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# Assessment of the Philippine Electric Power Industry Reform Act

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## Abstract

The Electric Power Industry Reform Act (EPIRA) is one of the landmark pro-market reforms implemented to achieve reliable and competitively priced electricity in the Philippines. Due to its perceived ineffectiveness, however, the law has been subjected to a number of criticisms with some calling for its review, if not an outright repeal. Generally, EPIRA adopted the "ideal" textbook architecture of the competitive energy markets found to be historically successful in Argentina, Canada, Brazil, and Australia, among others (Joskow 2008). Such adoption led to the creation of institutional arrangements and restructuring intended to provide long-term benefits and ensure that prices reflect the efficient economic cost of supplying electricity and service quality attributes (Joskow 2008). Thus far, two major findings stood out. First, the EPIRA appears to be a well-thought power sector reform design, having followed most of the features of the kind of reform structuring found to be successful historically. Second, significant progress has been attained, although a number of measures should be in place to sustain the progress and promote more competitive power supply and retail rates for all consumers. These measures include policy changes in the sub components of the power industry such as generation, transmission and distribution, and improvement in other areas such as reduction of system losses and universal charges, socialized pricing mechanism, taxes, and demand-side management.

**Keywords**: Electric Power Industry Reform Act, EPIRA, power sector, energy sector, electricity, reform

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**List of Acronyms**

| | |
|---|---|
| ADB | Asian Development Bank |
| APEC | Asia-Pacific Economic Cooperation |
| ARMM | Autonomous Region in Muslim Mindanao |
| ASEAN | Association of Southeast Asian Nations |
| BISELCO | Basilan Electric Cooperative |
| BOT | Build-Operate-Transfer |
| BSUP | Business Separation and Unbundling Plan |
| CLP | China Light and Power Co Ltd./CLP Power Hong Kong Ltd. |
| DOE | Department of Energy |
| DSM | Demand Side Management |
| DU | Distribution Utility |
| EAC | Economic Assistance Charges |
| EC | Electric Cooperative |
| EF | Evaluation Framework |
| EO | Executive Order |
| EPIRA | Electric Power Industry Reforms Act |
| ERB | Energy Regulatory Board |
| ERC | Energy Regulatory Commission |
| FDI | Foreign Direct Investment |
| FIES | Family Income and Expenditure Survey |
| GDP | Gross Domestic Product |
| GOCC | Government-Owned and Controlled Corporation |
| GWh | Gigawatt Hours |
| HECS | Household Energy Consumption Survey |
| HHI | Herfindahl-Hirschman Index |
| IDRC | International Development Research Centre |
| IEA | International Energy Agency |
| IPP | Independent Power Producer |
| IRR | Implementing Rules and Regulations |
| JCPC | Joint Congressional Power Commission |
| KEPCO | Korean Electric Power Corporation |
| KII | Key Informant Interview |
| KPMG | Klynveld Peat Marwick Goerdeler |
| MEA | Metropolitan Electricity Authority |
| MERALCO | Manila Electric Company |
| MMS | Market Management System |
| MO | Market Operator |
| MW | Megawatt |
| NAPOCOR | National Power Corporation |
| NCR | National Capital Region |
| NEA | National Electrification Administration |
| NGCP | National Grid Corporation of the Philippines |
| NMMS | New Market Management Systems |
| NPC | National Power Corporation |

| | |
|---|---|
| OATA | Overall Average Tariff Adjustment |
| PBR | Performance-Based Rate Making |
| PEMC | Philippine Electricity Market Corporation |
| PIDS | Philippine Institute for Development Studies |
| PLN | Perusahaan Listrik Negara |
| PNOC-EDC | Philippine National Oil Company - Energy Development Corporation |
| PPA | Power Purchase Agreement |
| PSALM | Power Sector Assets and Liabilities Management Corporation |
| RCOA | Retail Competition and Open Access |
| RE | Renewable Energy |
| RES | Retail Electricity Supplier |
| RORB | Return-on-Rate-Base |
| SAGR | Subsidized Approved Generation Rate |
| SP | Singapore Power |
| SPUG | Small Power Utilities Group |
| TAIPOWER | Taiwan Power Company |
| TCGR | True Cost of Generation |
| TISELCO | Ticao Island Electric Cooperative |
| TNB | Tenaga Nasional Berhad |
| TOR | Terms of Reference |
| TRANSCO | National Transmission Corporation |
| TRO | Temporary Restraining Order |
| UC | Universal Charge |
| UCME | Universal Charge for Missionary electrification |
| WESM | Wholesale Electricity Spot Market |

# Assessment of the Philippine electric power industry reforms

*Arlan Z.I. Brucal and Jenica A. Ancheta*

## 1. Introduction

The Electric Power Industry Reform Act of 2001, otherwise known as EPIRA, is considered one of the landmark pro-market reforms that were implemented in the Philippine history. The reform, which was passed into law through Republic Act No. 9136, restructured the country's power sector from a vertically integrated state monopoly to a sector that allows competition for some subsectors (i.e. generation and retail supply) while recognizing the importance of regulated subsectors (transmission and distribution) in ensuring a stable supply of electricity for the entire country.

Similar to other previously implemented policies, the EPIRA has been subjected to a number of criticisms primarily due to its perceived ineffectiveness particularly in reducing retail power prices. Power rates in the Philippines remain high relative to its neighbors. As a result, some called for its review and amendment, others clamored for an outright appeal. Despite its important policy implication, very little do we know about the consequences of the EPIRA, despite the fact that the law was implemented for the past seventeen years.

Countries such as the UK (i.e. England and Wales), Chile and Argentina, that went into similar restructuring experienced a significant decline in the price-cost margins over time (Joskow, 2008). This is apart from a number of improvements such as lower generation costs and improved availability (Newbery and Pollitt 1997, Bushnell and Wolfram 2005, Fabrazio, Rose and Wolfram 2007) and improved labor productivity and service quality (Domah and Pollitt 2001, Jamasb and Pollitt 2007). Meanwhile, other countries that have yet to undergo power sector restructuring, particularly those that have not moved from their highly subsidized pricing scheme, (e.g., Indonesia and Mexico) are now pursuing their own versions of EPIRA. There are also those that stay continue to operate as a vertically integrated utility (e.g., Hawaii and Taiwan) while instituting some changes in its regulatory framework[1]. Clearly, utilities and regulators are finding solutions as they respond to increasing restructuring of the power sector around the world, but which business model and power structure is most economically viable remains unexplored.

In the Philippines, relatively few studies have performed a comprehensive assessment of the EPIRA. For most studies, discussions on the EPIRA was just a part of a broader study on either competition policy and regulation in the industry (e.g. Patalinghug and Llanto 2005), electricity governance (e.g., Diokno-Pascual 2006) or market failures inherent in the sector (Abrenica 2007; Ahmed 2017). Meanwhile, studies that largely focused on EPIRA have centered on changes in the consumer price affordability and supply reliability, and on system loss (e.g., Navarro et al. 2016) or the status of competition in the electricity markets (e.g., Villamejor-Mendoza 2008). Moreover, very few of these studies took note of the multi-layered and multi-dimensional aspect of the policy; most of which focused on activities and outputs of EPIRA and very few on its outcomes and impacts.[2]

[1] For example, in pursuit of accommodating more renewables (primarily through distributed generation), Hawaii adopted revenue decoupling (Brucal and Tarui, 2018).

[2] An exception is the study by Ravago and Roumasset (2016) which provided a theoretical framework that characterized the EPIRA with respect to conflicting objectives and the problem of incomplete deregulation.

This study contributes to the policy debate by providing a comprehensive review of the EPIRA law and assess the success and progress of the law based on the business model or regulatory framework that the law intends to achieve. We contribute to the debate in two respects. First, we employed an evaluation framework that clearly sets out the major hypothesized effects resulting from the implementation of EPIRA (except from level 0 or benchmark). These hypothesized effects serve as a blueprint for identifying indicators for each level of the evaluation framework, thus providing a more systematic way of evaluating the overall changes associated with the reform. Second, we evaluate the design of the EPIRA with the set of institutional arrangements that have been proven effective historically, thus providing a "suitable" counterfactual benchmark for comparison purposes. In particular, we use Joskow's (2008) "textbook" architecture of desirable features of restructuring, regulatory reform, and the development of competitive markets as counterfactual benchmark.

To carry out the assessment, we combined desk research on the design the reform, with the view to determine if all the features of previous successful power sector reforms are incorporated in the EPIRA, with key information interviews (KIIs) and public consultations in major island grids (Luzon, Visayas and Mindanao) to get information on what has actually happened on the ground. The team also gathered statistical data from concerned government agencies, and the private sector to (i) generate indicators that where the effectiveness and progress of the power reform will be based on, and (ii) monitor how these indicators changed before and after the implementation of the EPIRA.

Based on the assessments, two major findings stand out. First, the EPIRA appears to be a well-thought power sector reform design, having followed most of the features of the kind of reform structuring that have been found to be successful historically (Joskow, 2008). Nonetheless, the country deviated from the "ideal" restructuring and regulatory reform by including provisions that seeks to provide subsidies between end-users and as well across geographic areas. This has consequential costs on the efficiency of power pricing. Second, significant progress had been attained, although a number of measures should be in place to sustain the progress and promote more competitive power supply and retail rates for all consumers. These measures include exploring the opportunities of demand-side management in meeting growing energy requirement of the country, as well as re-examining its conflicting objectives of electrification and efficient power pricing.

The report is structured as follows. Section 2 discusses the approach and method employed in the assessment, which highlights the evaluation framework. Section 3 enumerates the results of the evaluation. This section includes the indicators and their trend before and after the implementation the EPIRA in 2001. Section 4 concludes the study with a number of policy recommendations.

## 2. Approach and Methods: The Evaluation Framework

A key requirement for this report is to present an elaboration of the approach and methods for the study. The Evaluation Framework provides a foundation for the study. This section (a) notes the methodological challenges inherent in the evaluation of the EPIRA; (b) outlines the main features of the Evaluation Framework that has been developed through this process; (c)

addresses some additional issues in methodology, and (d) determines the key evaluations questions.

### *2.1. Rationale Behind the Evaluation Framework*

One of the major reasons why an evaluation framework is needed is because evaluation of EPIRA is exceptionally complex in a number of ways:

a) The objectives are multi-faceted, multi-layered and multi-dimensional. For example, utilization of renewable energy sources may not bring the most affordable energy price to end-users (at least in the short-run). Some of the objectives of the reform are actually inputs to attain other objectives. We also found that targeted outcomes covers both economic and social dimensions (e.g., competitiveness, environmental health, social equity)
b) The desired ultimate effects are complex (e.g., economic efficiency and enhance the competitiveness of Philippine products in the global market).
c) Changes in outcome and impact indicators will be partly (and sometimes dominantly) determined by the effects of other causes (deliberate effects of non-EPIRA inputs, or exogenous factors such as shocks in the global crude oil market).
d) The chain of causality is a long one, both conceptually and temporally. Following a results chain all the way from inputs to impact is known to be challenging, particularly in moving from outputs to outcomes and impact. In any circumstances, the intervals between inputs and their immediate effects and outputs, outcomes and impacts will be significant. When effects are expected to result from processes of institutional change, the plausible interval for effects to be manifested may be longer. This is particularly true in the case of EPIRA in which full implementation of structural change has not been completely attained, but interim changes may have impacts that are evolutionary or may serve as building blocks to other targeted results.
e) In the case of EPIRA, many of the intermediate effects that will be identified may not in themselves straightforward to measure, let alone to attribute proportionately to multiple causes particularly in a dynamic context where EPIRA is only one of the influences on systems that are continually changing.
f) The logic of causation is often itself controversial (for example, even if it could be demonstrated that EPIRA leads to the adoption of a particular policy designed to improve the attractiveness of the country's energy industry to foreign investors, the appropriateness and efficacy of the policy may well be disputed).
g) Last, but not least, the choice and the construction of appropriate counterfactuals (what would have happened if EPIRA had not happened?) is both difficult and controversial.

In order to address the above issues, this evaluation includes the following requirements:

a) A clearly set out logic that is being tested, why the particular hypotheses that are embodied in this logic are being tested, and the types of evidence that are appropriate in testing them.
b) A process that is as transparent as possible by which the assessment team proceed from findings to conclusions and (eventually) recommendations.
c) An optimized learning potential from the assessment by identifying and focusing on a manageable number of main lines of enquiry. The scale and the complexity of EPIRA mean that the number of possible causal chains is indefinitely large. In order to address this issue, the assessment selected a subset for close examination based

on the concerns of stakeholders, the evaluability of particular sub-chains, and the potential to add significantly to what is already known.

The team recognizes that a careful assessment has to be made against an appropriate and explicitly identified counterfactual. This has both a conceptual dimension (what is the relevant alternative to the with-EPIRA situation that the evaluators should consider?) and a practical one (is it practically possible to reconstruct a plausible without-EPIRA situation?). For the most part, however, our results are based on pre- and post-EPIRA analysis, which implicitly assumes that the counterfactual change is zero. This assumption is motivated by the lack of data on countries that have not undergone the same power sector reform similar to Philippines' EPIRA or lack of regional/geographic areas in the Philippines were not affected by the EPIRA.

Moreover, the comprehensiveness of the assessment has taken its toll on the more in-depth assessment of each segment of the EPIRA. In other words, the assessment provides a bird's eye view of the progress and success thus far of the reform; however, the team did not dive into the specific nuances and issues that each reform segment may have. While the team recognizes the value of this more in-depth analysis, they reserve this area for future researchers to explore on.

### *2.2. The Evaluation Framework*

Table 1. shows, for each level of the evaluation framework, the major hypothesized effects resulting from the implementation of EPIRA (except from level 0 or benchmark). These hypothesized effects serve as a blueprint for identifying indicators for each level of the evaluation framework as well as for determining the direction of causality. They also provide the basis for the evaluation questions that are considered in each of level of the EF. A list of indicators for each level is proposed in Appendix B.

**Table 1: Evaluation Framework – Logical Sequence of Effects**

| **Level 0 (Benchmark/Entry Conditions)** |
|---|
| *Evaluation Question:* Prior to the implementation of EPIRA, what are the specific conditions, strengths and weaknesses of the country in terms of the following:<br>1. Competitiveness of Philippine products<br>2. Electricity industry<br>a. Electricity Supply (reliability, quality, security, affordability)<br>b. Competition<br>c. Investment and Infrastructure/Modernization<br>3. Regulatory body governing the electric industry<br>4. Social Equity<br>a. Energy poverty<br>b. Electrification<br>c. Inter-customer equity (e.g., existence of cross-subsidies)<br>5. Sustainability of Energy<br>i. Share of renewables<br>ii. Investment climate for more sustainable energy sources |

**Level 1 (The Design)**

*Evaluation Questions:*

How does the design of EPIRA respond to the specific conditions, strengths and weaknesses of the country?

How does the design of EPIRA compare with the "ideal" design of power restructuring, regulatory reform and the development of competitive markets for power?

**Level 2 (The Outputs)**

*Evaluation Questions*:

How effective has been the contribution of EPIRA to the following:

a) Strengthened and purely independent regulatory body for the energy industry
b) Privatized assets and liabilities of the National Power Corporation
c) Enhanced institutional capacity and improved policy for:
    a. Grid modernization
    b. Electric industry competition
    c. Electrification
    d. Sustainable energy
    e. Consumer protection

What are the major activities and institutional changes of EPIRA that are targeted to address the weaknesses and/or boost the strengths of the Philippine Energy Industry? What were the progress made?

**Level 4 (The Outcomes)**

*Evaluation Questions*:

How effective has been the contribution of EPIRA to the following:

a) Improved reliability, quality, security, affordability of electric supply
b) Country electrified
c) Competition in the energy industry improved
d) Electric grid modernized
e) More renewables or prospects for renewables

| **Level 5 (The Impact)** |
|---|
| *Evaluation Questions*:<br><br>How effective has been the contribution of EPIRA to the following:<br><br>Inclusive and Sustained Economic Growth<br><br>a) Increased Foreign Direct Investment<br>b) Poverty and poverty<br>c) Robust economic growth |

## 3. Results of the Evaluation

### *3.1. Benchmarking; What was the situation prior to EPIRA?*

#### 3.1.1. Economic Situation

Prior to implementing EPIRA, the Philippine economy grew at an annual rate of 3.7% since 1991, peaking at 5.8% in 1995 (Figure 1). Assuming an energy-to-GDP elasticity of 1.0 (DOE 1998)[3] and 1.5 (Nuqui 1992), the Philippine would have needed to increase energy supply by 3.7% and 5.55%, respectively. This growth rate was significantly lower compared to the foreseen growth in national demand for electricity at 9% annually for the next 10 years in 1991, which would then require an additional 5,000MW on top of the 12,765MW capacity (Abanes 2011)[4]. The additional capacity would require an infusion of P38 billion annually into the development of the power industry, which had been a challenge considering the huge budget deficit of P145 billion during that time. Failure to infuse the said funds was seen to trigger another power crisis that may be similar in the 1970s, which has imposed substantial cost to the economy (Patalinghug 2003).

Total export grew by 97% from $8.186 million in 1991 to $17.447 million in 1995. This growth was slower than the export growth rate in the region, with 125% during the same period and much lower than China at 135%.[5] Notwithstanding, the country's export industry had shown resilience in the midst of the 1997 financial crisis, posting a growth rate of 118% between 1995 and 2000, compared to the region's growth rate of just 32%.

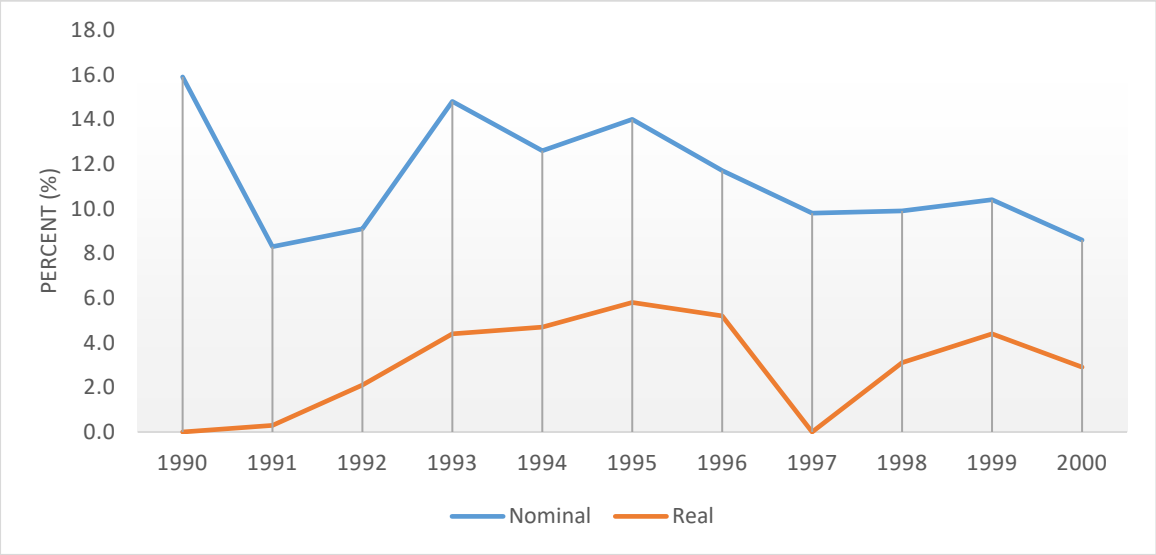
Employment rate, on the average, stood at 90.4 a decade prior to the implementation of EPIRA. Employment rate was highest in 1996 at 91.4. It dropped at 89.7 following the 1997 financial crisis and stayed at about the same rate until 2000.

Perhaps the most alarming economic trend relating to the Philippine power industry is the amount of foreign direct investment (FDIs) that the country has received since the early 1980s up to 2000. Figure – illustrates the relationship between electricity price (in US$/kWh) and net foreign direct inflows (in BOP, current US$) for the Philippines and its neighboring countries

[3] Department of Energy (1998). Philippine Energy Plan Update: 1998-2035 (Manila: DOE).
[4] Abanes, M. (2011). Revisiting the 10-year old Philippine Electric Power Industry Reform Act of 2001 (RA 9136) and its Local Implications Accessed at https://www.grin.com/document/176845.
[5] http://www.asean.org/storage/images/archive/19008.pdf.

for the period 1981-2000. Both variables are converted in natural logarithm to minimize the effect of scale.[6] The figure clearly depicts a negative relationship between FDI inflows and electricity price. To quantify the relationship, we regress the two variables and came up with the strong and statistically significant relationship below (robust standard errors are in parentheses). In particular, we observe that as electricity price rises by 1 percent, net FDI inflows reduces by 1.39 percent.

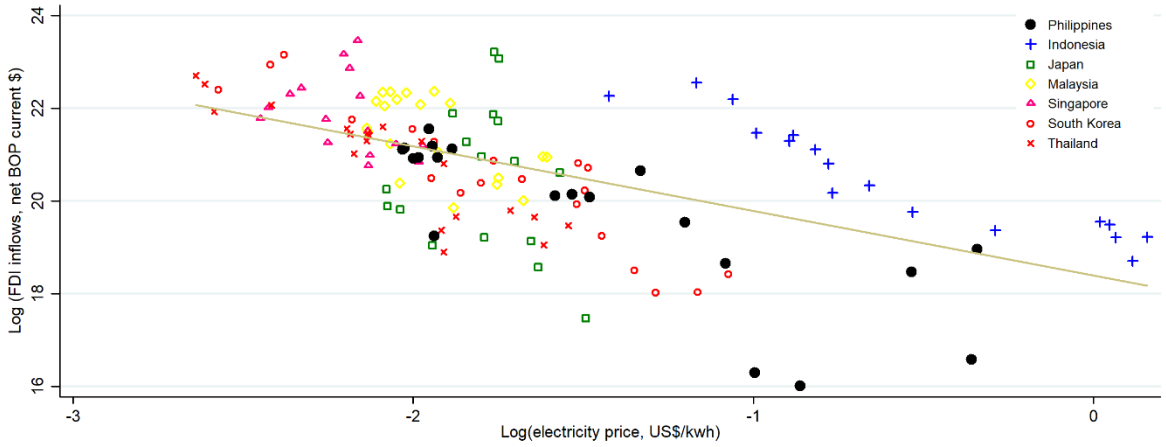
**Figure 1. Nominal and real GDP annual growth rate, 1990-2000.**




Source: Philippine Statistical Yearbook.

