Luzon, 2020-2030



Notes: MW - Megawatts; PSA - Power Supply Agreements; CSP - Competitive Selection Process. Except for 2020, the figures are projected.

Source: DOE (2023c).

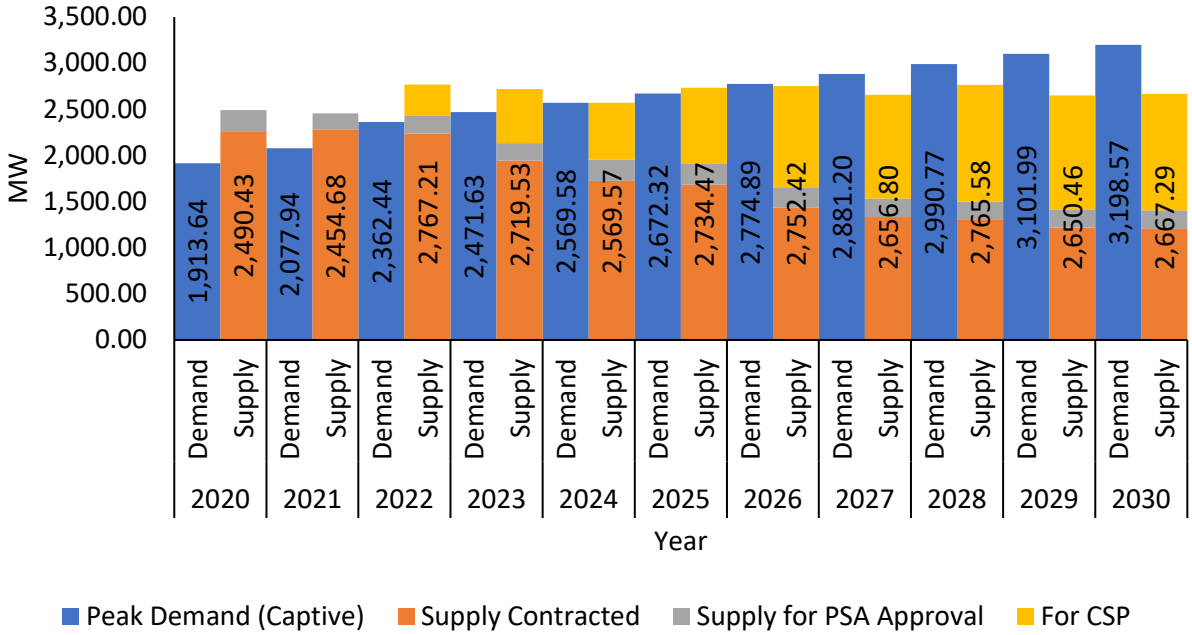
Figure 7. Supply-demand profile of distribution utilities, Visayas, 2020-2030



Notes: MW - Megawatts; PSA - Power Supply Agreements; CSP - Competitive Selection Process. Except for 2020, the figures are projected.

Source: DOE (2023c).