**Figure 2. Correlation between FDI inflow and industrial power rates, select Asian countries, 1980-2000.**

[6] One of the key informant interviews mentioned the need to have energy roadmap that will ensure investors of reliable and affordable power. This corroborates with the indicators supporting the notion that power reliability and affordability might be a significant factor in the decision-making process of potential foreign investors in the country.




*Notes:* The figure shows the correlation between FDI inflow (BOP, current Million USD) and industrial power rates (in US cents/kWh). All variables are converted in natural logarithms.

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### 3.1.2. The Philippine Electric Industry

#### *3.1.2.1. Power Supply*

*3.1.2.1.1. Reliability.* Here we define reliability of the power sector as the ability to meet energy demand at a particular area at a certain time period. Using data from the DOE, we find that at the aggregate, available capacity had been consistently lower than system peak demand (plus reserve margin) from 1990 up to 1993. On the average, supply margin, which is calculated as the difference between available capacity and peak demand divided by the available capacity, stood at 2.13%, peaking at 9.20% in 1996 due to increase in increased capacity. Slow growth in peak demand was observed in 1998-1999, probably due to the delayed effect of the 1997 financial crisis. The biggest deficit occurred in 1992 at -8.67%. In 2000, the country attained a supply margin of about 4%.[7]

**Table 2. Total peak demand and capacities of the Philippine power sector, 1990-2000.**

| Year | Total Peak Demand (in MW) | Peak Demand with Reserve Margin | Installed Capacity | Available Capacity |
|---|---|---|---|---|
| 1990 | 3,974 | 4,889 | 6,869 | 4,808 |
| 1991 | 4,081 | 5,021 | 6,789 | 4,752 |
| 1992 | 4,295 | 5,286 | 6,949 | 4,864 |

[7] In one of the key informant interviews, our correspondent mentioned that there should have been a real attempt by the Department of Energy [or ERC] to physically inspect and test run the actual capacities of the IPPs. This is particularly important for those built during the financial crisis when the capacity was, allegedly, no longer needed. Consequently, there was a conception that the capacities, which was the basis for the power purchase agreement (PPAs) were inexistent in the first place. ERC, in contrast, during one of the interviews, that they do inspect plants as part of their evaluation, particularly those applying for power supply agreement, since they have to apply for certificate of compliance before they operate. We reserve the exploration of this issue to future research.

| | | | | |
|---|---|---|---|---|
| 1993 | 4,676 | 5,754 | 7,959 | 5,571 |
| 1994 | 4,814 | 5,924 | 9,213 | 6,449 |
| 1995 | 5,328 | 6,556 | 9,732 | 6,812 |
| 1996 | 5,781 | 7,114 | 11,193 | 7,835 |
| 1997 | 6,350 | 7,815 | 11,762 | 8,233 |
| 1998 | 6,438 | 7,924 | 11,931 | 8,352 |
| 1999 | 6,607 | 8,132 | 12,431 | 8,702 |
| 2000 | 7,138 | 8,786 | 13,185 | 9,230 |

*Source of basic data:* Department of Energy (DOE).

Notes: Peak demand with reserve margin was calculated following Navarro, et al. (2016). For Luzon and Visayas, the ERC-approved required reserve margin above peak demand is 23.4% –composed of 2.8% Load Following and Frequency Regulation, 10.3% Spinning Reserve, 10.3% Back-Up. As for Mindanao, the ERC-approved required reserve margin above peak demand is 21% -- composed of (2.8% Load Following and Frequency Regulation, 9.1% Spinning Reserve, 9.1% Back-Up). Meanwhile, available capacity is assumed to be 70% of the total installed capacity based on DOE Power Situation Report 2015.

3.1.2.1.2. *Quality*. Although reliability and power quality are somewhat related, they are really two separate issues. Here, we distinguish quality from reliability but looking at power outages and fluctuations in voltage. Using data from the 1995 Household Energy Consumption Survey (HECS), we find that power outages were the main problem of electricity users in the Philippines, with 9 out of 10 households experiencing "brown-outs" during the survey period.8 This was true for both urban and rural areas in all regions, except the Autonomous Region in Muslim Mindanao (ARMM). High electricity rates were the major concern in ARMM (see Table 3). In Western Mindanao, 7 out of 10 households using electricity also reported fluctuations in the voltage as the main problem

**Table 3. Proportion of Households by Type of Problem on Fuel Supply by Region, Urban-Rural: 1995**

| Region and Area | Total No. of Hhs with Problem in Using (In thousand) | Problem with Electricity Use | | | | |
|---|---|---|---|---|---|---|
| | | Brown-Outs | High Rates | Low Voltage | Fluctuating Voltage | Others |
| Philippines | 7,383 | 89.6 | 72.6 | 47.0 | 49.7 | 2.8 |
| Urban | 4,760 | 89.8 | 71.6 | 46.1 | 48.0 | 2.8 |
| Rural | 2,624 | 89.2 | 74.4 | 48.5 | 52.8 | 2.8 |
| NCR | 1,558 | 93.3 | 69.0 | 31.6 | 31.4 | 1.0 |
| CAR | 119 | 79.0 | 73.1 | 30.2 | 47.1 | 0.8 |
| I. Ilocos | 515 | 94.4 | 73.4 | 37.3 | 48.3 | 3.7 |
| II. Cagayan Valley | 270 | 71.1 | 61.1 | 10.7 | 23.0 | 1.1 |
| III. Central Luzon | 944 | 92.3 | 70.6 | 58.5 | 66.2 | 2.8 |

[8] An interview with stakeholders at PSALM confirmed a number of power outages in early 1990s.

| Region and Area | Total No. of Hhs with Problem in Using (In thousand) | Problem with Electricity Use | | | | |
|---|---|---|---|---|---|---|
| | | Brown-Outs | High Rates | Low Voltage | Fluctuating Voltage | Others |
| IV. Southern Tagalog | 1,272 | 98.9 | 79.7 | 72.3 | 69.5 | 3.8 |
| V. Bicol | 394 | 87.1 | 75.1 | 35.5 | 53.0 | 3.3 |
| VI. Western Visayas | 466 | 82.8 | 73.4 | 56.9 | 53.9 | 3.0 |
| VII. Central Visayas | 400 | 80.8 | 61.8 | 52.2 | 33.8 | 3.2 |
| VIII. Eastern Visayas | 357 | 95.5 | 74.5 | 53.5 | 52.1 | 6.2 |
| IX. Western Mindanao | 206 | 77.2 | 70.0 | 60.2 | 70.4 | 11.2 |
| X. Northern Mindanao | 343 | 84.2 | 77.6 | 28.6 | 40.8 | 0.6 |
| XI. Southern Mindanao | 348 | 77.9 | 75.9 | 44.2 | 48.6 | 1.0 |
| XII. Central Mindanao | 104 | 79.8 | 67.3 | 44.2 | 58.6 | 2.0 |
| ARMM | 89 | 75.3 | 89.9 | 18.0 | 12.4 | |

Source: NSO-DOE, 1995 Household Energy Consumption Survey (HECS) Table K.

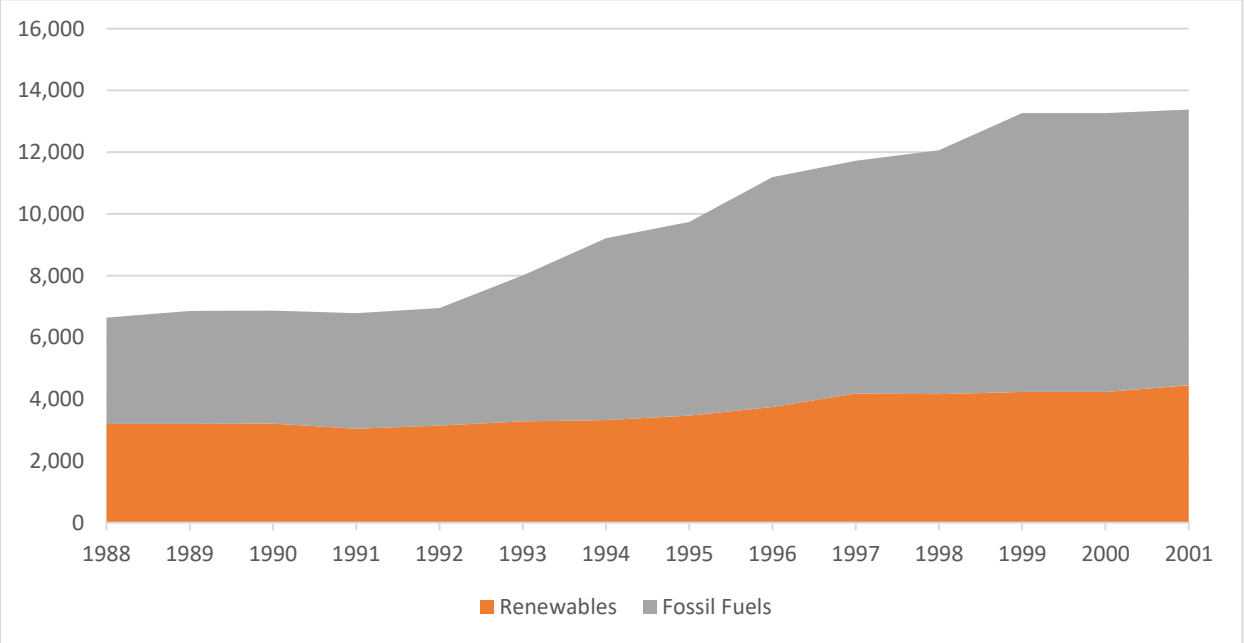
Anecdotal events also abound, illustrating a picture of the Philippine power crisis in the 1990s, which was recorded to have started in Mindanao between 1990 and 1991. At that time, El Niño brought in a long drought that effectively brought down the Agus Complex's normal capacity from slightly over 700 MW to as low as 300 MW. With a peak capacity at that time of around 800 MW, this resulted to a debilitating 10-12-hour power outages in Mindanao.[9] In 1991, the island lost power for 1,418 hours, nearly two months in 1991.[10] In1992, Luzon experienced no electricity for 347 hours, the equivalent of nearly 15 days.

3.1.2.1.3. *Security.* The team recognizes that there is a number of indicators that could reflect the country's energy security. For one, the term is complex and could cover a multitude of indicators. The International Energy Agency (IEA), for example, defines energy security as "the uninterrupted availability of energy sources at an affordable price." In our context, however, we limit the discussion of energy security to mean shielding the sector from external shocks (e.g., global crude oil price shocks) that may influence price or adversely affect availability of energy sources, depending on the country's imported energy source. This implies that energy security is correlated with less dependence on imported energy sources. [11]

[9] Delgado, G. The Power Crisis in the 90s. https://gaadsviews.com/2015/03/22/the-power-crisis-in-the-90s-4/.
[10] Spokane Chronicle, 1992. Accessed at https://news.google.com/newspapers?nid=1345&dat=19920408&id=w1hYAAAAIBAJ&sjid=9vkDAAAAIBAJ&pg=7181,962775&hl=en.
[11] During the Luzon public consultation, it was raised that self-sufficiency is not equivalent to energy security. The team recognizes this; hence, we combine analysis on energy security with a number of other analyses covering energy quality, availability and reliability, to provide qualification for the measure of energy security.

Historical data from the DOE illustrates the growing dependence of the Philippine electric industry on imported fossil-fuel since 1990. The total power generation in 1990 was 26,327 gigawatt-hours (GWh), of which 14,368 GWh (about 55 percent) were from fossil-based power plants and 11,959 GWh (about 45 percent) were from renewable sources such as hydro, geothermal, and others (wind, solar, biomass). In 1997, the share of fossil-fuel sources reached to 67 percent, before dropping to 57 percent in 2000. Gross generation for 1997 and 2000 were 39,797 GWh and 45,290 GWh, respectively.

**Figure 3. Installed generating capacity (in MWh), fossil-based versus renewables, 1989-2001.**




Source: 2000-2 Philippine Statistical Yearbook Table 14.6.

Dependence on imported fuel has implications on the unit price of electricity, which is sold in local currency.[12] A case in point was the depreciation of peso vis-à-vis the dollar during the 1997-1998 Asian financial crisis. Exchange rates against the dollar were relatively stable during the 1990s, until 1998 brought a devaluation of roughly 30%, from 29:1 to 40:1. Since 1998, the currency has continued to decline against the dollar to almost 55:1 (Woodhouse 2005). The progressive depreciation of the peso caused the price per kWh to soar.[13] This increase in prices were passed on to consumers who began to pay highest rates in the region.

*3.1.2.1.4. Affordability.* Since the early 1980s, the Philippine power rates remained the highest compared to all other electricity prices in its neighbor countries. Table 4 shows that overall electricity rates in the country ranks 2nd to Japan. For industrial power rates, the Philippines

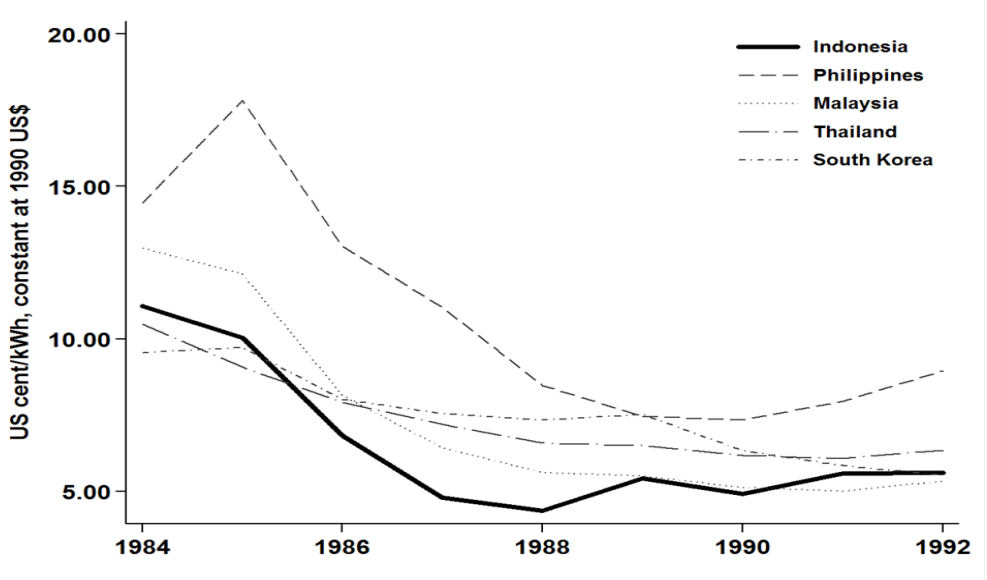
[12] During the key informant interviews, a couple of stakeholders expressed the dilemma of having natural gas prices indexed based on international market. Thus, unit price of natural gas can go up with the depreciation of peso, holding other things constant. This is true even for locally produced natural gas.

[13] The significant increase in the unit price of electricity is partly due to the IPP contracts that are dollar-denominated.

has the highest and potentially remained the most expensive in the region since the early 1980s (see Figure 4 and Table 4).[14]

Several neighboring countries (Thailand, Indonesia, Malaysia, Korea, Taiwan) have average tariffs that are much lower than that of the country. These lower tariffs result from Government policies to provide subsidies in the form of frozen tariffs, sale of fuel to utilities at below market rates and utility-losses shouldered by the government. A study done by the International Energy Consultants in 2012 suggests that the true cost of electricity in these countries rises to a level that is close to that of the Philippines if the subsidies are added back to the tariffs.

**Figure 4. Average industrial rates, in US cent/kWh, constant 1990.**




Source of basic data: Malhotra, Koenig and Sinsukprasert (1994). A survey of Asia's energy prices. World Bank Technical Paper No. 248.

**Table 4. Comparative Average Rates of Asian Utilities (as of December 1996).**

| Utility | Residential | Commercial | Industrial | Overall |
|---|---|---|---|---|
| PULN (Indonesia) | P1.78 | P2.78 | P1.60 | P1.84 |
| MEA (Thailand) | P2.25 | P2.28 | P1.85 | P2.03 |
| TNB (Malaysia) | P2.09 | P2.63 | P1.97 | P2.16 |
| KEPCO (Korea) | P2.83 | P2.76 | P1.50 | P1.96 |
| SP (Singapore) | P2.81 | P2.48 | P2.19 | P2.43 |
| TAIPOWER (Taiwan) | P2.11 | P2.72 | P1.81 | P1.97 |
| CLPO (Hong Kong) | P2.98 | P2.86 | P2.70 | P2.85 |
| **MERALCO (Philippines)** | **P3.61** | **P3.69** | **P3.34** | **P3.54** |
| Kansai (Japan) | P5.55 | P4.86 | P3.01 | P4.16 |

Source: MERALCO (as extracted from Patalinghug, 2003).

[14] It was highlighted in one of the key informant interviews that it would be very useful if the Philippine Statistical Authority would be able to generate CPI specifically for energy.

#### *3.1.2.2. Competition*

Prior to implementing EPIRA, the Philippine electric industry was dominated by the National Power Corporation (NPC) (Patalinghug, 2003). From its creation in 1936 up to the late 1980's, the generation of power and its transmission through the nationwide transmission grid in the country was vertically integrated, centrally controlled and managed, and wholly-owned by the NPC.[15] By the late 1980s, however, NPC had accumulated billions of debt, making it extremely difficult to (1) operate and maintain its existing generation portfolio, and (2) build and install new capacities in anticipation of the looming power crisis (KPMG, 2013).

In 1987, the then Aquino administration passed Executive Order No. 215, which aimed to encourage private sector participation in power generation. In particular, EO 215 seeks to provide accreditation to private sector entities (also known as Independent Power Producers or IPPs) to build and operate electric generating plants that are intended to sell electricity to the grid, consistent to NPC's developmental plans. EO 215 was followed by Republic Act No. 6957, also known as the Build-Operate-Transfer Law (BOT Law) in 1990, which permitted private contractors to construct and operate power generation facilities for an assured return on investments. Following the continued inability of national capacity to meet increasing power demand, the Philippine government strengthened the BOT Law by enacting the Republic Act No. 7718 or the Amended BOT Law in 1994.

During the Ramos Administration, the government further expanded the scope of private sector involvement in the power sector by implementing Republic Act No. 7468, otherwise known as the Electric Power Crisis Act of 1993 (Power Crisis Act). The law was approved in 1993 and gave the President the power to enter in to negotiated contracts for the "construction, repair, rehabilitation, improvement or maintenance of power plants, projects and facilities".

Notwithstanding, there has been continued pressure on the part of the government to implement a dramatic change in the power sector, owing to not enough private sector participation in power generation (which may also be caused by the increasing financial losses and heavy indebtedness of NPC, thus increasing risks faced by NPC's creditors and reducing investors' appetite to participate in the power industry).[16] This paved the way to the enactment of EPIRA in 2001.

#### *3.1.2.3. Investment and Infrastructure*

Historically, it is not hard to show that investment requirements of the Philippine power industry far exceed the capacities of national utilities and the government. Despite the active

[15] According to the Presidential Decree No. 40 signed by the then President Marcos in 1972, cooperatives, private utilities and local government may be permitted to own and operate isolated grids and generation facilities in areas beyond those set by the NPC, subject, however, to state regulation.

[16] The NPC's situation was exacerbated by the Asian financial crisis that struck in the late 1990s, which had an immediate impact on the IPP sector in the Philippines through the depreciation of peso, making the take-or-pay or capacity payments included in the power purchase contracts unsustainable. By December 2000, NPC had accumulated debts of P900 billion, nearly half of the government's P2.179-trillion debt. (Source: https://www.philstar.com/headlines/2014/01/14/1278583/special-report-whats-wrong-epira#Ucf2tWfEjszmGh4y.99).

wooing of private investors by the Philippine government, the number of power-related infrastructure projects has been limited since the 1980s and prior to EPIRA in 2001. In terms of power generation, for example, IPPs, which includes rural electric cooperatives and private utilities, and self-generating industries account for only 5.80% of the total (see Table 5). The share has reached to a record low of 0.34% in 1994 before rising to 5.04% in 2000.

**Table 5. Power Generation by Utility (In million kilowatt hours)**

| Year | Total | National Power Corporation | Independent Power Producers | | | | Self-Generating Industries |
|---|---|---|---|---|---|---|---|
| | | | National Power Corporations | Rural Electric Companies | Private Utilities | Manila Electric Company | |
| 1981 | 18,583 | 15,988 | | 222 | 368 | | 2,005 |
| 1982 | 19,406 | 17,307 | | 92 | 324 | | 1,683 |
| 1983 | 21,454 | 18,693 | - | - | 2,761 | … | - |
| 1984 | 21,180 | 18,731 | - | 42 | 1,677 | … | 730 |
| 1985 | 22,767 | 18,717 | - | - | 4,050 | … | - |
| 1986 | 21,797 | 19,271 | - | - | 2,526 | … | - |
| 1987 | 22,642 | 20,958 | - | 85 | 521 | 274 | 804 |
| 1988 | 24,538 | 22,920 | - | 55 | 457 | 261 | 845 |
| 1989 | 25,573 | 24,087 | - | 33 | 110 | 359 | 984 |
| 1990 | 26,327 | 24,798 | - | 33 | 134 | 283 | 1,079 |
| 1991 | 25,649 | 25,451 | - | 35 | 163 | … | - |
| 1992 | 25,870 | 25,538 | - | 43 | 289 | … | - |
| 1993 | 26,579 | 26,421 | - | 40 | 118 | … | - |
| 1994 | 30,459 | 25,092 | 5,265 | 32 | 70 | - | - |
| 1995 | 33,554 | 22,138 | 11,197 | 73 | 53 | 93 | - |
| 1996 | 36,707 | 23,816 | 11,788 | 93 | 138 | 872 | - |
| 1997 | 39,797 | 23,202 | 15,500 | 82 | 97 | 916 | - |
| 1998 | 41,580 | 24,541 | 15,143 | 273 | 766 | 857 | - |
| 1999 | 41,310 | 26,422 | 12,805 | 123 | 1,103 | 857 | - |
| 2000 | 45,290 | 40,978 | - | 73 | 1,026 | 3,213 | - |

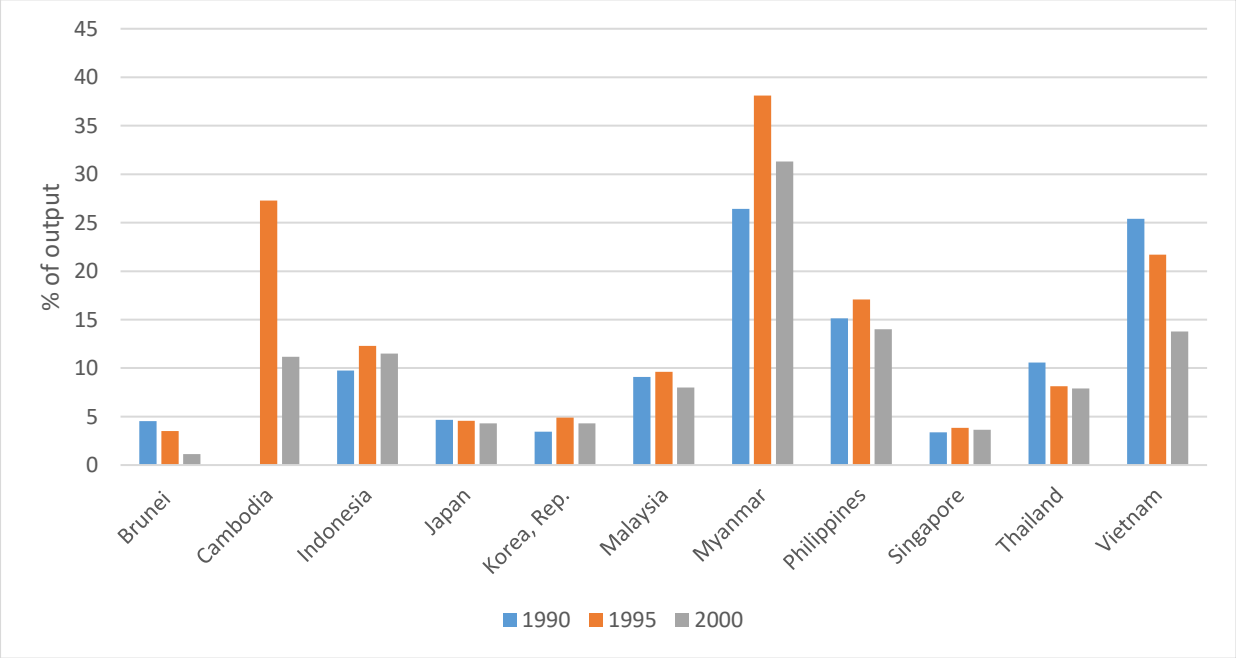
Source: 2000 Philippine Statistical Yearbook Table 14.5

#### *3.1.2.4. Electric Grid Modernization*

As discussed, the national grid is held by the NPC prior to implementation of EPIRA in 2001. With NPC suffering from poor financial health and heavy indebtedness, investments to modernize the grid had been strained severely, thus impeding opportunities to improve the delivery of electricity from generation plants to end-users. The lack of adequate investment in transmission infrastructure gets even more problematic when we consider the archipelagic nature of the country and its exposure to natural calamities like earthquakes and tropical storms, making the needed investment of transmission infrastructure costlier (Woodhouse 2005).

We do not have data on how much historical investments deviated from the optimal level prior to implementation of EPIRA. However, a cross-country comparison of system loss gives us an insight on how much the Philippine generally lags behind its neighboring countries. In particular, we can see that in 1990 the country ranked 3rd in having the highest share of transmission and distribution losses in total power output.[17] In 2000, it stood 2nd to Myanmar as Vietnam dramatically reduced in output losses from 25% to over 13%.

**Figure 5. Electric power transmission and distribution losses (% of output)**




Source: Authors' representation of data from the World Bank Development Indicators.

#### *3.1.2.5. Regulatory Environment*

Prior to implementation of EPIRA, the policy and regulation are governed by several government agencies: the National Electrification Administration (NEA); the DOE and the Energy Regulatory Board (ERB), and the NPC.

In 1973, NEA was transformed into a government-owned and controlled corporation (GOCC) "with borrowing authority and corporate powers and increased its capitalization to P1 Billion to further strengthen and enable the [electric cooperatives] to become effectively established and operationally viable. The most significant among these powers were its regulatory function with regard to rate fixing and the authority to grant and revoke franchises.

[17] According to the Philippine Distribution Code, system losses can be classified into three: technical losses, nontechnical losses, and administrative losses. Technical losses involve the conductor loss when electricity travels, the core loss in transformers, and any losses due to technical metering error. Non-technical losses refer to the energy lost due to pilferage, meter-reading errors and meter tampering. Administrative losses are the energy required for the proper operation of distribution system and any unbilled energy for community-related activities. In our analysis, we do not have distinguish losses between these three categories.

Meanwhile, the DOE, which was created in 1977, is responsible for energy policy and coordination with other government institutions for its implementation.

The NPC centrally controlled, managed and wholly-owned the generation of power of power and its transmission from 1936 up to 1980s. Prior to implementing EPIRA, about 90 percent of the generated power came from the NPC, with more than half of that coming from NPC power plants and the balance from independent power producers (IPPs) under power purchase agreements with NPC. NPC was tasked to fix its power generation and transmission rates.

Price and price-related regulations of private electric utilities are the domain of the Energy Regulatory Board (ERB) since its creation in 1987. In 1992, Republic Act No. 7638 was signed, mandating ERB to oversee the rates of the NPC and the ECs. Non-pricing functions of the ERB with respect to the petroleum industry were transferred to the DOE. In 1998 he Philippine oil industry was fully deregulated, thus, ERB's focus of responsibility centered on the electric industry.

Primarily due to the structure of the Philippine power sector prior to EPIRA, that anti-trust and competition had never been in the radar screen of most industry players. Moreover, Mendoza (2008) pointed out that the country has not much experience in performance-based regulation, open access of end-users to their service providers nor promotion of investments to build capacities or improve service delivery. It is, therefore, no surprise that, even with the restructuring, the sector had to first regain its financial viability, improve its regulatory performance and inspire confidence in private sector for the power sector reform to succeed.

### 3.1.3. Social Equity

#### *3.1.3.1. Electrification*

Energy poverty may be defined by the minimum energy consumption needed to sustain lives. Current indicators used by such organizations as the World Bank and the International Energy Agency (IEA) measure energy poverty indicators as outputs (e.g., lack of electricity connections), while others use outcome (e.g., energy consumption and associated welfare gains). Due to data limitations, we focus on electricity connections.

Table 6 shows the proportion of families with electricity by region in years prior to the implementation of EPIRA, as reported in the Family Income and Expenditure Survey (FIES). In 1991, about 62% of the families have access to electricity. The National Capital Region (NCR) had the highest share of families with electricity at 97%, while the Autonomous Region of Muslim Mindanao (ARMM) had the lowest at about 20%. Urban families have higher share of families with electricity, about twice as much as that of the families in rural areas. In 1994, the share of families with electricity has grown to 66% and further increased to 70% in 1997.

**Table 6. Proportion of Families with Electricity by Region, Urban – Rural, selected years.**

| | 1991 | | | 1994 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Region** | **Total** | **Urban** | **Rural** | **Total** | **Urban** | **Rural** | **Total** | **Urban** | **Rural** |
| Philippines | 61.69 | 80.88 | 42.82 | 66.04 | 84.19 | 48.07 | 70.40 | 90.38 | 52.28 |
| NCR | 96.63 | 96.63 | - | 98.40 | 98.40 | - | 99.51 | 99.51 | - |
| CAR | 48.20 | 75.11 | 36.21 | 55.96 | 82.74 | 43.91 | 55.62 | 93.96 | 39.97 |

| Region | 1991 | | | 1994 | | | 1997 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural |
| Region I | 71.65 | 76.05 | 68.86 | 73.95 | 78.00 | 71.12 | 75.90 | 79.82 | 69.07 |
| Region II | 57.87 | 74.74 | 52.46 | 61.61 | 76.54 | 56.81 | 63.24 | 83.07 | 57.89 |
| Region III | 84.89 | 90.06 | 77.48 | 86.47 | 91.70 | 78.93 | 91.42 | 96.45 | 85.04 |
| Region IV | 71.08 | 88.27 | 52.75 | 75.78 | 90.27 | 60.16 | 79.74 | 93.67 | 64.18 |
| Region V | 43.80 | 60.81 | 59.01 | 51.14 | 70.09 | 42.88 | 57.27 | 81.29 | 48.48 |
| Region VI | 44.97 | 65.38 | 31.88 | 53.52 | 74.00 | 40.69 | 57.27 | 80.04 | 44.04 |
| Region VII | 48.44 | 68.69 | 32.52 | 54.31 | 76.83 | 36.45 | 59.12 | 82.47 | 40.96 |
| Region VIII | 36.68 | 56.07 | 28.75 | 42.71 | 62.44 | 34.64 | 46.77 | 71.54 | 37.67 |
| Region IX | 42.75 | 72.56 | 27.78 | 46.18 | 76.59 | 30.83 | 48.85 | 79.19 | 35.54 |
| Region X | 54.19 | 67.86 | 43.07 | 58.21 | 70.13 | 48.44 | 64.89 | 81.56 | 52.03 |
| Region XI | 52.36 | 69.91 | 37.11 | 55.41 | 72.04 | 40.88 | 64.74 | 86.92 | 50.55 |
| Region XII | 46.45 | 62.43 | 36.11 | 50.87 | 63.35 | 44.04 | 59.34 | 83.95 | 48.98 |
| ARMM | 19.87 | 33.69 | 15.81 | 20.82 | 31.58 | 17.67 | 31.65 | 51.01 | 26.26 |
| CARAGA | - | - | - | - | - | - | 57.22 | 74.70 | 47.14 |

Source: 1997 FIES Special Report on Housing Table L.

In terms of the major island grids, Luzon has above average share of families with electricity (68% in 1991), followed by Visayas (43%) and Mindanao (43%). Note, however, that without ARMM, Mindanao would have higher share of families with electricity in 1991 at 49%. The distribution remains the same in 1994 and 1997.

#### *3.1.3.2. Inter-customer equity*

Prior to and immediately after the implementation of EPIRA, the Philippine power sector is characterized by a number of cross-subsidies. For example, Patalinghug (2003) mentioned that the NPC-Small Power Utilities Group (SPUG)[18] required P13.2 billion worth of subsidies to carry out missionary electrification for the period 1998-2001.[19] The cost of these subsidies was borne by consumers in the form of charges that are embedded in the NPC's pricing of bulk electricity. Other cross-subsidies include subsidies within and among the grids and among various classes of consumers.[20]

To get a sense of the magnitude of the cross subsidies, we refer to study done under the Consumer Impact Assessment Technical Assistance Project.[21] In particular, we refer to a

[18] NPC-SPUG is responsible for producing power generation and its associated power delivery systems in areas that are not connected to the transmission system. NPC-SPUG is a provider of basic electricity services in unviable,
unserved, and marginalized areas.

[19] In contrast to the other Asian neighbors like Thailand, Malaysia, Thailand, Indonesia, Korea and Taiwan, the Philippine government does not provide subsidies that reduce average tariffs, such as tariff caps, direct subsidies for utility losses (including foreign exchange losses) and fuel cost caps. These subsidies were generally considered as bad economic practices and generally unsustainable (IEC, 2012).

[20] A cost adjustment mechanism that accounts for fluctuations in fuel prices and foreign exchange rates is also embedded in the NPC's electricity prices.

[21] The study was conducted under a grant from the Asian Development Bank in coordination with the Philippine Department of Energy as the Executing Agency. The project was undertaken by Navigant Consulting, Inc.

simulation exercise on households for which interclass subsidy and inter-grid figures were available. Table 7 summarizes the results of the simulation.

**Table 7. Effect of removing subsidies on 1998 residential prices.**

| Province | 1998 Price | Price after removal of EAC | % change from 1998 | Price after removal of IC | % change from 1998 |
|---|---|---|---|---|---|
| **Luzon** | | | | | |
| NCR | 4.38 | 4.21 | -3.8 | 5.01 | 14.4 |
| Bulacan | 4.22 | 4.05 | -4 | 4.85 | 15 |
| Cavite | 4.25 | 4.08 | -3.9 | 4.88 | 14.9 |
| Laguna | 4.27 | 4.12 | -3.6 | 4.87 | 13.9 |
| Quezon | 4.28 | 4.2 | -1.9 | 4.76 | 11.3 |
| Rizal | 4.33 | 4.16 | -3.9 | 4.96 | 14.6 |
| Tarlac | 4.24 | 4.56 | 7.5 | 4.8 | 13.3 |
| **Visayas** | | | | | |
| Iloilo | 4.23 | 4.82 | 14 | 5.13 | 21.4 |
| **Mindanao** | | | | | |
| Davao Norte | 2.77 | 3.44 | 24 | 3.7 | 33.3 |
| Davao Sur | 2.73 | 3.38 | 23.9 | 3.92 | 43.8 |

Source: DOE as extracted from the Consumer Impact Assessment Technical Assistance Project.

From Table 7, we see that exception of Tarlac, the Luzon provinces would have experienced a decline in residential prices in 1998 after the removal of the Economic Assistance Charges (EAC).[22] Meanwhile, all of provinces in Mindanao would have experienced an increase in residential prices. The magnitude of price change is quite significant, with an average decline of about 3.52% in Luzon (excluding Tarlac) from the 1997 price level to about 24% price increase in Mindanao. Meanwhile, the removal of interclass subsidies (i.e., subsidies from industrial and commercial customers to residential customers), would have brought residential price increases in all provinces, ranging from an average increase of about 14% in Luzon to more than 38% in Mindanao.

### 3.1.4. Sustainability of Energy

(formerly Resource Management International, Inc.) in association with UPecon Foundation (essentially the School of Economics of the University of the Philippines) and Ian Pope & Associates.

[22] The EAC includes subsidies from the Luzon grid to the Visayas and Mindanao grids, and some subsidies within each grid.

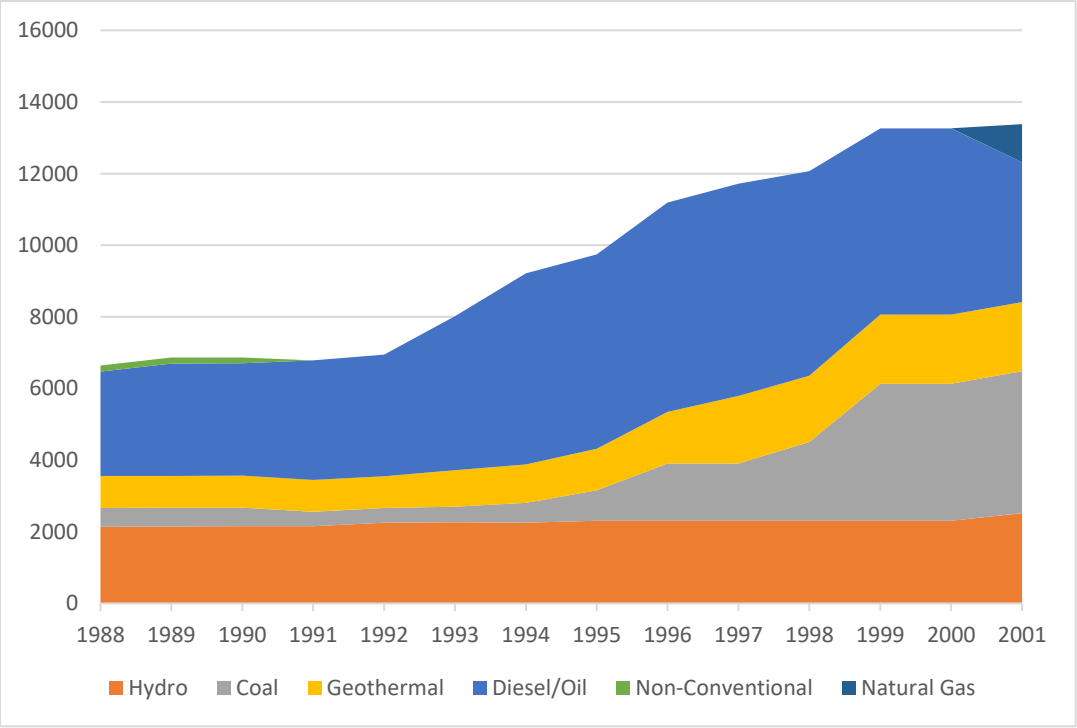
### *3.1.4.1. Share of renewables in the energy mix*

Historical data from the DOE illustrates the growing dependence of the Philippine electric industry on imported fossil-fuel since 1990. The total power generation in 1990 was 26,327 gigawatt-hours (GWh), of which 14,368 GWh (about 55 percent) were from fossil-based power plants and 11,959 GWh (about 45 percent) were from renewable sources such as hydro, geothermal, and others (wind, solar, biomass). In 1997, the share of fossil-fuel sources reached to 67 percent, before dropping to 57 percent in 2000. Gross generation for 1997 and 2000 were 39,797 GWh and 45,290 GWh, respectively.

Over the period of 1990-2000, the share of fossil-fuel-based generation grew by an average of 6.58 percent, peaking in 1995 at 15.92 percent. 1999 saw the biggest drop in fossil-based generation. Of the imported energy source, coal was seen to have increased dramatically, both in levels and in share total energy mix.

Meanwhile, the growth of renewable-based generation had been low and volatile historically. On the average, renewable-based generation grew at an annual rate of 4.84 percent, peaking in 1999 at 31.86 percent. Hydro-powered plants, which had been used as baseload, remains flat while geothermal-powered plants have relatively grown starting 1996.

**Figure 6. Installed generating capacity in the Philippine power sector (in mWh), 1988-2001.**




Source: 2000-2 Philippine Statistical Yearbook Table 14.6

### *3.1.4.2. Investment climate for renewables*

There is growing interest in renewable energy in many parts of the world as a result of energy security and environmental concerns and the need to deliver electricity to energy-poor regions (Verzola, Logarta and Maniego 2017). Notwithstanding, the share of renewables, even if we include biofuels and hydropower, to total global energy consumption had been small, less than 5 percent. In contrast, Philippines has had more than 40% in renewables.

Modern renewables started to appear in the 1980s and 1990s.[23] Since then, renewable energy prices continuously dropped, owing to the growing investment and research in the sector around the world. Nonetheless, the country's investment climate seems to ignore these opportunities, at least prior to the implementation of EPIRA in 2001. For one, the important laws that may have supported the shift from fossil fuels to renewables (largely indirectly) only includes the Constitution and the Clean Air Act of 1999.

Prior to the Renewable Energy Act of 2008, there were no incentives to renewable energy development in the country. The DOE listed challenges and barriers for RE development in the country, which include high upfront and technological costs, non-competitiveness, non-viable markets, inaccessible financial packages, and social acceptability. These barriers are coupled by the plausibility that retail rates in the country do not account the external damage costs associated with air pollutions coming from dirty fossil-fired generation plants. Without any policy addressing these concerns (e.g., carbon pricing), power from renewables may be viewed as less competitive, making investments in renewable energy sources extremely challenging.

### *3.2. Inputs/Design*

In doing performance assessment of power sector reform, one of the challenges that must be confronted is the need to choose a suitable counterfactual benchmark for comparison purposes (Joskow 2008). This implies that we may need to develop metrics that would illustrate the scenario had the reform did not occur or if the reform had been made differently and compare these metrics with what we observed in the data. Unfortunately, this is extremely difficult in our current setting primarily due to data availability. In the succeeding sections, we will employ "before and after" comparisons using time series data that will reflect the changes in the indicators that we developed in the benchmarking exercise.

In this section, we conduct an evaluation of the design by comparing the observed performance with performance under a clearly defined alternative set of institutional arrangements. In this case, we will compare the performance of the country in reforming the power sector to the "ideal" textbook performance that Joskow (2008) had proposed. In particular, we discuss how the Philippines crafted its power sector reform strategy (based on EPIRA Law) and how this design compares with Joskow's (2008) "textbook" architecture of desirable features of restructuring, regulatory reform, and the development of competitive markets.

#### 3.2.1. EPIRA generally followed Joskow's (2008) "textbook" architecture

[23] Hannah Ritchie and Max Roser (2018) - "Energy Production & Changing Energy Sources". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/energy-production-and-changing-energy-sources' [Online Resource]

Table 8 enumerates the features of Joskow's (2008) "textbook" architecture of desirable features of restructuring, regulatory reform, and the development of competitive markets, and compares them with the power sector structure of the Philippines prior to the EPIRA and the corresponding reform as stated in the law. Generally, the EPIRA was crafted following most of the features of the "ideal" power restructuring reform. In succeeding sections, we will show how these reforms led to a number of improvements in several dimensions, including among others, the decline in transmission and distribution losses and building up of capacities to meet the growing power demand.