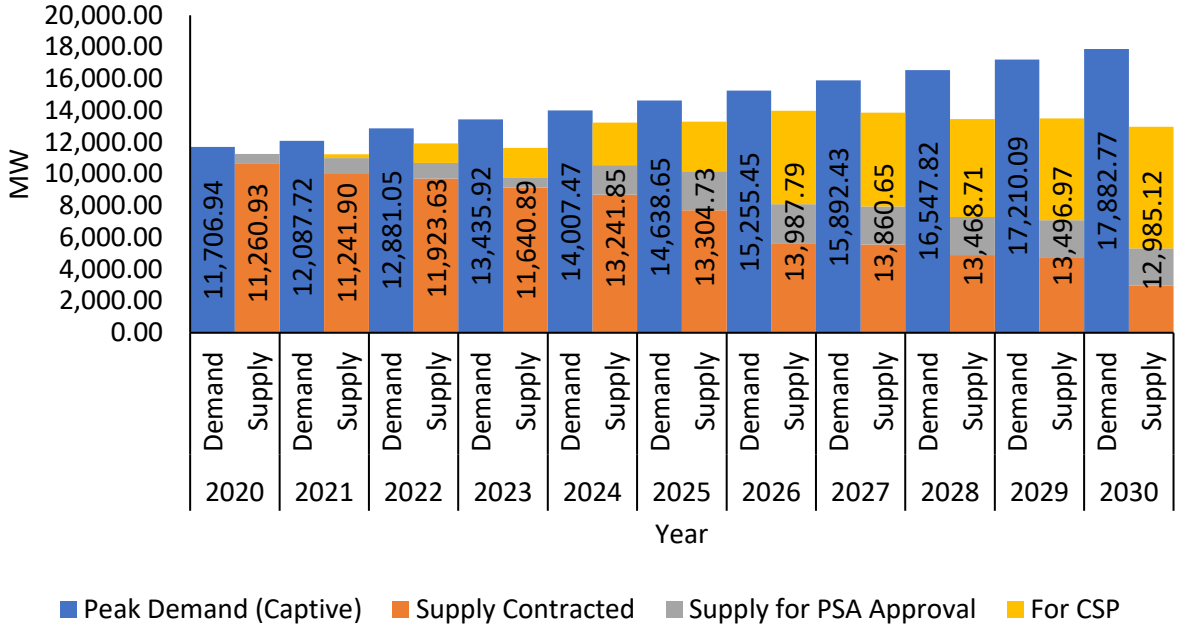
Figure 8. Supply-demand profile of distribution utilities, Mindanao, 2020-2030



Notes: MW - Megawatts; PSA - Power Supply Agreements; CSP - Competitive Selection Process. Except for 2020, the figures are projected.

Source: DOE (2023c).

Figure 9. Supply-demand profile of distribution utilities, Philippines, 2020-2030



Notes: MW - Megawatts; PSA - Power Supply Agreements; CSP - Competitive Selection Process. Except for 2020, the figures are projected.

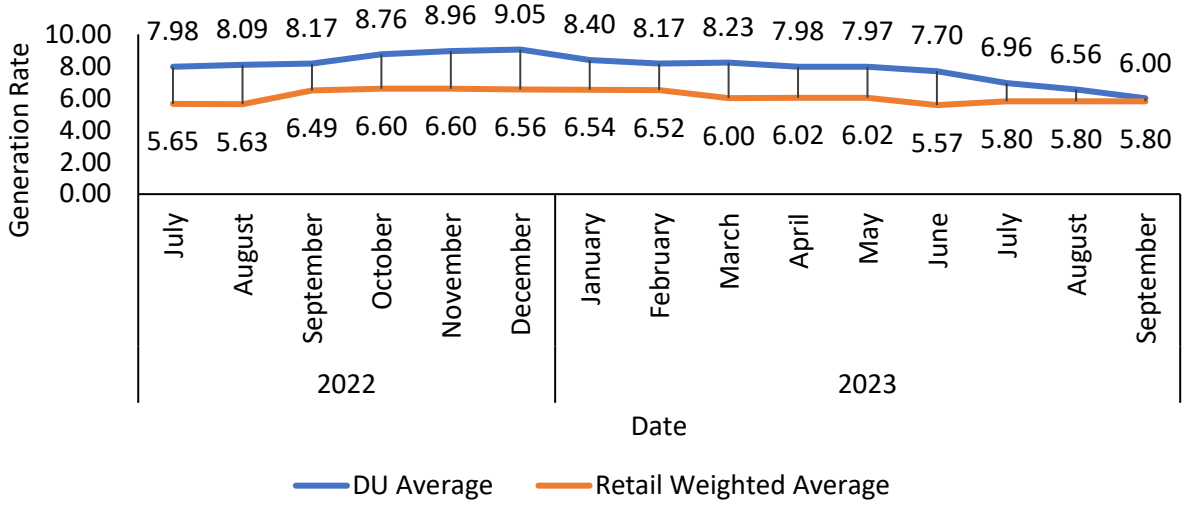
Source: DOE (2023c).

6.7 Retail electricity supply market

Another major reform in the electric power industry restructuring is the implementation of the RCOA, which allowed consumers to choose suppliers and switch from the incumbent DU in their area to their chosen retail supplier. In this market, the structure is competitive and the market is contestable. There are weak barriers to entry and exit and the market can be contested by entrants willing to challenge the incumbents should they fail to behave competitively. This is enabled by the RCOA, where consumers with a monthly average peak demand of at least 500 kilowatts are allowed to choose their respective suppliers, and DUs must allow open access to their wires in the process. As of September 2023, there are 47 retail electricity suppliers (RES), 29 local RES, 47 suppliers of last resort, and 3,277 eligible end-users (PEMC 2023b).