**Table 8. A comparison between the "Textbook" features of ideal power industry restructuring reform, (Joskow 2008) and the power industry structure of the Philippines before and under EPIRA.**

| "Textbook" features of ideal power industry restructuring reform, (Joskow 2008) | Before EPIRA | Selected Provisions of EPIRA |
|---|---|---|
| 1. Privatization of state-owned electricity monopolies to create hard budget constraints and high-powered incentives for performance improvements and to make it more difficult for the state to use these enterprises to pursue costly political agendas. | PD No. 40 of 1972 gave the NPC a monopoly on power generation and transmission. Private generation firms called IPPs started participating in 1987. In 1993, the government entered into "take-or-pay" contracts with IPPs, with arguably generous terms (Woodhouse, 2005). The government guaranteed NPCs obligations, with further increased national government's contingent liabilities. | Ch.1 Sec.2. clearly states that it is the policy of the State to "provide an orderly and transparent privatization of the assets and liabilities of the NPC".<br><br>Chp.5 Sec. 47, states that "[e]xcept for the assets of Small Power Utilities Group (SPUG), the generation assets, real estate, and other disposable assets as well as IPP contracts of NPC shall be privatized…".<br><br>Ch.6 Sec.49-50 created the PSALM Corp. to "manage the orderly sale, disposition, and privatization of NPC generation assets, real estate and other disposable assets, and IPP contract.." |
| 2. Vertical separation of potentially competitive segments (e.g., | The industry has two major sectors: 1) a vertically | Ch. 2 Sec.5 stipulates that "the electric power industry be divided into four: namely |

| | | |
|---|---|---|
| generation, marketing and retail supply) from segments that will continue to be regulated (distribution, transmission, system operations) either structurally (through divestiture) or functionally (walls separating affiliates within the same corporation). These changes are thought to be necessary to guard cross-subsidization of competitive businesses from regulated businesses and discriminatory policies affecting access to distribution and transmission networks upon which all competitive suppliers depend. | Integrated generation/ transmission subsector consisting of a) the state-owned generation and transmission company (i.e., the NPC) and b) a number of independent private generation companies or independent power producers (IPPs); and 2) a fragmented and inefficient distribution/supply sub-sector consisting of some 17 investor-owned utilities (IOUs), 119 rural electric cooperatives (RECs), and 10 municipal, city and provincial distribution systems. | generation, transmission, distribution and supply. Generation shall be competitive and open (Sec.6). The transmission and distribution of electric power shall be regulated…, subject to the ratemaking powers of the ERC. (Sec.7 and 8). Meanwhile, supply of electricity to the contestable market is not a public utility operation and suppliers shall not be required to secure national franchise. Prices charged by the suppliers will to be subject to ERC regulation (Sec. 29). |
| 3. Horizontal restructuring of the generation segment, to create an adequate of competing generators to mitigate market power and to ensure that wholesale markets are reasonably competitive. | In 2000, more than 90-percent of the total power generated by the industry came from NPC, with more than half of that coming from NPC power plants and the balance from IPPs under power purchase agreements with NPC | Ch. 2 Sec.5 does not consider power generation a public utility operation, thus allowing any person or entity to engage in power generation without securing a national franchise. With RCOA, the prices charged by a generation company shall not be regulated by the ERC. |

| | | |
|---|---|---|
| 4. Horizontal integration of transmission facilities and network operations to encompass the geographic expanse of "natural" wholesale markets and the designation of a single *independent* system operator to manage the operation of the network, to schedule the generation to meet demand and to maintain the physical parameters of the network (frequency, voltage, stability), and to guide investments in transmission infrastructure to meet reliability and economic standards. | The power industry in the Philippines was vertically integrated and the National Power Corporation (NPC) had monopoly over power generation and transmission. | Ch.2 Sec. 8. Provides for the creation of TRANSCO, which assumed the electrical transmission function of the National Power Corporation (NPC). TRASCO shall "act as the system operator of the nationwide electrical transmission and sub-transmission system" and "ensure and maintain the reliability, adequacy, security, stability and integrity of the nationwide electrical grid". Sec 21 mandates PSALM Corp. to award in competitive bidding, the transmission facilities to a qualified party either through outright sale or a concession contract. |
| 5. The creation of voluntary public wholesale spot energy and operating reserve market institutions to support requirements for real time balancing of supply and demand for electric energy, to allocate scarce network transmission capacity, to respond quickly and effectively to unplanned outages of transmission or generating facilities consistent with the need to maintain network voltage, frequency and stability parameters within narrow limits, and | Prior to EPIRA, there is no voluntary public wholesale spot energy and operating reserve market institutions. | Ch. 2 Sec. 30 provides for the establishment of the wholesale electricity spot market (WESM) composed of the wholesale electricity spot market participants within one year from the effectivity of EPIRA. The statute also states that WESM will be implemented by a market operator, an autonomous group, to be constituted by DOE, with equitable representation from electric power industry participants, initially under the |

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| to facilitate economical trading opportunities among suppliers and between buyers and sellers. | | administrative supervision of the TRANSCO. |
| 6. The development of active "demand-side" institutions that allow consumers to react to variations in wholesale market prices and fully integrate demand side responses to energy prices and reliability criteria into wholesale and retail markets | In 1995, the DOE issued a directive instituting the demand-side management by electric utilities (Department<br>Circular No. 95-08-007). This circular enjoins the electric utilities and electric-cooperatives to develop and submit to ERB their DSM plans periodically every 2<br>years for review and approval, beginning in 1996. DSM policies of the government<br>are focused on the promotion of energy efficient appliances and equipment; establishment of a DSM policy within the ERB; development of energy service companies; continuation of a DSM collaborative process; and adequate DSM funding and skilled staff. The Omnibus Electricity Bill recently passed in the House of Representatives,<br>mandates the ERB to allow the distribution utilities to recover demand-side<br>investment costs | No specific provisions on developing "demand-side" institution, although Ch.1 Sec.2 declares that the law seeks to "encourage the efficient use of energy and other modalities of demand side management". It is also implied in the definition of terms (Sec. 4) that DSM will be undertaken by the distribution utilities to "encourage end-users in the proper management of their load to achieve efficiency in the<br>utilization of fixed infrastructures in the system". |

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| 7. The application of regulatory rules and supporting network institutions to promote efficient access to the transmission network by wholesale buyers and sellers in order to facilitate efficient competitive production and exchange. This includes mechanisms efficiently to allocate scarce transmission capacity among competing network users, and to provide for efficient siting and interconnection of new generating facilities. | Prior to EPIRA, the NPC centrally controlled and wholly owned the transmission through the nationwide transmission grid. Moreover, NPC is tasked to fixed rates subject to approval by the Energy Regulatory Board (ERB). | Ch. 2 Sec. 43 stipulates that ERC shall "promulgate and enforce a National Grid Code", which was published in December 2001. The Code established the basic rules, requirements, procedures, and<br><br>standards that govern the operation, maintenance, and development of country's high-voltage transmission system. |
| 8. The unbundling of retail tariffs to separate prices for retail power supplies and associated customer services to be supplied competitively from the regulated "delivery" charges for using distribution and transmission networks that would continue (primarily) to be provided by regulated monopolies | The power industry in the Philippines was vertically integrated and the National Power Corporation (NPC) had monopoly over power generation and transmission; thus, retail tariffs are unbundled and prices are not separate between transmission, distribution and generation rates. | Ch.2 Sec 36 provides for the unbundling of the rates of NPC between transmission and generation rates. Consequently, the rates shall reflect the respective costs of providing each service. Inter-grid and intra-grid cross subsidies for both the transmission and the generation rates shall be removed. The statute also provides for the unbundling of distribution wheeling charge from the retail rate<br><br>and the rates shall reflect the respective costs of providing each service. |
| 9. Where policymakers have determined that retail competition will not be | The power industry in the Philippines was vertically integrated and the National | Sec. 45 allows distribution companies or alternative designated suppliers to own |

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| available (e.g. for domestic and small commercial customers), distribution companies or alternative designated suppliers would have the responsibility to supply these customers by purchasing power in competitive wholesale markets or, if they choose, to build their own generating facilities to provide power supplies. However, in the latter case the associated charges for power would be subject to wholesale market-based regulatory benchmarks, primarily competitive procurement processes. | Power Corporation (NPC) had monopoly over power generation and transmission. Private generators or IPPs have power purchase agreements with the NPC. | can own, operate or control more than thirty percent (30%) of the installed generating capacity of a grid and/or twenty-five percent (25%) of the national installed generating capacity. Meanwhile, DU may enter into bilateral power supply contracts subject to review by the ER. Finally, for the first five years from the establishment of the WESM, no DU shall source more than 90% of its total demand from bilateral power supply contracts. |
| 10. The creation of independent regulatory agencies with good information about the costs, service quality and comparative performance of the firms supplying regulated network services, the authority to enforce regulatory requirements, and an expert staff to use this information and authority to regulate effectively the prices charged by distribution and transmission companies and the terms and conditions of access to these networks by wholesale and retail | | Ch. 4 Sec. 38 creates the Energy Regulatory Commission (ERC). The ERC is an independent, quasi-judicial regulatory body tasked to "promote competition, encourage market development, ensure customer choice and penalize abuse of market power in the restructured electricity industry". Sec. 40 provides for the "establishment of rigorous training programs for its staff for the purpose of enhancing the technical competence of the ERC in the following |

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| suppliers of power, are also an important but underappreciated component of successful reforms. | | areas: evaluation of technical performance and monitoring of compliance with service and performance standards, performance-based rate-setting reform, environmental standards and such other areas as will enable the ERC to adequately perform its duties and functions. |
| 11. Transition mechanisms must be put in place to move from the old system to the new system. These mechanisms should be compatible with the development of well-functioning competitive markets. | Not applicable | Ch.14 Sec. 67 or Rule 30. of the IRR states that "the NPC will file with ERC for its approval the transition supply contracts duly negotiated by DUs. |

### 3.2.2. Deviations from the "Ideal" Features of Restructuring Reform

While the Philippine power sector reform has generally followed the basic architecture of Joskow's (2008) textbook model, this is not to say the everything worked perfectly. For one, as in other countries, the power sector reform in the Philippines has embedded a number of conflicting objectives, including the promotion of renewable energy and improving social equity, among others. Inevitably, there will instances where certain measures in the reform will detract the objectives of the other (Ravago and Roumasset, 2016).

To highlight this issue, we refer to two major provisions in the EPIRA that seeks to support to support marginalized end-users (i.e., those under lifeline rates and are subsidized by end-users) as well as those that are for some reasons not connected to the grid.

#### *3.2.2.1. Lifeline Rates*

The EPIRA defines "Lifeline Rate" as the subsidized rate given to low-income captive market end-users who cannot afford to pay at full cost. In practice, consumers with monthly electricity consumption of 100 kWh or less will enjoy subsidized prices. For MERALCO, customers using up to 20 kWh a month are free of charge. Those using 21-50 kWh are enjoying a 50-percent discount in rates; 51-70 kWh users are getting a discount of 35 percent; and 20 percent for 71-

100 kWh consumers. Meanwhile, residential consumers in the higher consumption bracket would have to pay extra cost as subsidy to their poorer counterparts.

Under the law, the provision of lifeline rates was exempted from the cross-subsidy phaseout, which was provided in the EPIRA law for a period of 10 years, unless extended by law. In 2011, this socialized pricing mechanism was extended for another 10 years.

Implementing lifeline rates has a number of advantages. First, this socialized pricing mechanism is seen as an equitable way to provide basic levels of electricity to the poor. It can also mitigate the burden of increased tariffs on the poor, which can occur particularly during the adjustment phase of the reform. Second, lifeline rates can also provide incentive for large consumers to economize on use, thus supporting the objective of improving the overall efficiency in the power sector.

While laudable, quantity-based consumption subsidies such as the lifeline rates, in practice, do a poor job of targeting benefits to the poor. There is also the risk of exclusion as poor consumers are not necessarily small consumers, and leakage as some well-off households may have properties that may end up consuming electricity within the threshold (possibly due to holidays or infrequent rental operations such as Airbnb). Under certain conditions, lifeline rates may be regressive if poor (and more numerous) families consume more than threshold. This may be the case when several families are renting a property together. This socialize pricing mechanisms also create distortions in the power sector as the price paid would not reflect the marginal cost of service. There is also the risk of financial unsustainability when the overall revenues from residential customers would not be enough to cover operating and maintenance as well as capital cost of service delivery. Finally, lifeline rates may be problematic in an open-access regime when the subsidized tariff would not be transferred to poor customers if suppliers buy in bulk and sell the service on a retail basis.

#### *3.2.2.2. Universal Charge for Missionary Electrification*

Subsidies for electrification is not a new concept not was introduced by the EPIRA. A commentary by Urbano Mendiola[24] reveals that subsidized electrification started in 1988. It was in 2001, however, when EPIRA prescribed a Universal Charge on Missionary Electrification (UCME) to be imposed on all electric consumers nationwide. The UCME institutionalized the provision of subsidies in areas not interconnected to the main grids, with the view that this end-user funded electrification can make development and progress in these areas at par with the main grids.

Similar to lifeline rates, the UCME is justified as a way to achieve social equity. However, UCME is still a form of cross-subsidies, thus imposing a distortion in the sector as the price paid by end-user in the locality does not reflect the true cost of service delivery. Since the difference in service delivery is still paid for by ratepayers in the main grids, the UCME provides no incentive for the Small Power Utilities Group (SPUG) under the National Power Corporation (NPC) or by Independent Power Providers (IPPs). UCME can also hamper the progress of private sector investment in the locality.

Overall, there must be an evaluation of UCME to determine its cost-effectiveness against other alternatives and against other means to attain the same goal. At the

[24]Urban Mendiola worked at the NPC for 39 years. His commentary on electrification subsidies can be found at https://asian-power.com/regulation/commentary/missionary-electrification-subsidies-in-philippines.

moment, it would be very useful to determine consumer valuation of electricity in marginalized areas. In this way, we can ascertain whether the benefit of providing electricity in marginalized areas outweighs the costs of its implementation.[25]

##### *3.2.2.2.1. Less appreciation for demand-side management*

Chapter 1 Section 2 of the EPIRA declares that the law seeks to "encourage the efficient use of energy and other modalities of demand side management". It is also implied in the definition of terms (Sec. 4) that DSM will be undertaken by the distribution utilities to "encourage end-users in the proper management of their load to achieve efficiency in the utilization of fixed infrastructures in the system. While laudable, there had been no explicit direction nor clear policy direction on how to use demand management in maintaining not only the stability of the grid but also in meeting long-run demand in a more cost-effective way.

### *3.3. Outputs*

As previously discussed, the EPIRA has a number of objectives, and its thrusts were manifold. This led to a number of outputs generated by the EPIRA We discuss each of these outputs below..

#### 3.3.1. Generation segment of the power sector deregulated.

Pursuant to Section 6 of EPIRA, the generation segment of the power sector was made competitive and open to all qualified generation companies. Under EPIRA, generation utilities are no longer required to secure franchise authority from Congress to operate but are mandated to obtain a license from the ERC to operate (Patalinghug 2003). EPIRA also established a maximum permissible market share for participants in the generation segment. In particular, Rule 11, Section 4 of the Act limits the ownership, operation or control to 30% of the installed generating capacity of a grid and/or 25% of the national installed generating capacity.[26]

#### 3.3.2. A new government-owned transmission company created and, consequently, the operation of the transmission system privatized.

Pursuant to Section 8 of EPIRA, the National Transmission Corporation (TRANSCO) was created in 2001. The TRANSCO assumed the electrical transmission function of the NPC that used to dominate the transmission sector (along with the generation sector) and all of its

[25] Based on an experiment that randomized the expansion of electric grid infrastructure in rural Kenya, Lee et al. (2016) found that consumer surplus is far less than total costs at all price levels, suggesting that residential electrification may reduce social welfare.

[26] Such restrictions do not apply to PSALM or NPC during the time its assets are being privatized and isolated grids that are not connected to the high voltage transmission system.

transmission and sub-transmission assets.[27] The TRANSCO became a corporate entity wholly owned by PSALM. Among the function of the TRANSCO includes the following:[28]

- Act as the system operator of the nationwide electrical transmission and sub-transmission system;
- Provide open and non-discriminatory access to its transmission system to all electricity users;
- Ensure and maintain the reliability, adequacy, security, stability and integrity of the
- nationwide electrical grid;
- improve and expand its transmission facilities;
- Subject to technical constraints, the grid operator of the TRANSCO shall provide central dispatch of all generation facilities connected, directly or indirectly, to the transmission system in accordance with the dispatch schedule submitted by the market operator, taking into account outstanding bilateral contracts; and
- Undertake the preparation of the Transmission Development Plans.

EPIRA also mandates the privatization of the government's transmission facilities to promote competition and investments in the power industry. In 2007, the consortium of Monte Oro Grid Resources Corp., Calaca High Power Corporation, and the State Grid Corporation of China as technical partner, won the 25-year concession in 2007 to operate the country's power transmission network after an open, public, and competitive bidding process. At $3.95 billion, it was the biggest government auction conducted in efforts to reform the local power sector.

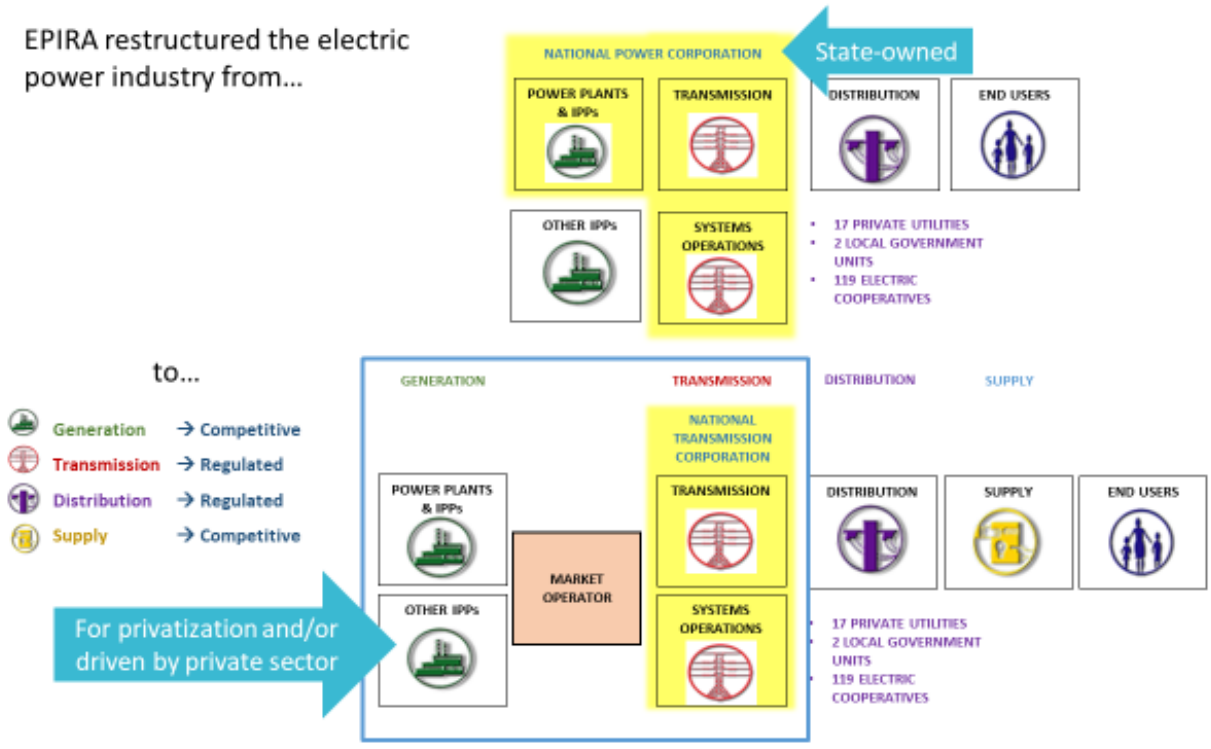
NGCP officially started operations as power transmission service provider in 2009. Under a congressionally-granted 50-year franchise, NGCP has the right to operate and maintain the transmission system and related facilities, and the right of eminent domain necessary to construct, expand, maintain, and operate the transmission system.[29]

### 3.3.3. Unbundling of supply activities (unregulated) from the regulated distribution sector

A major component of EPIRA was the restructuring of the Philippine power sector; that is, separation of the previously vertically integrated power companies into generation, transmission, distribution and supply and metering services. An illustration of the structural changes introduced by EPIRA is provided in Figure 7.

[27] Meanwhile, all the transmission and subtransmission related activities of NPC were transferred to and assumed by the PSALM.
[28] Section 9 of the EPIRA.
[29] NGCP website.

**Figure 7. Philippine power industry restructuring due to EPIRA.**




Source: Figure from ERC

Section 3 of the Rules and Regulations to implement EPIRA states that "an electric power industry participant shall prepare and submit for approval by the ERC its Business Separation and Unbundling Plan (BSUP) on or before December 31, 2002." ERC was expected to render its decision within 6 months from filing of the BSUP. Nonetheless, it was only in December 2008 that the ERC had decided almost 100% of the unbundling applications of 120 electric cooperatives (ECs), 20 private utilities and the NPC. The resulting overall average tariff adjustment (OATA) varies for each distribution utility.[30] The biggest adjustment based on the proposed/applied rate was an increase of P1.7855 per kWh for Ticao Island Electric Cooperative (TISELCO) while the biggest reduction was P2.1067 for Basilan Electric Cooperative (BISELCO). Annex A of the 13th status report on EPIRA Implementation provides a complete data on tariff adjustment per distribution utility.[31]

#### *3.3.3.1. Elimination of cross-subsidies within and among various grids, and among various classes of consumers*

Section 36 of the Act states that inter-grid and intra-grid subsidies for both transmission and the generation will be removed, which was targeted to be completed along with the ERC

[30] Based on a key informant interview, the unbundling took longer than expected because ERC combined the process with rate review and approval. A case in point was MERALCO's application, which ended up with 30 hearings, one hearing for every locality with which it has franchise area on.

[31] Accessible at https://www.doe.gov.ph/sites/default/files/pdf/electric_power/power_industry_reforms/13th_epira_status_report.pdf. A table showing the progress made in unbundling rates is provided in Appendix C.

approval of the unbundled transmission and generation rates. The removal of subsidies is in line with the provision of EPIRA to have retail rates that "reflect the respective costs of providing the [electric] service".[32] Furthermore, former DOE Sec. Perez argued that the removal of inter-class subsidies is revenue neutral for the NPC and the Meralco, and that it will help spur the creation of many jobs by attracting power-intensive industries with more competitive power rates.[33]

The removal of subsidies was designed to phase out in a period not exceeding three years from the establishment by the ERC of a universal charge (UC) to be collected from all electricity end-users. The ERC may extend the period of removing the subsidies for another year if the cessation of the subsidies "would have material adverse effect upon the public interest, especially on residential users or would have an immediate, irreparable and adverse financial effect on the distribution utility".[34]

In 2002 and 2005, the inter-grid (between Luzon and Visayas) and intra-grid (within Luzon) subsidies were removed, respectively. In 2005, the distribution utilities removed the inter-class subsidies (between industrial and residential). The removal of inter-class subsidies was done in two phases; 40 percent of the subsidies was removed in 2004 and 60 percent was taken out in 60.[35]

Meanwhile, a socialized pricing mechanism called a lifeline rate for the marginalized end-users was exempted from the cross-subsidy phase-out for a period of 10 years, pursuant to Section 73 of EPIRA. Under the lifeline subsidy scheme, residential consumers in the higher consumption bracket would have to pay extra cost as subsidy to their poorer counterparts. In 2011, Republic Act No. 10150 was signed, extending the implementation of the lifeline rate for another 10 years.

Finally, the missionary electrification[36] is heavily subsidized through the Universal Charge for Missionary Electrification (UCME). This implies that ratepayers – whether residential, commercial or industrial – on the country's major islands and in the principal population centers subsidizes end-users in areas with unstable grids, inadequate generation capacity or lack of affordable fuel (Ahmed, 2017).[37]

To get a sense of the magnitude of the subsidy, the table below gives an overview of the existing generation rates, which range from about P5/kWh to P7/kWh in 2016. The existing Subsidized Approved Generation Rate (SAGR) is the generation rate paid by cooperatives powering SPUG areas, while the effective rate is the cost of power generation including the generation charge and system loss. The effective rates are highly subsidized as the true cost of generation (TCGR)

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[32] Section 36., para. 2 of the EPIRA.

[33] https://www.philstar.com/business/2004/10/12/265949/doe-justifies-scrapping-cross-subsidies-power-users

[34] Rule 16, Section 3 of the IRR.

[35] https://www.philstar.com/business/2004/10/12/265949/doe-justifies-scrapping-cross-subsidies-power-users

[36] The IRR defines missionary electrification as the provision of basic electricity service in unviable areas (or areas within a DU Franchise Area where immediate extension of distribution line is not feasible), with the ultimate goal of bringing the operations in these areas to viability levels.

[37] http://ieefa.org/wp-content/uploads/2017/11/Now-Is-The-Time-To-Restructure-The-Philippines-Electricity-Sector-Nov-2017.pdf

is between P19/kWh and P33/kWh, on the average. The difference (as illustrated in the last column) is paid for by ratepayers under UCME.

**Table 9. Existing Effective Rates and True Cost of Generation of Small Power Utilities Group in 2016.**

| SPUG Area | Existing Subsidized Approved Generation Rates (SAGR) | Effective Rate, P/kWh | True Cost of Generation | | | | |
|---|---|---|---|---|---|---|---|
| | | | 24-hours | 12-16 hours | 6-8 hours | Average | Difference |
| Mindoro Area | 5.64 | 6.20 | 8.87 | 21.65 | 32.61 | 21.04 | **14.84** |
| Marinduque | 5.64 | 6.20 | 9.55 | 21.65 | 37.07 | 22.76 | **16.56** |
| Mainland Palawan | 5.64 | 6.20 | 11.01 | 32.30 | 33.74 | 25.68 | **19.48** |
| Catanduanes | 5.64 | 6.20 | 9.43 | 18.20 | 39.72 | 22.45 | **16.25** |
| Masbate | 5.12 | 5.68 | 12.51 | 17.57 | 96.79 | 42.29 | **36.61** |
| Tablas | 5.64 | 6.20 | 11.95 | 21.65 | 30.47 | 21.36 | **15.16** |
| Romblon | 6.25 | 6.20 | 11.95 | 21.65 | 24.57 | 19.39 | **13.19** |
| Bantayan | 6.25 | 7.06 | 14.91 | 28.11 | 30.47 | 24.50 | **17.44** |
| Camotes | 6.25 | 7.06 | 14.91 | 28.11 | 30.47 | 24.50 | **17.44** |
| Siquijor | 6.25 | 7.06 | 14.91 | 28.11 | 30.47 | 24.50 | **17.44** |
| Tawi-Tawi | 5.12 | 5.12 | 10.73 | 24.01 | 34.03 | 22.92 | **17.80** |
| Basilan | 5.12 | 5.12 | 11.74 | 50.80 | 34.03 | 32.19 | **27.07** |
| Sulu | 5.12 | 5.12 | 10.50 | 50.80 | 34.03 | 31.78 | **26.66** |
| Other Luzon | | | | | | | |
| Group 1 | 4.80 | 5.36 | 10.03 | 20.62 | 67.32 | 32.66 | **27.30** |
| Group 2 | 5.64 | 6.20 | 10.03 | 20.62 | 67.32 | 32.66 | **26.46** |
| Other Visayas | 5.64 | 6.45 | 16.21 | 24.16 | 42.24 | 27.54 | **21.09** |
| Other Mindanao | 4.80 | 4.80 | 10.95 | 23.25 | 34.03 | 22.74 | **17.94** |

Source: IEAAA 2017 Report, NPC-SPUG website.

### 3.3.4. Creation of an independent regulatory body (Energy Regulatory Commission) and a Joint Congressional Power Commission (JCPC) to oversee implementation of the law.

Pursuant to Section 38 of the EPIRA, the Energy and Regulatory Commission (ERC) was created. ERC is an independent, quasi-judicial regulatory body that promotes competition, encourages market development, ensures customer choice, and penalizes abuse of market power. This is on top of the traditional rate and service regulation functions, which include establishing and enforcing a methodology for setting transmission and distribution wheeling rates and retail rates for the captive market of a distribution utility.

Meanwhile, EPIRA also created the JCPC as the body that will exercise the power of overseeing the proper implementation of the law. Its members are from Congress, and it is jointly chaired by the chairmen of the energy committees in both Houses of Congress. The JCPC started its operation in 2002 with budget of 25 million and is expected to exist for a period of 10 years, unless otherwise extended by a joint concurrent resolution.

### 3.3.5. Privatization and sale of NPC assets and contracts with Independent Power Producers (IPPs) which would give government the cash flows needed to pay off NPC's debts and create a level playing field among generators, which in turn would encourage the influx of private sector investments in the industry;

One of the major provisions of EPIRA is the creation of the Power Sector Assets and Liabilities Management Corporation (PSALM) to manage the orderly privatization of NPC's generation and transmission assets, including NPC's real estates and IPP contracts. Consequently, PSALM assumed all outstanding obligations of NPC arising from loans, issuances of bonds, securities, and other instruments of indebtedness. The proceeds of the privatization are to be used to settle all of the NPC's financial obligations and stranded contract costs. Formally established in June of 2001, PSALM has 25 years from the effectivity of the EPIRA to fulfill its mandate unless otherwise extended by law. After its corporate life, all its assets and outstanding liabilities will revert to and assumed by the government.

A report from the Asian Development Bank (ADB) pointed out that "regulatory and other uncertainties led to the failure of the initial privatization efforts." Substantive progress with privatization towards the end of 2006 with the turnover of the 112-MW Pantabangan-Masiway Hydroelectric Power Plants to First Gen Hydro Power Corporation. According to ADB, major privatizations efforts were successful with the launch of the Wholesale Electricity Spot Market (WESM) in 2006, "as well as various changes in the terms and conditions of the sales that reduced the risks and uncertainties faced by prospective investors".

In 2011, PSALM reached a key milestone was attained with the sales of 80% of the generating capacity of the Luzon and Visayas grid and assignment of 77% of the IPP contracts. These milestones are requirements set by the ERC to implement retail competition and open access (RCOA). As of 2018[38], only a number of power plants have not been privatized, namely; the 650-MW Malaya Thermal Power Plant (MTPP) and the 982 MW Agus-Pulangui hydropower complex and the decommissioned Bataan Thermal Plant, comprising 8,410MW or about 75% of the total capacity (Table 9).[39]

**Table 10. Disposition of Power Plants and IPP Contracts (MW), as of April 2018.**

| Item | Privatized | Balance | Total | Privatized (%) |
|---|---|---|---|---|
| Generation companies | 4,583 | 1,651 | 6,234 | 73.52 |
| IPP Contracts | 3,827 | 1,229 | 5,056 | 75.69 |
| Total | 8,410 | 2,880 | 11,290 | 74.49 |

Note: Total capacity (column 3) were extracted from the 2016 ADB Performance Evaluation Report "Philippines: Electricity Market and Transmission Development Project". Balance are from the PSALM website.

As of June 2018, PSALM, through the privatization of generation assets, the transmission business, and the IPP contracted capacities, has generated a total of PhP944.69 billion. Actual

[38] 30th Electric Power Industry Reform Act (EPIRA) Implementation Status Report, DOE.
[39] PSALM website.

collection amounted to PhP545.20 billion. Total collections of PhP545.2 billion, including interest income on placements, were exclusively utilized for the liquidation of financial obligations amounting to PhP599.58 billion.

**Table 11. Privatization Proceeds Generation and Collection (in PhP Billion), as of 30 June 2018.**

| Assets | Generated | Collected | Balance |
|---|---|---|---|
| Generating Assets | 162.27 | 162.27 | - |
| Decommissioned Plants | 0.63 | 0.63 | - |
| Transmission Business (TransCo) | 290.90 /a | 178.77 | 112.13 |
| Appointment of IPPAs | 490.75 | 203.53 /b | 271.03 |
| Total | 944.60 | 545.20 | 383.17 /c |

Notes: /a - Privatization Proceeds relative to concession fees are inclusive of interest on deferred payment; /b - Collections include adjustments in IPPA proceeds based on IPP plant operation; /c - includes the remaining balance of NGCP's advance payment of PHP22.73 Billion.
Source: PSALM.

### 3.3.6. Creation of a wholesale electricity spot market for the trading of energy, by which competitive market forces would establish generation tariffs and make costs more transparent.

Section 30 of the EPIRA provides for the creation of the wholesale electricity spot market (WESM). In particular, the law mandates that DOE to establish WESM within one year after the effectivity of the law. The said market was designed 'to provide the mechanism for identifying and setting the price of actual variations from the quantities transacted under contracts between sellers and purchasers of electricity". WESM enabled distribution utilities and electricity suppliers to purchase bulk electricity directly from generating entities or to buy it from spot market.[40] The WESM serves as an avenue for generated power to be dispatched on the basis of prices bid into the market, with the lowest priced electricity dispatched first – a concept known as merit order. It was envisioned that WESM would provide the economic signals needed to encourage efficient investment in new generation capacity.

Jointly with the electric power industry participants, the DOE formulated the detailed rules that will govern WESM. The WESM rules were promulgated in 2002. Nonetheless, WESM only commenced commercial operations in Luzon grid in June 2006, after several months of trial operations. Four years into the commercial operations in Luzon, the Visayas grid was integrated into the WESM and commenced commercial operations on 26 December 2010.

As of 2018, the WESM has 286 registered participants for Luzon (67%) and Visayas (37%), of which 113 are generators (Table 12). This is a huge increase from the 68 registered generators in the same region in 2015. In the 2016 ADB report, the region is dominated by four

[40] For the first 5 years after the establishment of the WESM, no distribution utility was permitted to source more than 90% of its total electricity requirements from bilateral supply contracts.

players (San Miguel Corporations, Aboitiz Power Corporation, First Gen Corporation and PSALM) which comprise 64% of the total registered capacity (ADB, 2016). The WESM is seen to be moderately concentrated with an HHI score of 1,000-1,800 in 2015.[41] This is still lower compared to its counterpart in New Zealand which has a score of 2000. Further, the report showed a favorable improvement in the HHI trend over time due to the entry of new players into the market. Thus, the improvement in HHI is expected to have been improved with the influx of new registered players in the market and is expected to continue with the planned extension of the market to incorporate the grid in Mindanao.

**Table 12. Number of Registered WESM Participants, by Region and Category.**

| Category | Luzon | Visayas | Total |
|---|---|---|---|
| Bulk User | 56 | 18 | 74 |
| Bulk User Contestable Customer | 4 | 2 | 6 |
| Electric Cooperative | 43 | 28 | 71 |
| Generator | 76 | 37 | 113 |
| Private DU | 13 | 4 | 17 |
| Supplier | 0 | 0 | 5 |
| **Total** | **190** | **89** | **286** |

Note: A WESM participant is any person or entity registered with the Market Operator (MO) in any one or more categories listed in the table above. Only persons or entities that are registered as WESM members or participants may inject or withdraw electricity from the Grid. Upon registration, the WESM members are bound by the WESM Rules.
Source: http://www.wesm.ph/

Under EPIRA, the WESM shall be implemented by an independent market operator, "to be constituted by DOE, with equitable representation from electric power industry participants, initially under the administrative supervision of the TRANSCO".[42] In contrast, the DOE created the Philippine Electricity Market Corporation (PEMC) to operate the market, with the secretary of the DOE as chairman of the board consisting of representatives from the various sectors of the electric power industry. According to ADB, the DOE justified this action as a necessary transitional step taken to ensure that "all market dysfunctionalities (disorders in the operation of WESM) experienced during the initial years of WESM operations would be fully mitigated before handing over WESM administration to an independent operator".[43][44]

[41] The Herfindahl-Hirschman Index (HHI) is a measure of market concentration. It is calculated by squaring the market share of each firm competing in a market and summing the results. The HHI ranges from close to zero (perfect competition) to 10,000 (monopoly). The closer a market is to a monopoly, the higher the market concentration (and the lower the competition). A market with an HHI that is less than 1,000 is considered competitive. Markets with results of 1,000–1,800 are moderately concentrated, and those with an HHI of 1,800 or more are highly concentrated.
[42] Section 30 of the EPIRA.
[43] ADB (2016) Philippines: Electricity Market and Transmission Development Project. ADB Evaluation Report.
[44] A recent consultation with the DOE revealed on-going discussions on having an independent market operator for WESM.

### 3.3.7. Implementation of retail competition and open access

Section 31 of the EPIRA states that retail competition and open access (RCOA) on distribution wires shall be implemented not later than 3 years after the enactment of the law, subject to the following conditions:

(a) Establishment of the wholesale electricity spot market;
(b) Approval of unbundled transmission and distribution wheeling charges;
(c) Initial implementation of the cross-subsidy removal scheme;
(d) Privatization of at least seventy (70%) percent of the total capacity of generating assets of
NPC in Luzon and Visayas; and
(e) Transfer of the management and control of at least seventy percent (70%) of the total energy output of power plants under contract with NPC to the IPP Administrators.

Upon the initial implementation of open access, the ERC shall allow all electricity end-users with a monthly average peak demand of at least 1MW for the preceding 12 months to be the contestable market[45]. The threshold level for contestable shall be reduced to 750kW after 2 years. At this level, aggregators shall be allowed to supply electricity to end-users whose aggregate demand within a contiguous area is at least seven hundred fifty kilowatts (750kW). On the basis of ERC's evaluation, threshold level shall gradually reduce until it reaches the household demand level. In the case of electric cooperatives, retail competition and open access shall be implemented not earlier than 5 years upon the effectivity of EPIRA.

In 2012, 11 years after the effectivity of EPIRA, the ERC declared the commencement of RCOA, after confirming the existence of all the conditions mentioned above. A transition period of 6 months followed leading to the to the commercial operations in 2013 wherein PEMC was designated as the Central Registration Body under the RCOA regime.

On June 19, 2015, the DOE issued Department Circular No. 2013-06-0010, which provides for the full implementation of RCOA and, consequently, requiring contestable customers, or those that reach a power consumption threshold of 1 megawatt (MW), to move away from being in the captive market of a utility by June 25, 2016. The date was later moved to February 26, 2017. However, the Supreme Court issued the temporary restraining order (TRO) on February 21, 2017, just several days before the DOE-prescribed deadline. The TRO resulted from a number of petitioners, including colleges, which pointed out that EPIRA does not call for a mandatory switch for customers to buy their electricity from a DU to a retail electricity supplier (RES).

To bring forward the development of RCOA, the DOE issued two circulars that allow qualified consumers to voluntarily choose their suppliers instead of being mandated to switch from their DU to RES. The Department Circular No. 2017-12-0013, in particular, allows "contestable customers with a monthly peak demand of 750kW and above may participate in the retail market". Meanwhile, those with monthly peak demand of 500kW to 749 kW may voluntarily participate in the retail market by June 26, 2018. Finally, a contiguous area whose aggregate peak demand is not less than 500kW can become a contestable market and participate in the

[45] EPIRA defines a "contestable markets" as the electricity end-users who have a choice of a supplier of Electricity, as may be determined by the ERC.

retail market by December 26, 2018. In a second circular, DC No. 2017-12-0014, the DOE laid down policies related to the RES or alternative power supplier for contestable customers.

**Table 13. Summary of Policy Issuances for the Implementation of RCOA**

| Date | Policy Issuance | Title |
|---|---|---|
| **Department of Energy** | DC2013-07-0014 | Promulgating the Retail Market Manuals for the Implementation of Retail Competition and Open Access and Providing for Transitory Arrangements |
| | DC2013-07-0013 | Providing Supplemental Policies to Empower the Contestable Customers Under the Regime of Retail Competition and Open Access and Ensure Greater Competition in the Generation and Supply Sectors of the Philippine Electric Power Industry |
| | DC2013-05-0006 | Enjoining All Generation Companies, Distribution Utilities, Suppliers and Local Suppliers to Ensure an Effective and Successful Transition Towards the Implementation of Retail Competition and Open Access |
| | DC2013-01-0002 | Promulgating the Retail Rules for the Integration of Retail Competition and Open Access in the Wholesale Electricity Spot Market |
| | DC2012-11-0010 | Providing for Additional Guidelines and Implementing Policies for Retail Competition and Open Access and Amending Department Circular No. (DC) 2012-05-0005 Entitled "Prescribing the General Policies for the Implementation of the Retail Competition and Open Access |
| | DC2012-06-0007 | Directing the National Electrification Administration to Develop a Mechanism for Ensuring the Adequacy of and Compliance by the Electric Cooperatives with the Prescribed Prudential Requirements in the Wholesale Electricity Spot Market and Spearhead the Collective Petition thereof for the Approval of the Energy Regulatory Commission |
| | DC2012-02-0002 | Designating the Philippines Electricity Market Corporation (PEMC) as the Central Registration Body (CRB) |
| | DC2011-06-0006 | Creating the Steering Committee Defining the Policies for the Commencement of Retail Competition and Open Access |

| | | |
|---|---|---|
| **ERC** | Resolution No. 14, s. of 2013 | A Resolution Adopting a Pro-Forma Distribution Wheeling Services Agreement (DWSA) Between a Retail Electricity Supplier (RES) and a Distribution Utility (DU) upon Retail Competition and Open Access (RCOA) |
| | Resolution No. 13, s. of 2013 | A Resolution Adopting a Pro-Forman Connection Agreement Between a Distribution Utility and a Contestable Customer upon Retail Competition and Open Access (RCOA) |
| | Resolution No. 12, s. of 2013 | A Resolution Adopting a Pro-Forma Supplier of Last Resort (SOLR) Contract Between a SOLR and a Contestable Customer upon Retail Competition and Open Access (RCOA) |
| | Resolution No. 11, s. of 2013 | A Resolution Adopting the Supplemental Rules to the Transitory Rules for the Initial Implementation of Open Access and Retail Competition |
| | Resolution No. 5, s. of 2013 | A Resolution on Disclosures of Capacity and Energy Allocations by Distribution Utilities in the Luzon and Visayas Grids and Retail Electricity Suppliers |
| | Resolution No. 16, s. of 2012 | A Resolution Adopting the Transitory Rules for the Implementation of Open Access and Retail Competition |
| | ERC Decision for ERC Case No. 2011-004 RM | In the Matter of the Declaration of the Retail Competition and Open Access Pursuant to Section 31 of Republic Act No. 9136, Otherwise Known as the Electric Power Industry Reform Act of 2001, and Sections 3 and 4 of its Implementing Rules and Regulations |
| | ERC Order on ERC Case No. 2011-009 RM | In the Matter of the Request for Deferment of the Implementation of the Open Access and Retail Competition (OARC) in Luzon and the Visayas |
| | Resolution No. 27, s. of 2011 | A Resolution om the Installation of Interval Meters in the Premises of Qualified Contestable Customers and on the Provision of their Load Profile |
| | Resolution No. 10, s. of 2011 | A Resolution Declaring December 26, 2011 as the Open Access Date to Mark the Commencement of the Full Operations of the Competitive Retail Electricity Market in Luzon and Visayas |

| | | |
|---|---|---|
| **RCOA-Steering Committee** | RCOA-SC RESO. NO. 2012-02 | Resolution Designating the Philippine Electricity Market Corporation (PEMC) as the Central Registry Body and the Settlement Agent in the Implementation of the Retail Competition and Open Access |
| | RCOA-SC RESO. NO. 2011-01 | Resolution Endorsing the Deferment of the Implementation of the Retail Competition and Open Access (RCOA) to 26 October 2012 |

Source: DOE

As of September 2018, there are 1,560 contestable customers, of which 1,124 have already registered at PEMC as participants in the RCOA regime (Table 14). Meanwhile, 31 and 14 RES and local RES have registered, respectively. Finally, 98% of the Retail Metering Service Provider had expressed to participate in the RCOA regime.