Figure 10 below provides a comparison of the generation rate between distribution utilities and retail suppliers. From July 2022 to September 2023, retail suppliers consistently provided cheaper rates relative to DUs, illustrating the competitive pressure to reduce prices in contestable markets.

Figure 10. Generation Rate, DU Average vs Retail Weighted Average, July 2022 to September 2023



Notes: DU - Distribution Utility. Figures in PHP/kWh.

Source: PEMC (2023c).

6.8 Current issues in the industry

The previous description of the complex structure of the electric power industry sets the background for presenting the issues that arise from the supply and demand relations in the electric power markets as well as the interactions between the regulated entities and policy and regulatory institutions. We present some of the crucial issues below.

a. While the high barriers to entry to the power generation market is a natural characteristic in generating power given the capital-intensive endeavor to set up power plants (Hafner and Luciani 2022), the lengthy and difficult permitting process further complicates the timely investment on and expansion of needed supply every year. The government started addressing this through the Energy Virtual One Stop Shop (EVOSS), a system for online filing of applications related to energy projects and the synchronous and coordinated actions on these by permitting agencies. RA 11234, which was enacted in 2019, directed the development and implementation of the EVOSS. The EVOSS became operational in July 2020. However, the permitting process facilitated by the EVOSS still needs improvement as local government units are still not yet part of the system.

b. Given the oligopolistic nature of generation markets per grid, power generators can exercise market power to increase prices by strategically withholding power supply from one of its generating units during times when that unit is considered a "pivotal supplier" or the last unit needed to balance supply and demand (Abrenica 2009; Danao 2009). Nonetheless, while mechanisms exist to monitor possible exercise of market power, such as the measurement of pivotal supply index, residual supply index, and capacity gaps in the PEMC's market assessment reports (PEMC 2023a and 2024) and the ERC's mandate to investigate cases of abuses in market power, the potential for abuse remains an issue.

Improvement in competition in the generation market can help reduce the incentive to exercise market power.

c. Electricity markets grapple with the problem of maintaining affordability and always ensuring adequate supply for consumers. Unsurprisingly, both are objectives with significant political implications for the government if unmet. Increases in electricity price fuel price increases for other goods and services in the economy's energy-intensive sectors, influencing the government's ability to meet its inflation targets (Mapa 2023). Power outages expose not only the electric power industry but also the government officials to public scrutiny, driven by productivity losses in local economies and the significant disruption to consumers' daily lives.[16]

d. Given the delayed regulatory reset process and rate rebasing in the transmission subsector, the NGCP is not effectively incentivized to meet its transmission investment targets and maintain efficiency in transmission performance. Stakeholders pointed out that the NGCP is incentivized to do the bare minimum only since increasing transmission connections, especially for renewable energy projects, would contribute to a higher and more volatile cost of electricity,[17] and it already had a high enough approved weighted average cost of capital (WACC) from the previous regulatory period, allowing it to profit without needing to meet some of the required investments.[18] The WACC from the previous regulatory period is 15 percent, which was determined ahead of the 2011-2015 regulatory period, or the Third Regulatory Period (with the count starting from the year the NGCP got its franchise). The regulatory rebasing is supposed to be a forward-looking exercise, but the ERC had been delayed in conducting the reset for the Fourth Regulatory Period. Questions then arose on whether the use of the 15 percent WACC from the previous regulatory period for the recovery of capital in the succeeding regulatory period was justified. The ERC is now catching up and conducting the rebasing for the 2016-2022 regulatory period, the Fourth Regulatory Period. It had released initial results disallowing some revenue claims and adopting a lower WACC of 10.71 percent (ERC 2023). Nevertheless, the constraints and realities surrounding transmission regulation and the incentives faced by the NGCP still need to be examined in order to find future policy improvements in the transmission subsector.

e. Delays in regulatory approvals for rate applications and bilateral contracts unnecessarily raise market transaction costs and, in some cases, cause power supply interruptions. As described earlier in Figures 6, 7, 8 and 9, finalizing the contracts for the supply requirements of DUs depends on the approval of the ERC. While it is necessary to regulate the implementation of PSAs in ensuring the least possible cost for consumers, unnecessarily long and difficult timelines for filing and investigating such contracts increase the risks of power interruptions as supplies become tight and also contribute to

[16] See Navarro et al. (2023) for further discussion on reliability and affordability in the energy sector.