**Table 14. Summary of RCOA Registration.**

| Participants | Expected[a] | Registered | Percentage |
|---|---|---|---|
| Contestable Costumer | 1,560 | 1,124 | 72% |
| Local Retail Electricity Supplier | 24 | 14 | 58% |
| Retail Electricity Supplier | 30 | 31 | 103% |
| Retail Metering Service Provider | 48 | 47 | 98% |
| Supplier of Last Resort | 44 | 24 | 55% |
| Grand Total | 1,706 | 1,240 | 73% |

Note: [a]Data from the 31st EPIRA Status Report. Number of participants are from the PEMC Participant List, last updated September 2018

## *3.4. Outcomes*

This subsection highlights the outcomes that EPIRA has attained to date.

### 3.4.1. Improved reliability, quality, security, affordability of electric supply

#### *3.4.1.1. Improved reliability of electric supply*

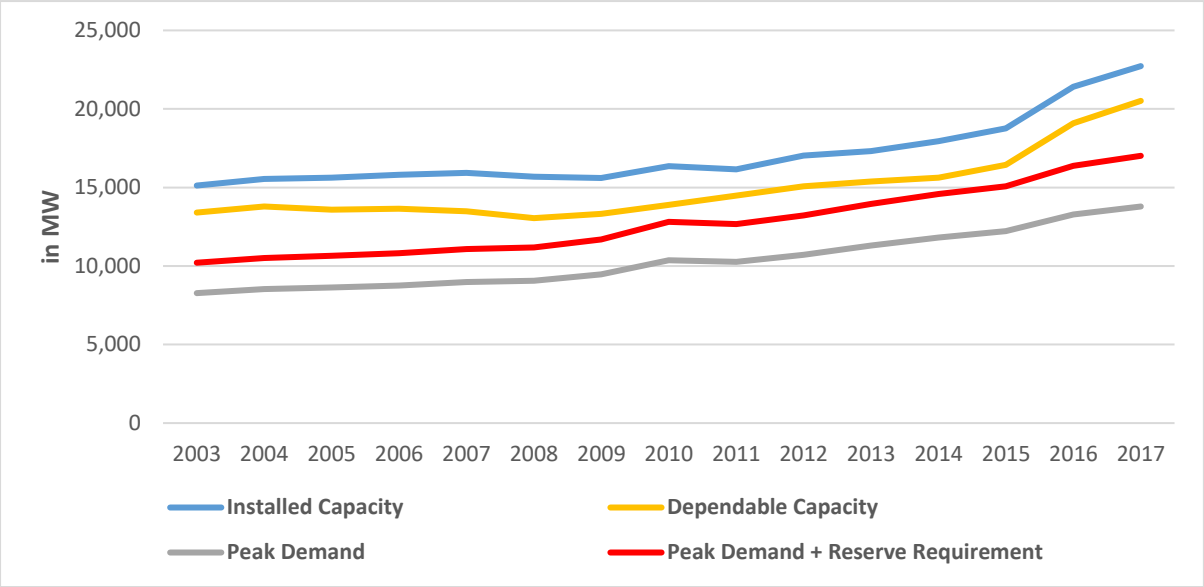
One of the objectives of the EPIRA is to ensure that the supply of electricity would meet the demand of the consumers to ensure continuous access to electricity. This implies that achieving a balance between demand and supply of electricity is crucial, particularly when technologies that would store electricity is not yet available or economically viable at the moment. Failure to secure this balance would mean power outages which can be disruptive not only for households but for the entire economy.

The figure below shows that annual trend of installed and dependable capacity, system peak demand and peak demand with reserve requirement.[46] In 2017, the country's peak demand has

[46] Navarro et al. (2016) defines *installed capacity* as the maximum capacity of the generating plants which are connected to the grid and *dependable capacity* as the capacity that is left when taking into account ambient

grown by more than 66% compared to 2003 level. While dependable capacity has grown slower at 53% during the period, peak demand had been consistently lower than dependable capacity, even if we add reserve requirement of 23.4%.[47] This analysis, however, does not consider equipment limitations such as force outages or schedule maintenance of the generation facilities, which can lower the amount of power that is actually injected into the grid. This amount of energy comprises the *available capacity* which may be lower than dependable capacity. Based on the 2015 power situation outlook published by the DOE, we can assume that available capacity is 70% of the installed capacity. Thereafter, we find that the country's available capacity is still consistently higher than the combined peak demand and reserve requirement for the period 2003-2017.

**Figure 8. Installed and dependable capacity, system peak demand and peak demand + reserve requirement in MW, Philippines, 2003-2017.**




Source: Data from DOE Power Statistics.

We apply the same analysis to the major grids to see if there would be misallocation of capacities that may result in systematic power shortages in certain areas. For Luzon, peak demand has grown by about 64% compared to 2003 levels while dependable capacity has only grown by 37%. Notwithstanding, dependable capacity had been consistently higher than the combined peak demand and reserve requirement.

Visayas, in contrast, experienced some periods of energy deficit as dependable capacity went below peak demand and reserve requirement in 2009 and slightly in 2010. This led to rotating power outage in Cebu and other areas in the region in 2009 but was immediately addressed, although insufficiently, with new capacities getting online in 2010. Meanwhile, dependable

limitations for a time period such as a month or a season. The latter includes factors such as efficiency ratios and the temperature, making it is necessarily lower than the installed capacity to account for adjustments that power plants need to continuously run.

[47] The ERC-approved reserve margin for Luzon and Visayas is 23.4% and 21% for Mindanao. For the Philippines, we adopt the requirement for Luzon and Visayas.

capacity picked up until 2017, posting a growth rate of 111% relative to 2003 levels. Demand grew at a slightly lower pace at 98% during the same period.

For Mindanao, dependable capacity has increased significantly since 2003, with total dependable capacity 1,623MW higher compared to 2003 level. With a growth rate of 111%, dependable capacities in Mindanao outpaced demand at 56%. Significant increases in capacities occurred in 2016, with the 2 x 135 MW FDC Misamis Coal Power Plant and 150 MW SMC Malita Coal Power Plant getting online.

**Figure 9. Installed and dependable capacity, system peak demand and peak demand + reserve requirement in MW, by Major Grid, 2003-2017.**

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Luzon** | | | | | | | | | | | | | | | |
| Installed Capacity | 11,812 | 12,162 | 12,128 | 12,092 | 12,174 | 11,913 | 11,863 | 11,981 | 11,739 | 12,528 | 12,790 | 13,213 | 13,668 | 14,977 | 15,743 |
| Dependable Capacity | 10,521 | 10,871 | 10,596 | 10,466 | 10,311 | 9,868 | 10,230 | 10,498 | 10,824 | 11,349 | 11,519 | 11,622 | 12,179 | 13,600 | 14,430 |
| Peak Demand | 6,149 | 6,323 | 6,443 | 6,466 | 6,643 | 6,674 | 6,928 | 7,656 | 7,552 | 7,889 | 8,305 | 8,717 | 8,928 | 9,726 | 10,054 |
| PD + RR | 7,588 | 7,803 | 7,951 | 7,979 | 8,197 | 8,236 | 8,549 | 9,448 | 9,319 | 9,735 | 10,248 | 10,757 | 11,017 | 12,002 | 12,407 |
| **Visayas** | | | | | | | | | | | | | | | |
| Installed Capacity | 1,647 | 1,721 | 1,793 | 1,803 | 1,833 | 1,835 | 1,818 | 2,407 | 2,402 | 2,448 | 2,448 | 2,520 | 2,683 | 3,284 | 3,425 |
| Dependable Capacity | 1,424 | 1,520 | 1,506 | 1,467 | 1,498 | 1,499 | 1,392 | 1,745 | 2,037 | 2,103 | 2,103 | 2,160 | 2,228 | 2,813 | 3,002 |
| Peak Demand | 995 | 1,025 | 1,037 | 1,066 | 1,102 | 1,176 | 1,241 | 1,431 | 1,431 | 1,481 | 1,572 | 1,636 | 1,768 | 1,893 | 1,975 |
| PD + RR | 1,228 | 1,265 | 1,280 | 1,315 | 1,360 | 1,451 | 1,531 | 1,766 | 1,766 | 1,828 | 1,940 | 2,019 | 2,182 | 2,336 | 2,437 |
| **Mindanao** | | | | | | | | | | | | | | | |
| Installed Capacity | 1,665 | 1,665 | 1,698 | 1,908 | 1,933 | 1,933 | 1,929 | 1,971 | 2,022 | 2,049 | 2,087 | 2,211 | 2,414 | 3,162 | 3,559 |
| Dependable Capacity | 1,460 | 1,402 | 1,493 | 1,705 | 1,670 | 1,682 | 1,697 | 1,658 | 1,616 | 1,614 | 1,749 | 1,838 | 2,025 | 2,684 | 3,083 |
| Peak Demand | 1,131 | 1,177 | 1,149 | 1,228 | 1,241 | 1,204 | 1,303 | 1,288 | 1,288 | 1,346 | 1,428 | 1,469 | 1,517 | 1,653 | 1,760 |
| PD + RR | 1,369 | 1,424 | 1,390 | 1,486 | 1,502 | 1,457 | 1,577 | 1,558 | 1,558 | 1,629 | 1,728 | 1,777 | 1,836 | 2,000 | 2,130 |

Note: PD + RR is peak demand + reserve requirement.

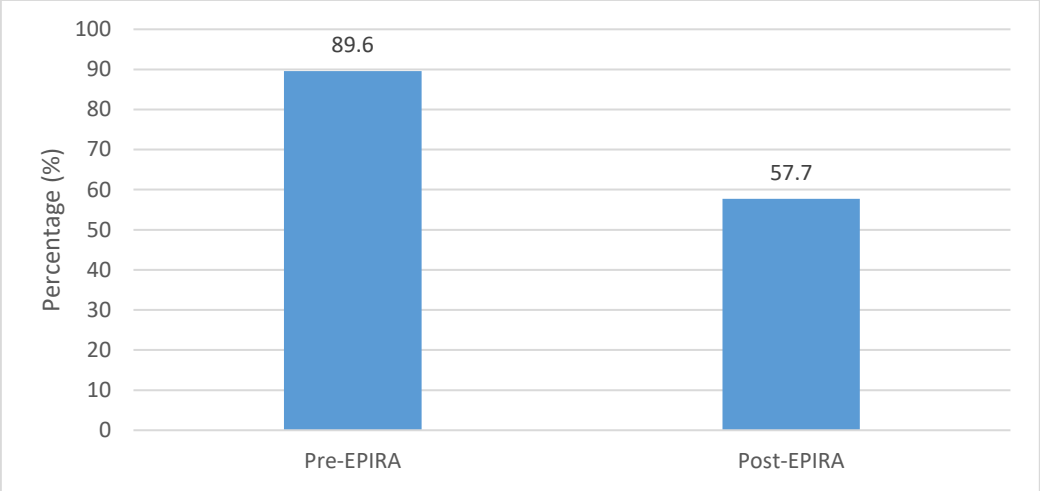
Source: DOE Power Statistics

#### *3.4.1.2. Improved quality of electric supply*

Although reliability and power quality are somewhat related, they are really two separate issues. Here, we distinguish quality from reliability but looking at power outages. Using data from the 1995 and 2004 Household Energy Consumption Survey (HECS), we find that power outages were the main problem of electricity users in the Philippines, with 9 out of 10 households experiencing "brown-outs" during the survey period.[48] However, we observed a dramatic dropped in the proportion of households experiencing power outages in 2004 (Figure 10).

[48] An interview with stakeholders at PSALM confirmed a number of power outages in early 1990s.

**Figure 10. Proportion of Households that experienced problems in brownouts, 1995 (pre-EPIRA) vs 2004 (post-EPIRA).**




Source: Household Energy Consumption Survey (1995 and 2004).

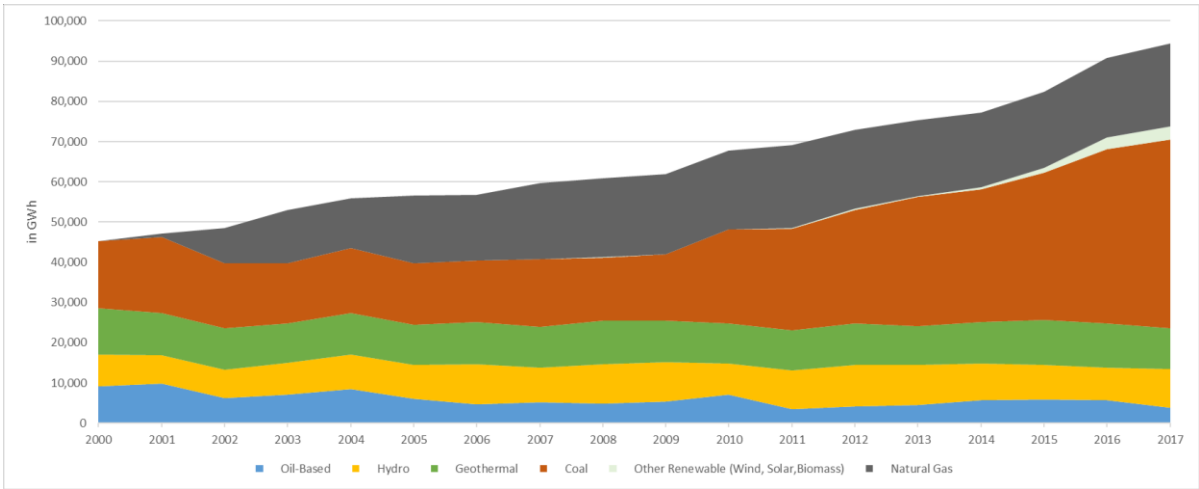
#### *3.4.1.3. Improved security of electric supply*

As previously mentioned in the pre-EPIRA analysis, energy security in this subsection is characterized using a very narrow metric – dependence on fossil-based energy sources that are import-intensive.[49] In the absence of more comprehensive data to measure and qualify energy security, dependence on imported fossil fuel may imply less energy security for two reasons: (1) high dependence on internationally-traded commodity exposes the country to a number of global risks and uncertainties; and (2) the declining wholesale price of renewables around the world may increase the risk of having stranded energy assets in the future.

Historical data from the DOE illustrates the growing dependence of the Philippine electric industry on imported fossil-fuel since 2000. The total power generation in 2000 was 41,578 GWh, of which 26,327 gigawatt-hours (GWh), of which 28,524 GWh (about 66 percent) were from fossil-based power plants (Oil-based, coal and natural gas) and 13,054 GWh (about 34 percent) were from renewable sources such as hydro, geothermal, and others (wind, solar, biomass). In 2017, the share of fossil-fuel sources reached to 75 percent, mostly driven by growing dependence on coal.

[49] During public consultations on the preliminary results of the paper, it was raised that energy security does not necessarily require dependence on renewables, even if they are locally source. This is because most energy sources use price of internationally-traded commodity (i.e. natural gas) in the global market.

**Figure 11. Total Power Generation, by source, 2000-2017.**




Source: Authors' representation of data from DOE Power Statistics.

#### *3.4.1.4. Improved affordability of power rates*

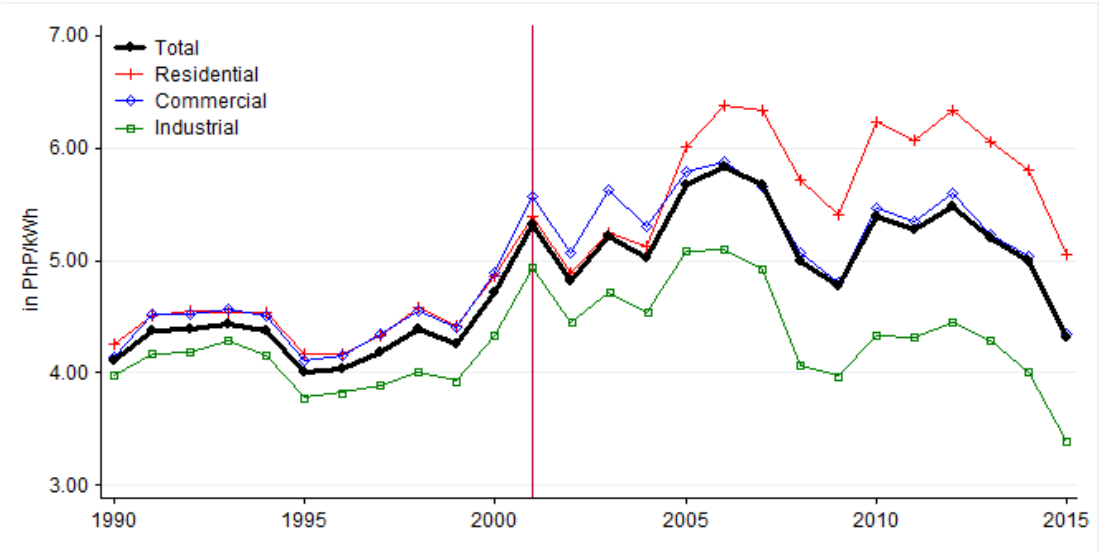
The Philippines remains to have the second highest power rates in Asia. According to a report by the International Energy Consultants, the top 5 countries with the highest power rates surveyed in Asia are Japan (P12.31 per kWh); Philippines (P8.96 per kWh); Singapore (P8.83 per kWh; Hong Kong (P6.53 per kWh); and Thailand (P6.23 per kWh).[50] It should be noted, however, however, that other countries included in the list received subsidies from their governments. In contrast, electricity rates in the Philippines are not subsidized by the government.

Meanwhile, the country has seen increasing pattern of real electricity prices pre-EPIRA period and a generally declining trend after the implementation of EPIRA (Figure 12). In 2000, average electricity price (in real terms) increased by 14.67% relative to 1990. In 2015, it declined by 8.38 percent relative to its 2000 level.

We also see divergence in the real electricity prices across customers starting in 2001. This is driven by the removal of cross-customer subsidies. Commercial and industrial prices posted a decline of 11.07 and 21.75 percent, respectively, relative to their 2000 level. In contrast, residential prices increased by 3.87 percent during the same period, although this increase is significantly lower compared to its 1990-2000 growth rate.

[50] Source: https://businessmirror.com.ph/average-electricity-price-in-phl-2nd-highest-in-asia-think-tank/

**Figure 12. Electricity Rates (PhP/kWh, in 2000 prices), 1990-2017.**



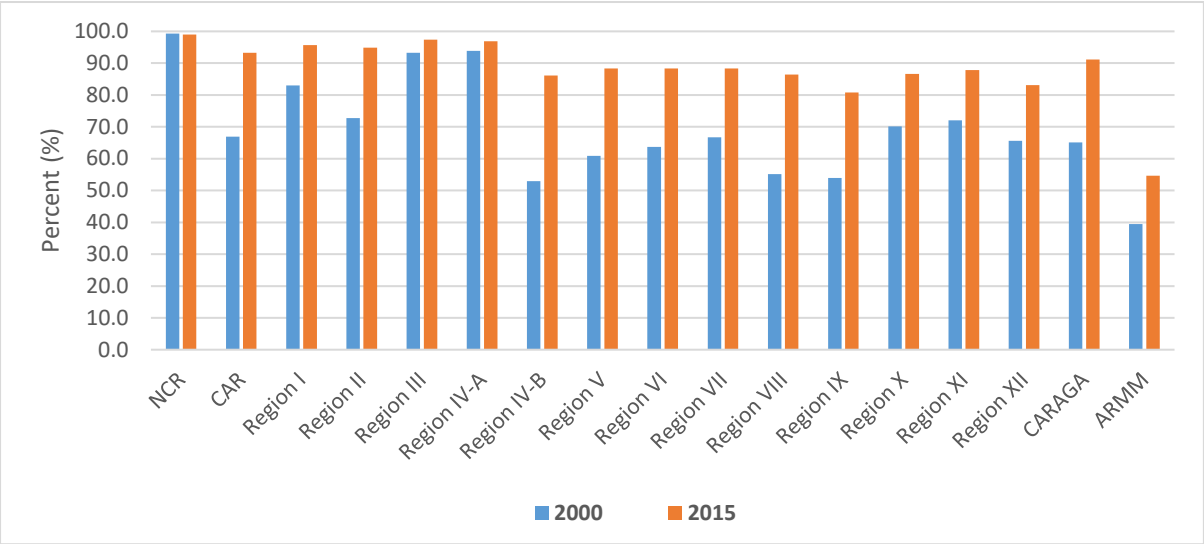

Source: MERALCO (nominal electricity price); Bangko Sentral ng Pilipinas (Consumer Price Index)

### 3.4.2. Country electrified

Significant progress has been achieved in improving household access to electricity after the implementation of EPIRA. Figure 13 shows the proportion of families with electricity by region in 2000 and in 2015 as reported in the Family Income and Expenditure Survey (FIES). In 2001 prior to the implementation of EPIRA, 76% of the families have access to electricity. It has grown to 91.1% in 2015, up by 15 percentage points. The NCR remains to have the highest share of families with electricity at 99% in 2015, followed by Regions III (97.4%) and IV-A (96.9%) while the Autonomous Region of Muslim Mindanao (ARMM) had the lowest at about 54%. All regions have posted an increase in the share of electrified families between 2000 and 2015. Region IV-B posted the highest growth during the period (62.75%), followed by Regions VIII (56.52%) and IX (49.91%).[51]

[51] The tabular representation of the share of electrified families between 1985 and 2015 across all regions can be found in Appendix.

**Figure 13. Share of families with electricity, by region, 2000 and 2015.**



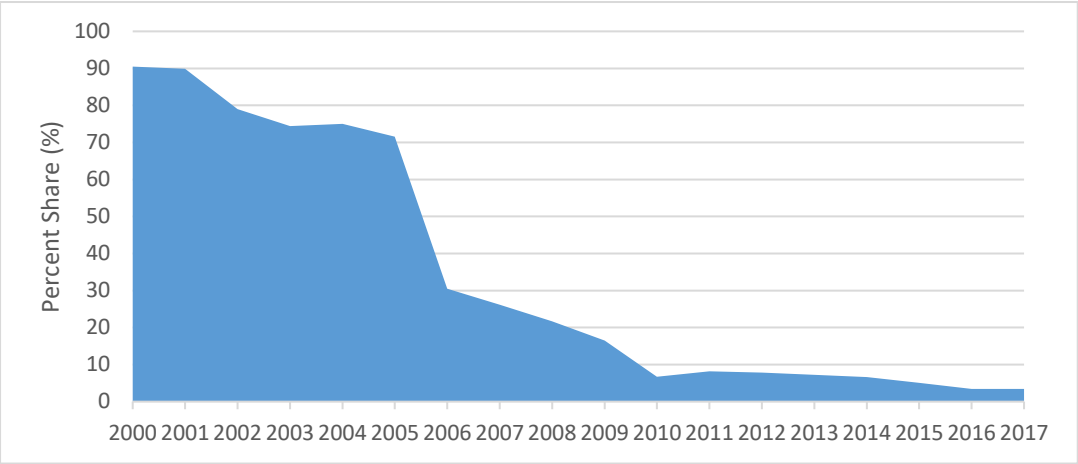

Source: FIES

### 3.4.3. Competition in the energy industry improved

Prior to implementing EPIRA, the power industry in the Philippines was vertically integrated and the NPC had monopoly over power generation and transmission. Private generators or IPPs have power purchase agreements with the NPC. Despite the government's effort to attract private sector participation, very few players entered into the industry. For example, in 2000, more than 90% of electricity came from the NPC-owned generators.

As a result of breaking the national monopoly in the generation segment of the industry, the electricity generation market changed from an NPC-dominated to a non-NPC dominated system. As of 2017, NPC only got 3.5% of the national grid market share (Figure 14 and Table 15). These shares are all in the Mindanao grid, which is not connected to the Luzon-Visayas grid. Meanwhile, 88.6% of the national grid are being supplied by Non-NPC, and its share is higher in Luzon at 96.4%. Generation of IPPs with contract to NPC accounted for 7.4% while NPC-SPUG accounted for 04% of the national grid.

**Figure 14. Share of NPC-generated power, 2000-2016.**




Source: 2017 Philippine Statistical Yearbook (2000-2016); 2017 DOE Power Statistics (2017).

**Table 15. Gross Power Generation by Ownership in MWh**

| LUZON | NPC | NPC-SPUG | NPC-IPP | NON-NPC | Total Generation |
|---|---|---|---|---|---|
| 2003 | 8,657,765 | 362,281 | 16,551,238 | 11,963,346 | 37,534,630 |
| 2004 | 9,815,942 | 307,956 | 17,388,492 | 12,341,521 | 39,853,911 |
| 2005 | 8,940,873 | 347,958 | 16,802,445 | 14,535,453 | 40,626,729 |
| 2006 | 10,151,183 | 395,638 | 15,697,752 | 14,996,884 | 41,241,457 |
| 2007 | 8,753,565 | 323,106 | 18,186,606 | 16,356,635 | 43,619,912 |
| 2008 | 6,017,617 | 330,245 | 19,591,211 | 18,260,462 | 44,199,535 |
| 2009 | 3,834,285 | 346,903 | 18,598,457 | 22,195,212 | 44,974,857 |
| 2010 | 224,621 | 379,619 | 6,691,024 | 42,969,462 | 50,264,726 |
| 2011 | 527,256 | 380,593 | 2,160,094 | 46,949,315 | 50,017,258 |
| 2012 | 513,973 | 313,738 | 2,285,159 | 49,199,556 | 52,312,426 |
| 2013 | 474,407 | 262,604 | 2,068,913 | 52,013,594 | 54,819,518 |
| 2014 | 212,481 | 249,531 | 1,972,580 | 54,331,889 | 56,766,481 |
| 2015 | 243,075 | 235,663 | 1,575,325 | 58,058,800 | 60,112,863 |
| 2016 | 0 | 252,094 | 2,040,914 | 64,204,541 | 66,497,549 |
| 2017 | 0 | 206,802 | 2,230,792 | 66,074,825 | 68,512,419 |
| **% Share** | **0.0%** | **0.3%** | **3.3%** | **96.4%** | **100.0%** |
| **VISAYAS** | | | | | |
| 2003 | 2,248,367 | 28,427 | 5,013,565 | 1,551,736 | 8,842,095 |
| 2004 | 2,383,809 | 26,107 | 4,987,116 | 1,619,347 | 9,016,379 |
| 2005 | 2,405,941 | 34,889 | 4,783,435 | 1,474,087 | 8,698,352 |
| 2006 | 2,285,094 | 27,868 | 4,567,554 | 1,248,207 | 8,128,723 |
| 2007 | 2,380,146 | 24,185 | 4,254,623 | 1,442,640 | 8,101,594 |
| 2008 | 2,332,300 | 24,677 | 4,983,186 | 1,309,530 | 8,649,693 |
| 2009 | 1,689,843 | 25,849 | 4,967,055 | 2,041,551 | 8,724,298 |
| 2010 | 176,325 | 29,729 | 4,482,236 | 4,386,974 | 9,075,264 |

| | | | | | |
|---|---|---|---|---|---|
| 2011 | 42,685 | 48,798 | 4,173,690 | 6,190,570 | 10,455,743 |
| 2012 | 35,028 | 31,569 | 4,273,702 | 7,142,416 | 11,482,715 |
| 2013 | 29,913 | 33,020 | 3,581,237 | 7,455,424 | 11,099,594 |
| 2014 | 21,473 | 34,311 | 3,363,599 | 7,594,541 | 11,013,924 |
| 2015 | 169 | 22,125 | 3,576,022 | 8,572,168 | 12,170,484 |
| 2016 | 0 | 23,488 | 3,454,094 | 9,477,303 | 12,954,885 |
| 2017 | 0 | 27,310 | 3,378,417 | 10,648,159 | 14,053,886 |
| **% Share** | **0.0%** | **0.2%** | **24.0%** | **75.8%** | **100.0%** |
| **MINDANAO** | | | | | |
| 2003 | 3,961,534 | 67,985 | 2,493,262 | 40,940 | 6,563,721 |
| 2004 | 4,231,058 | 60,629 | 2,757,354 | 38,099 | 7,087,140 |
| 2005 | 3,970,988 | 79,581 | 3,130,882 | 61,207 | 7,242,658 |
| 2006 | 4,356,036 | 83,379 | 2,907,359 | 67,175 | 7,413,949 |
| 2007 | 4,017,307 | 90,082 | 3,714,700 | 68,195 | 7,890,284 |
| 2008 | 4,392,914 | 93,131 | 3,397,821 | 87,891 | 7,971,757 |
| 2009 | 4,220,812 | 101,474 | 3,834,457 | 78,536 | 8,235,279 |
| 2010 | 3,652,342 | 113,134 | 3,551,259 | 1,086,034 | 8,402,769 |
| 2011 | 4,571,806 | 113,483 | 3,201,999 | 815,360 | 8,702,648 |
| 2012 | 4,692,101 | 120,821 | 3,315,987 | 997,962 | 9,126,871 |
| 2013 | 4,530,854 | 127,659 | 3,262,174 | 1,426,043 | 9,346,730 |
| 2014 | 4,458,471 | 132,401 | 3,046,097 | 1,843,623 | 9,480,592 |
| 2015 | 3,516,111 | 147,309 | 3,596,023 | 2,870,423 | 10,129,866 |
| 2016 | 2,714,603 | 164,914 | 1,727,808 | 6,738,132 | 11,345,457 |
| 2017 | 3,346,327 | 176,399 | 1,358,518 | 6,922,793 | 11,804,037 |
| **% Share** | **28.3%** | **1.5%** | **11.5%** | **58.6%** | **100.0%** |
| **PHILIPPINES** | | | | | |
| 2003 | 14,867,666 | 458,692 | 24,058,156 | 13,556,023 | 52,940,537 |
| 2004 | 16,430,809 | 394,691 | 25,132,962 | 13,998,967 | 55,957,429 |
| 2005 | 15,317,802 | 462,428 | 24,716,762 | 16,070,748 | 56,567,740 |
| 2006 | 16,792,313 | 506,885 | 23,172,666 | 16,312,267 | 56,784,131 |
| 2007 | 15,151,017 | 437,372 | 26,155,930 | 17,867,469 | 59,611,788 |
| 2008 | 12,742,831 | 448,054 | 27,972,217 | 19,657,883 | 60,820,985 |
| 2009 | 9,744,939 | 474,225 | 27,399,969 | 24,315,299 | 61,934,432 |
| 2010 | 4,053,288 | 522,482 | 14,724,519 | 48,442,471 | 67,742,760 |
| 2011 | 5,141,747 | 542,874 | 9,535,783 | 53,955,245 | 69,175,649 |
| 2012 | 5,241,101 | 466,129 | 9,874,848 | 57,339,934 | 72,922,012 |
| 2013 | 5,035,174 | 423,283 | 8,912,324 | 60,895,060 | 75,265,841 |
| 2014 | 4,692,425 | 416,243 | 8,382,276 | 63,770,053 | 77,260,997 |
| 2015 | 3,759,355 | 405,097 | 8,747,370 | 69,501,390 | 82,413,212 |
| 2016 | 2,714,603 | 440,496 | 7,222,816 | 80,419,976 | 90,797,891 |
| 2017 | 3,346,327 | 410,511 | 6,967,727 | 83,645,777 | 94,370,342 |
| **% Share** | **3.5%** | **0.4%** | **7.4%** | **88.6%** | **100.0%** |

Source: 2017 DOE Power Statistics (2017)

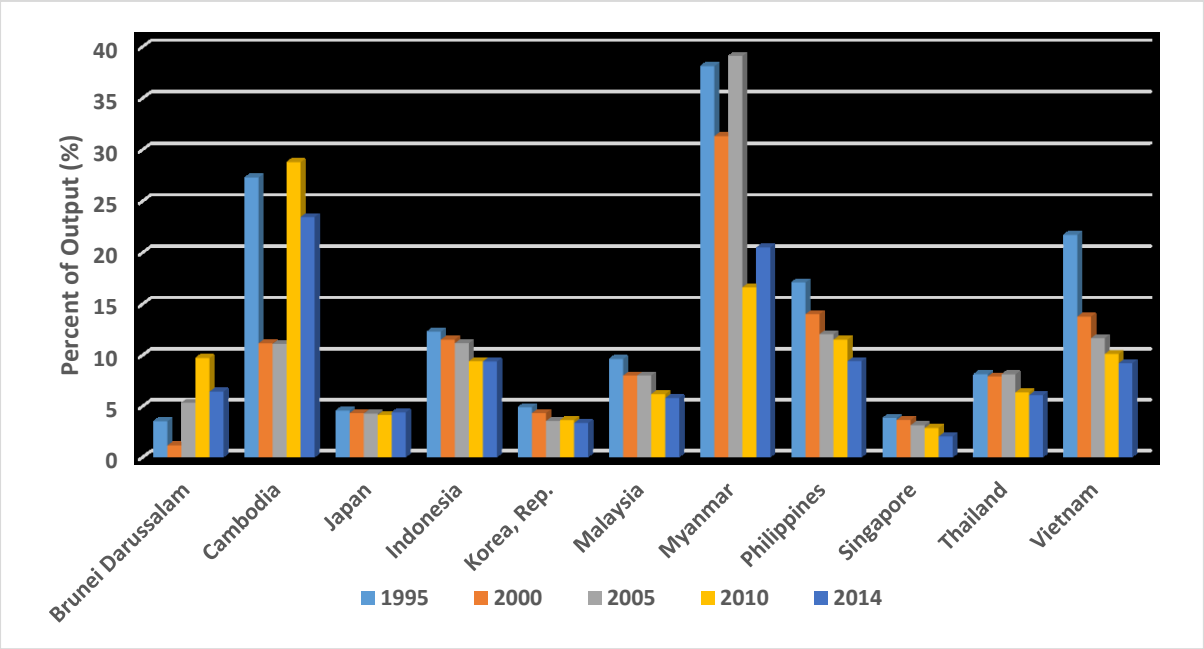
### 3.4.4. Electric grid modernized/efficiency in the sector improved

Relative to the pre-EPIRA regime, it can be argued that there is increased efficiency in the power sector. There are two ways to determine if this claim is valid. First, we can verify that there had been significant decline in the transmission and distribution losses over the years, and the rate at which these losses decline is much faster after the EPIRA was implemented compared to previous years.

Prior to implementing EPIRA, the national grid is held by the NPC. With NPC suffering from poor financial health and heavy indebtedness, investments to modernize the grid had been strained severely. Consequently, NPC's financial challenges impeded opportunities to improve the delivery of electricity from generation plants to end-users (Woodhouse, 2005).

Data from the World Bank Indicators (WDI) reveals that the share of transmission and distribution losses in total power output had been declining for the Philippines since 1995 (Figure 15). From 1995, the share of transmission and distribution losses has declined by about 45 percent from 17 percent in 1995 to 9 percent in 2014. A study by Navarro et al. (2016) finds that the rate of decline in system losses is significant higher for all the major grids in the post-EPIRA regime (2001-2015) compared to the pre-EPIRA (1991-2000).

**Figure 15. Electric power transmission and distribution losses (% of output), 1995-2014.**




Source: World Development Indicators.

The improvement in the efficiency of the grid can be attributed to a number of factors. One of which is the implementation of the ERC-approved loss factors (caps) per grid and across DUs and electric cooperatives in the post-EPIRA years. Using actual system losses in 2000 as benchmarks, all major grids were able to reduce their loss factors below the ERC-prescribed thresholds, which may have resulted from the investments the grid operator has made over the years as well as the installation of better metering systems (Navarro et al., 2016). The table below illustrates the transmission and transmission assets of NCGP since 2012.

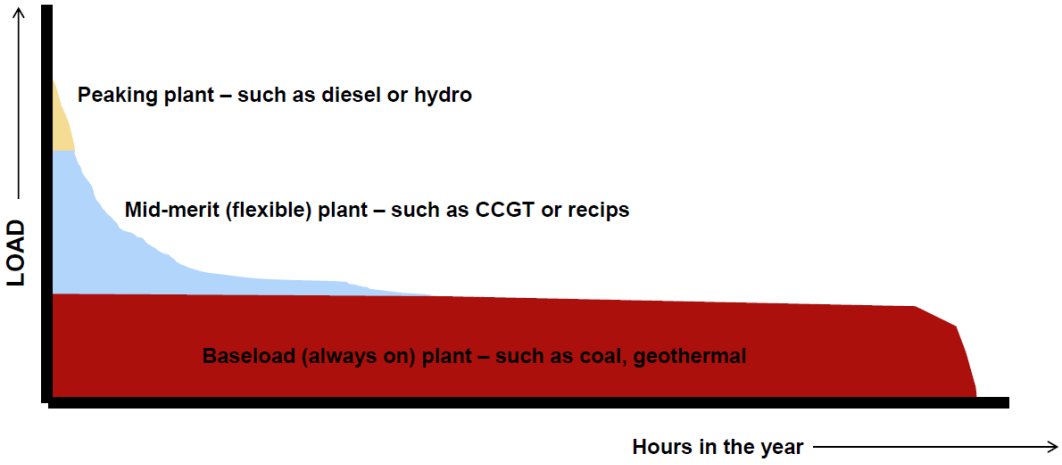
**Table 16. Transmission & Sub-Transmission Assets of NGCP, 2012-2017.**

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| North Luzon | 5,379.11 | 5,446.30 | 5,446.30 | 5,571.34 | 5,571.34 | 5,898.95 |
| South Luzon | 3,994.39 | 3,924.79 | 3,924.79 | 3,965.50 | 4,031.28 | 3,895.79 |
| Visayas | 4,971.12 | 4,868.98 | 4,868.98 | 4,520.02 | 4,475.63 | 4,973.09 |
| Mindanao | 5,145.64 | 5,145.64 | 5,145.64 | 5,734.02 | 6,080.71 | 6,080.71 |
| Total | 19,490.26 | 19,385.71 | 19,385.71 | 19,790.88 | 20,158.96 | 20,848.54 |

Source: NGCP

The second way to determine if the efficiency has improved in the market is to look at how retailers have formed their resource portfolios over time. In the power sector, meeting electricity demand will require a mix of plants that is cheapest. That is, plants that generally have high fixed costs would have lower variable costs (e.g., coal) while those plants with lower fixed costs often have high variable costs (e.g., diesel), and those that lie in between (e.g., CCG). To attain least costs of service delivery, plants that are cheap to run will be used more consistently while those that have high variable costs will be used to meet peaks in the demand (see Figure 16).

**Figure 16. An illustration of how retailers meet its demand using different types of plants.**




Source: Lantau Group (2015)

Based on the above, it is optimal that retailers with higher load factors[52] should be able to form lower-cost portfolios. Using data from the National Electrification Administration (NEA), we look at the correlation between average power cost and load factors for all electric cooperatives in Luzon, Visayas and Mindanao. We also try to minimize the effect of outliers by eliminating plants with load factor below the 10$^{th}$ percentile and above the 90$^{th}$ percentile. Results are summarized in Table 17 and Figure 17. Interestingly, we see that in Luzon and Visayas, where WESM is implemented and for which NPC no longer participate in the generation market, the optimal structure of resource mix is in place. We do not see the same trend in Mindanao.

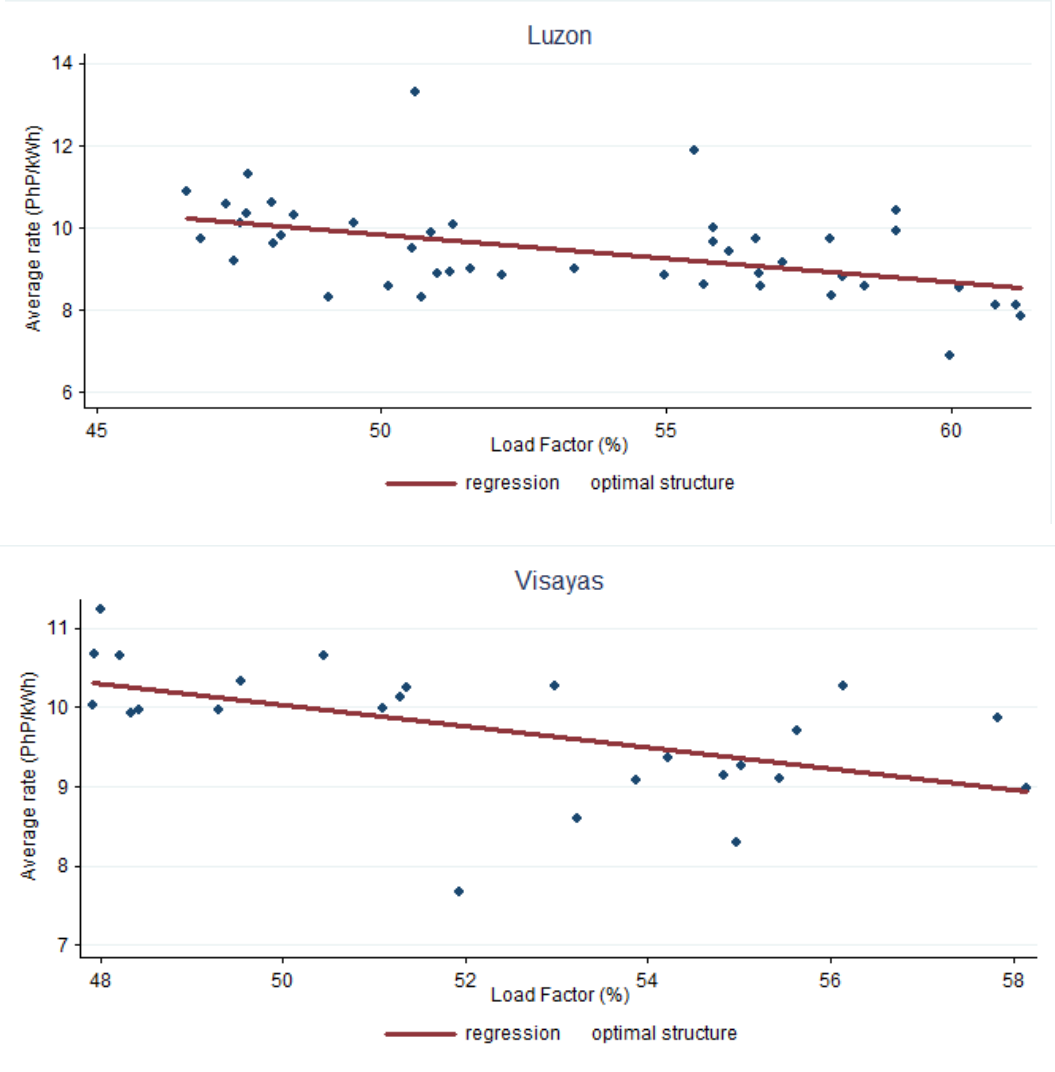
[52] Electrical Load factor is a measure of the utilization rate, or efficiency of electrical energy usage. It is the ratio of total energy (KWh) used in the billing period divided by the possible total energy used within the period, if used at the peak demand (KW) during the entire period.