[17] As a regulated entity, the NGCP is supposed to be incentivized to contribute to the government's affordability objectives; otherwise, it risks being investigated by policymakers.

[18] In discussion with energy sector stakeholders during focus group discussions via Zoom on December 14 and 15, 2023.

price volatility as some DUs procure from the WESM or enter into emergency supply arrangements with oil-based generators.

f. The financial insolvency of many electric cooperatives continues to be an issue, especially since some of them consistently fail to collect payments from their customers and rely on the government to relieve them of their financial obligations. Of the 7 ECs categorized by the NEA as "in the red" status, the lowest average collection efficiency is 9.86 percent in the 2nd Quarter of 2023 (NEA 2023). Fabella et al. (2018) argues that the management takeover of the NEA for ailing ECs remains to be ineffective. The possibility of a takeover also does not effectively deter ineffective management of ECs, as they eventually return once financial and operational performance has improved. Further discussion addressing the issues on viability of ECs is needed, specifically if difficult reforms, such as privatization, consolidation, and corporatization, to address the incentives surrounding ownership are to be explored in the future.

g. Stakeholders have also pointed out that many small gencos have low financial capacity in securing PSAs from DUs relative to larger gencos. The lengthy and tedious bidding processes tend to favor larger gencos that are more likely to afford the transaction costs.[19]

h. Some stakeholders fear that cross-ownership over power supply agreements, where generation companies can provide supply to their affiliated distribution utilities at the expense of cheaper suppliers, has anticompetitive implications. While owning both generation and distribution assets is allowed under the EPIRA, these may incentivize collusion between affiliated gencos and DUs in the bilateral contracting markets. Nonetheless, other stakeholders believe that there are existing mechanisms in place from both the DOE and the ERC to ensure a competitive selection process for the awarding of PSAs. Furthermore, disallowing affiliated gencos from participating would make the process less competitive, as there are less prospective bidders that would participate in the bidding for PSAs.[20]

i. Contractual issues are emerging as regulators gradually increase the implementation of RCOA. For instance, differing interpretations on fuel cost recovery adjustments in retail supply contracts have led to many disconnection notices to contestable consumers. Energy sector stakeholders also pointed out that being in a competitive market, dissatisfied customers of retail electricity suppliers can always switch to other suppliers.[21] In fact, switching costs, which had been identified as one of the obstacles for the effective implementation of the RCOA (PEMC 2020), have been significantly lessened (DOE 2021b).

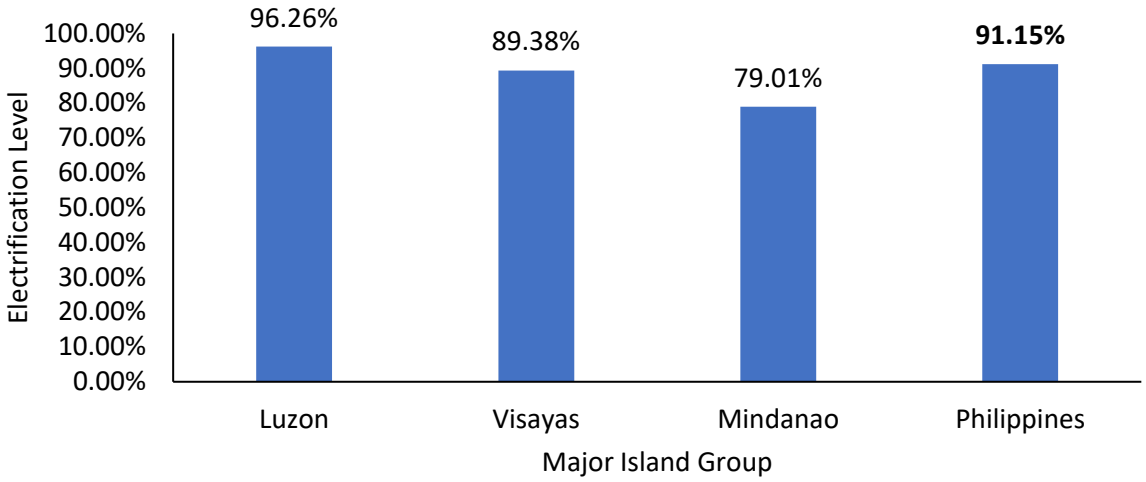
[19] In discussion with energy sector stakeholders during a focus group discussion via Zoom on December 14, 2023.

[20] In discussion with energy sector stakeholders during focus group discussion via Zoom on December 14 and 15, 2023.

[21] In discussion with energy sector stakeholders during a focus group discussion via Zoom on December 14, 2023.

j. Many areas remain unserved with electricity, contributing to the slow socioeconomic development of these areas. Figure 10 shows the level of household electrification in the Philippines. In 2023, only 91.15 percent of households nationwide have access to electricity, and Mindanao specifically has only 79.01 percent access rate. This illustrates that the government has yet to meet its decades-long objective of universal electrification. Accelerating the implementation of the National Total Electrification Roadmap is key in addressing this.

Figure 11. Household electrification (%) by major island region, Philippines, 2023



Source: DOE (2023d).

k. Finally, some components of the electric power industry reforms have not yet materialized, such as the development of the reserve market in the WESM, the privatization of the remaining generation assets of the NPC, and the full opening of retail competition at the residential level. The reserve market will allow the transmission network to tap into the spot market for ancillary services (Power Philippines 2024). As shown previously in Table 1, the PSALM remains the dominant supplier of electricity in the Mindanao grid because the remaining generation assets to be privatized are mostly in Mindanao. The large number of captive customers in the distribution sector, as shown previously in Table 4, represents the remaining work to be done in achieving retail competition.

7. Conclusion

The preceding discussions presented the market structure, regulatory and governance mechanisms, and issues per industry in the energy sector. As the analysis has shown, structuring the understanding of the energy sector by component industry is a useful approach to untangling the complexities of the sector. Another useful approach is to look at problems in the energy sector as cross-cutting concerns or cutting across several industries.

For example, the problem of affordability of electricity prices and the government's attempt to address this through RA 11371 or the *Murang Kuryente* Act involve not only the electric power industry but also the upstream natural gas development industry. This is because the budget that

is supposed to fund the Murang Kuryente Act implementation is being sourced from the Malampaya Fund, but this is a special account in the national budget which no longer has existing reserve balance and can only be "funded" if the national government will have excess revenues. The untangling of this issue involves detailed discussions of what happened to the Malampaya Fund and upstream natural gas development.

Another example is the energy affordability and energy poverty implications of the abandonment of coal technology because of the desire to accelerate the clean energy transition. There has not been enough discussion either in the government circle or among industry players on the implications of the pace at which we are abandoning coal technology. The analysis must involve tackling topics that cut across the various industries that make up the energy sector, such as the high cost of natural gas (a fuel better suited for mid-merit power plants but is being thought of as alternative fuel for baseload plants), the prohibitively high cost of and long investment period in nuclear power development (a technology that is being considered again by the government and is a very reliable alternative source of baseload capacity), the uncertain timing of transmission capacity expansion that is supposed to help bring in cheaper renewable energy, and the adverse impact on energy security of the ill-timed removal of coal baseload power plants. Disregarding these considerations and letting final energy become less affordable is like asking Filipino consumers, whose electricity expenditure takes up a large portion of their disposable incomes relative to consumers in other countries (such as countries in the Southeast Asia region, where electricity price is highest for the Philippines), to suffer more and far longer.

The analysis of future research areas will also involve analyzing cross-cutting concerns. It is difficult to pick which among the issues identified in this study can be considered priority future research areas because all those issues are affecting our country’s energy security. Nevertheless, if the issues or topics can be grouped together to provide more structure to the approach of researchers in the public and private sector, it would be productive to group and prioritize the issues affecting energy affordability, given that this is a pressing concern of households and businesses, and issues that can be addressed by amending the EPIRA, given that the legislature and the executive are providing opportunities to introduce needed amendments.

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