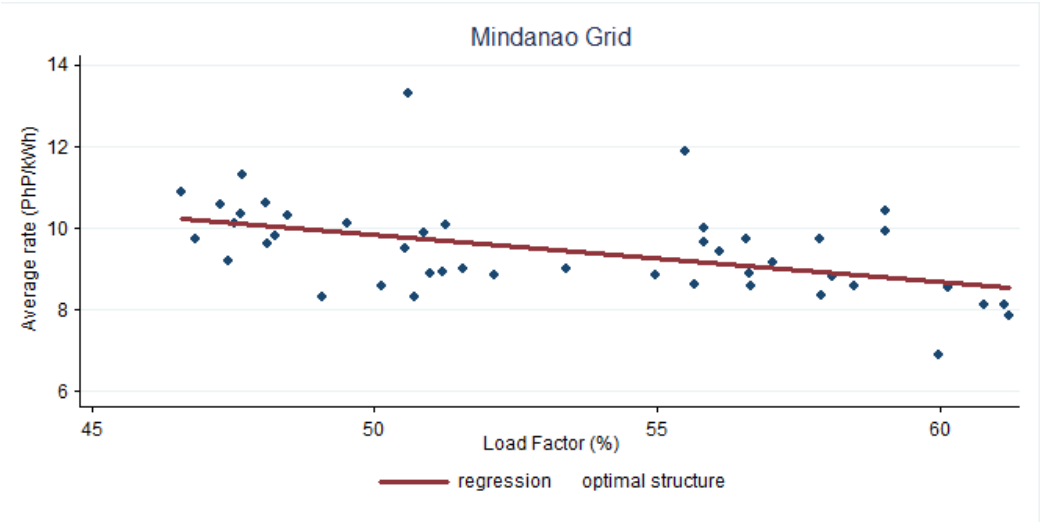
**Table 17. Regression estimates of Load Factor on Average Power Rates, 2017.**

| | Philippines | | Luzon | | Visayas | | Mindanao | |
|---|---|---|---|---|---|---|---|---|
| | All | 10th-90th | All | 10th-90th | All | 10th-90th | All | 10th-90th |
| Load Factor | -0.0817*** | -0.105*** | -0.0774*** | -0.115*** | -0.156*** | -0.134** | -0.0651 | -0.0465 |
| | (-4.95) | (-3.43) | (-4.00) | (-3.53) | (-5.49) | (-3.03) | (-1.40) | (-0.44) |
| N | 118 | 96 | 55 | 45 | 31 | 25 | 32 | 25 |

Note: 10th-90th means plants within 10th and 90th percentile only. Source of raw data: NEA, 2017

**Figure 17. Average power costs vs. load factor for different electric cooperative, 2017.**






Source: NEA, 2017. Note: Includes plants belonging to the 10th and 90th percentile of load factor.

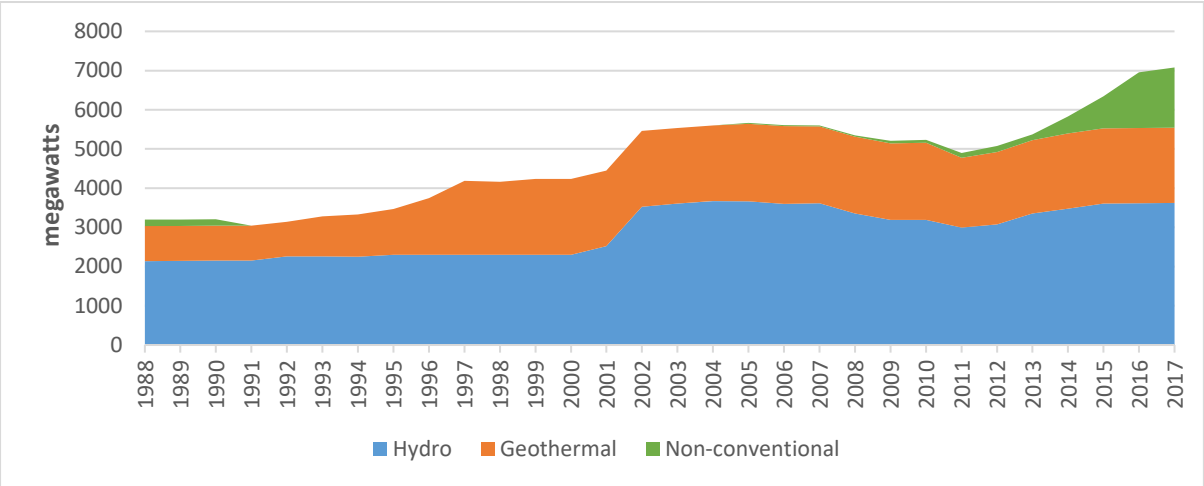
Despite the declining trend in the share of system losses to power output in the Philippines, a cross-country comparison of system loss reveals that the country, it consistently ranked in the top 3 amongst selected Asian countries. In 2014, the Philippines stood 3rd in the selected Asian countries with the highest transmission and distribution losses. This implies that investments in improving the transmission and distribution systems are still warranted.

### 3.4.5. More renewables or prospects for renewables

There is growing interest in renewable energy in many parts of the world as a result of energy security and environmental concerns (Verzola, Logarta and Maniego, 2017), along with the need to deliver electricity to energy-poor regions that may or may not be part of national grid. Notwithstanding, the share of renewables, even if we include biofuels and hydropower, to total global energy consumption had been small, less than 5 percent since the 1980s. In contrast, Philippines has had more than 40% in renewables over the years.

Total installed capacity for renewable energy has increased from 3200MW in 1988 to 7,7079MW in 2017 (Figure 18). This translates to a growth rate of 121% during the period. It is also observed that installed capacity for renewables grew at a faster rate (3.26 percent) post-EPIRA, compared to 2.45 percent pre-EPIRA. A significant increase in generation capacity for hydropower was observed in 2002, while new capacities were built for non-conventional renewables (e.g., wind, solar and biofuels) starting in 2005 but mostly in 2015.

**Figure 18. Installed Generation Capacity by Renewable Sources, in MW, 1988-2017.**




Source: Philippine Statistical Yearbook.

Despite the seemingly impressive growth of renewables in the Philippine power sector, the country remains to be increasingly dependent on fossil fuel in meeting the growing local energy demand. In 1988, about 48 percent of the country's total generation capacity consists of renewable energy before dropping to 32 percent in 2000. After the EPIRA, average share was at about 34 percent, with the lowest share occurring in 2017. This is in contrast with generation capacities for fossil fuel-based power, particularly coal, which experienced a dramatic uptake starting in 2009.

Regarding prospects for renewables, the business climate and policy environment for investment in renewable energy is arguably much better after EPIRA. Even if we do not count Republic Act No. 9513 (also known as the Renewable Energy Act of 2008 or RE Act), there are still a number of measures taken by the government to entice investors to pour funds for renewables. One of these is the development of the Grid Code which is clearly laid out in the EPIRA. As the country aims to develop and integrate renewable energy into the grid, grid codes can be crucial to simplify the planning, operational, and other tasks. Grid codes contain the rules laid by the authorities for all its stakeholders, i.e., the users and power generating stations for connecting to the network and operate as per the standards. In the Philippines, the national transmission and distribution grid codes were published in December 2001.

Moreover, the DOE also supported efforts to build renewable energy sector by operationalizing WESM Reserve Market in March 2014, consistent with the objectives of EPIRA and market design of WESM. According to PEMC, the launch of the Reserve Market opens opportunities to facilitate the entry of renewable energy pursuant to the RE law, along with co-optimization energy and reserves, fostering greater competition among energy and reserve providers that will lead to a more transparent and competitive prices.

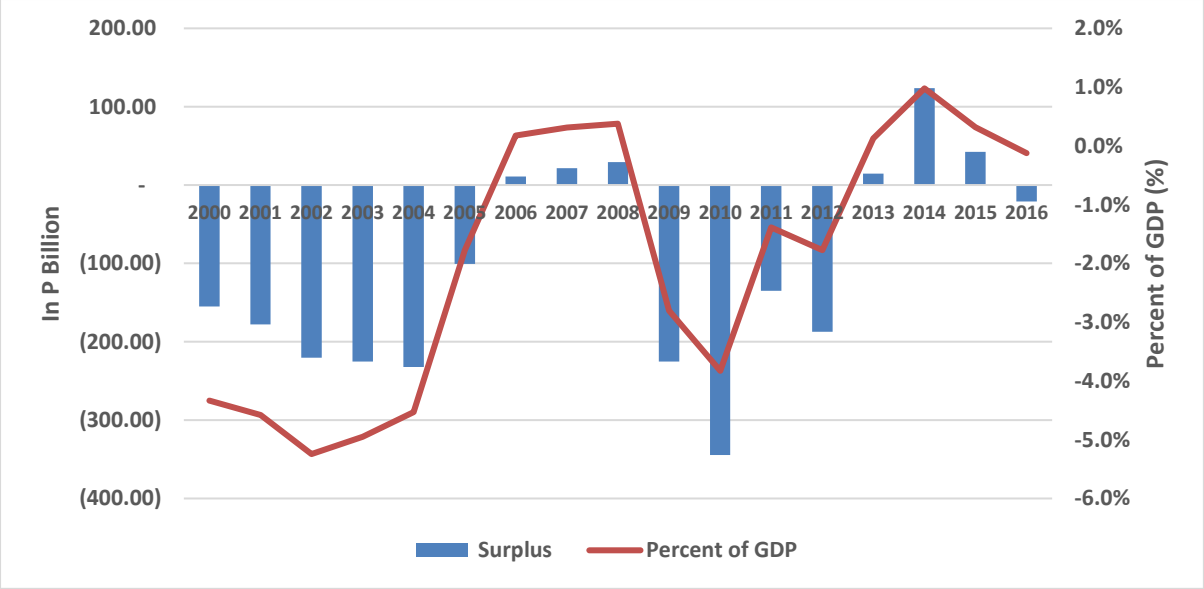
## *3.5. The Impacts*

### 3.5.1. Improved fiscal condition of the government

Before the 2001 EPIRA, the power supply industry had been fiscally dependent on the government and public finances (ADB, 2016). By December 2000, NPC had accumulated debts of P900 billion, nearly half of the P2.179-trillion government debt.[53] Despite some progress associated with the implementation of EPIRA in 2001, the power sector still faced major challenges, including sector debt financing, and implications for national fiscal balance, up to 2004. For example, a report from the World Bank reveals that the cash deficit of NPC increased from P19 billion in 1999 to about P86 billion ($1.5 billion—including loan repayment and capital expenditures) in 2003.[54] This coincides with the ballooning fiscal deficit starting in 2000 to 2004 (Figure 19).

Perhaps the most obvious impact of the EPIRA was the improvement in the fiscal condition of the government, which, at least in part, can be attributed to the change in power industry operations from a fiscally dependent industry to a net tax payer and, consequently, with the serviced and reduced the high levels of debt that had been incurred by NPC prior to the reform (ADB, 2016). In particular, the first 9 years since the WESM operated in 2006, we also observe the first time since 2000 the country had budget surplus. These budget surplus remains positive, except during the 2009 global recession, of which the effect may have been felt up to 2012.

**Figure 19. Philippine Total Surplus/Deficit, 2000-2016.**




Source: Department of Finance

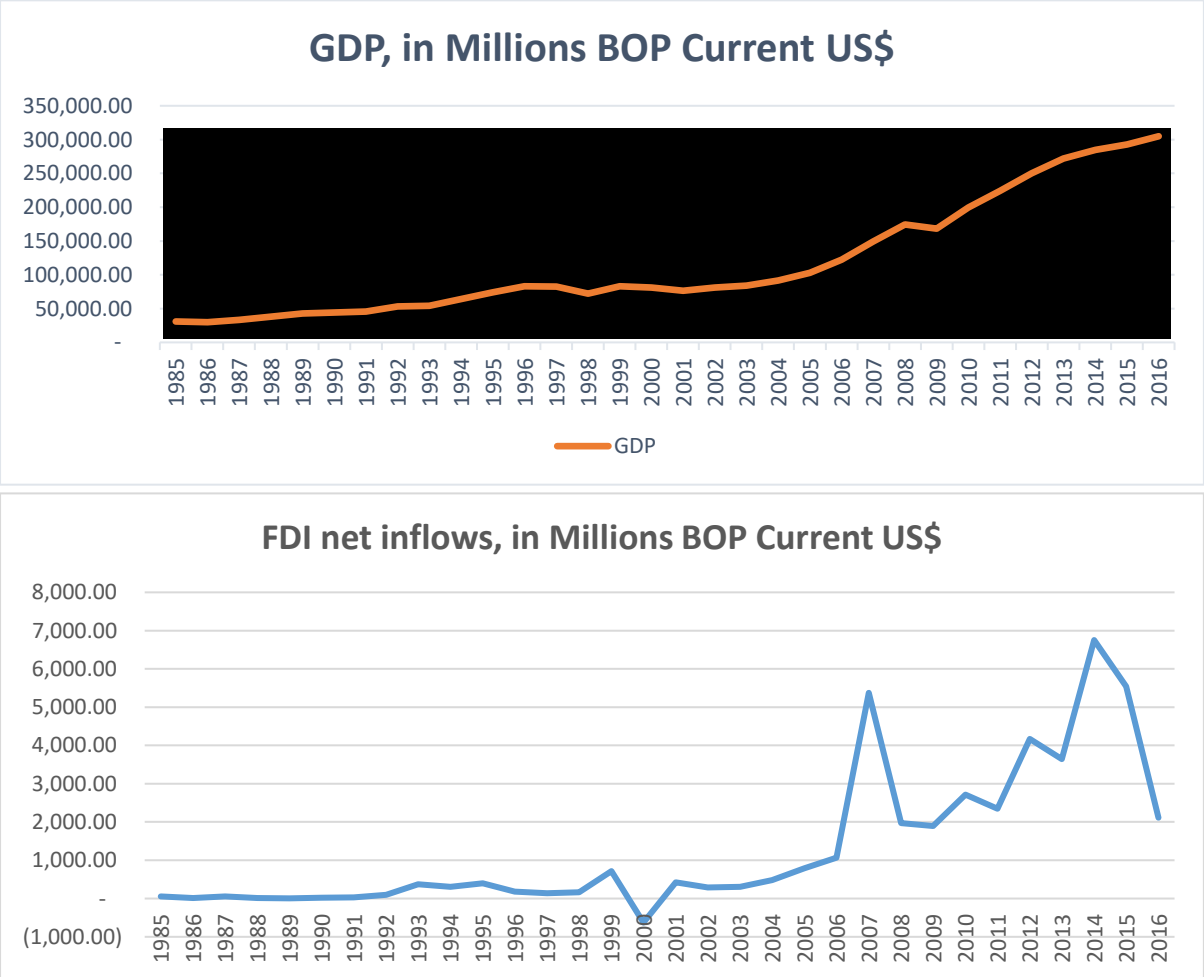
[53] Gonzales, I. (2014) "Special report: What's wrong with EPIRA?" *The Philippine Star*. [https://www.philstar.com/headlines/2014/01/14/1278583/special-report-whats-wrong-epira].
[54] http://siteresources.worldbank.org/INTPHILIPPINES/Resources/DB14-Power-June23.pdf

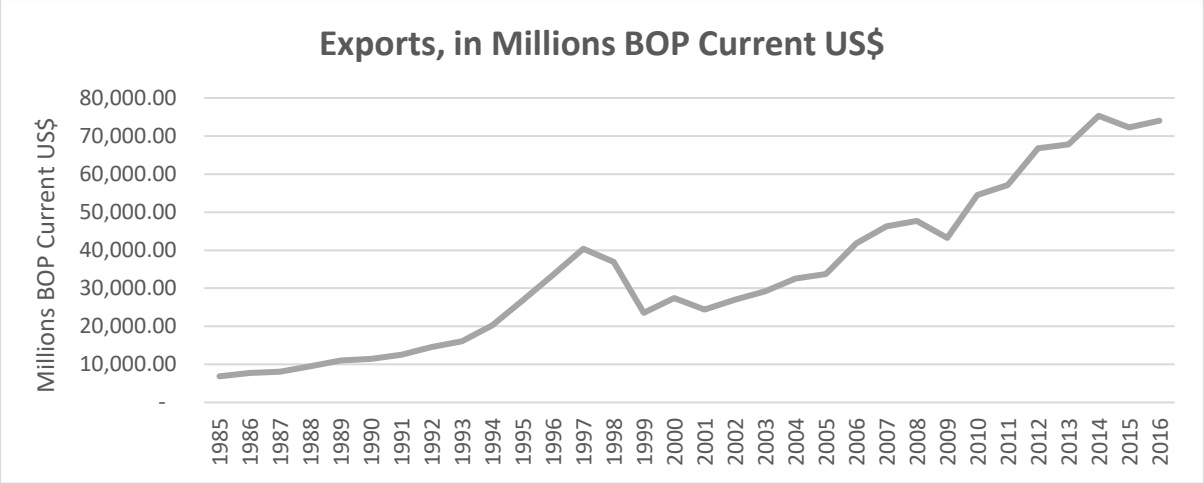
### 3.5.2. Other Macroeconomic Metrics

Without a well specified econometric estimation model, it is extremely difficult to establish causal link between the implementation of EPIRA and some macroeconomic variables, such as net FDI inflows, exports, and gross domestic product (GDP), nor provide an accurate estimate of the magnitude of the influence of the power sector reform to any of these variables. A number of confounding factors exist, which makes the analysis complex and not straightforward. In the absence of a good counterfactual, which can be a country that share similar time- and geographic-characteristics but did not experience reform, estimating the causal effect of the power reform is almost infeasible.

Nonetheless, we still present the trend of these variables over time to see if we can observe a considerable shift or structural break in any of the series right around the time EPIRA was implemented. Starting with GDP, we see seemingly constant increase since 1985 before a slight downward trend in 1997 and another one in 2009. This is probably because of the 1997 Asian financial crisis and the 2009 global recession, respectively. Notwithstanding, we see an increase in the rate of GDP growth starting 2005. We see the same trend for FDI and exports, with a little acceleration in growth starting 2006. While this can be associated, at least in part, to the initial operation of WESM in 2006, which also attracted a number of investments both local and national in the power sector, we leave the estimation of this effect to future research.

**Figure 20. Other Macroeconomic Metrics**






Source: World Development Indicators

## 4. Conclusions and Policy Recommendations

The study provides a comprehensive review of the EPIRA law and assess the success and progress of the law based on the business model or regulatory framework that the law intends to achieve. Based on the assessments, two major findings stand out. First, the EPIRA appears to be a well-thought power sector reform design, having followed most of the features of the kind of reform structuring that have been found to be successful historically (Joskow, 2008). Deviations from the "ideal" restructuring and regulatory reform have been found to have significant costs. For the Philippines, deviations arise when the EPIRA included provisions that promotes social equity across income classes and as well across geographic areas. Certainly, there are costs associated with these policies, which at the moment is being shouldered by the ratepayers in the form of Universal Charges. Having said this, future evaluations of these policies are needed to determine their cost effectiveness and to identify more efficient alternative measures to attain the same objectives.

Fostering competition in the country's power industry is one of the major objectives of EPIRA. Therefore, it is important to emphasize that the increase in competition is anchored on how effective the sector can attract additional players. This will ensure that no huge mark-ups of the incumbent can be maintained in the long run. But the long-run tendency of the market to have more competition in the market is hampered by the uncertainties brought about by sudden interventions of the government. In other words, when problems arise, these problems are sometimes addressed in ways that are inconsistent with the market approach. A case in point is when ERC imposed a cap of Php 62/kWh in 2013 as a result of a price spike in the WESM. Felder (2007) warns that the immediate response to reduce prices through sudden regulatory mandates can either undercut price signals, which later on can get worst and result in a vicious cycle if regulatory uncertainty, unfriendly investment climate, and counterproductive policies. Needless to say, there should be strong political commitment to implementing the reform.

Second, significant progress had been attained, although a number of measures should be in place to sustain the progress and promote more competitive power supply and retail rates for all consumers. In 2014, the "Task Force to Study Ways to Reduce the Price of Electricity" have

published their recommendations, which we also reviewed and, most of which, we supported in line with the findings of the assessment. We also added a few more recommendations that emerged from the assessment.

Generation:

1. DOE to undertake generation mapping, as a policy and regular practice, and implement optimal decision-making on the location of the generation plants.
2. DOE to develop a sustainable and optimal energy mix policy and demand side management practices. An initiative to develop an optimization model that has both supply and demand side measures is on-going at the UP College of Engineering, in partnership with University of Hawai'i.

Transmission and System Operation

1. NGCP to undertake capital expenditures (CAPEX) to further strengthen transmission (and this also applies to distribution) systems, resolve transmission congestions and modernize the infrastructure. Modernizing the grid can incorporate more renewables in the grid.

Distribution:

1. DUs to continue improving the generation mix at the DU level, particularly in Mindanao.
2. ERC to streamline and fast-track the approval of power supply agreements (PSAs), in order to encourage more investments in the sector. This may entail building additional capacities and government funding to perform the task.

System Losses (in transmitting and distributing power)

1. DOE, with the help from the industry players and academic institutions, to carefully examine the components of the systems loss, with the view to identify ways of reducing it. Consequently, this exercise may lead to a review of the ERC-set cap on systems losses.
2. ERC to strictly enforce RA 7832 (the law on system losses) and aim for a long-term goal of single-digit losses.

Universal Charges (UCs)

1. DOE, with the help from the industry players and academic institutions, to review the cost effectiveness of the UCs and determine ways of attaining the same objective with less distortions in the power sector.
2. NPC to improve the missionary electrification implementation so as to reduce the universal charges. NPC can partner with the private sector and academic entities to evaluate the cost effectiveness of missionary electrification. In particular, the group can look into the prospect of the national government absorbing universal charges and how it influences overall welfare.

Socialized Pricing Mechanism

1. Consider offering a separate social tariff (or vouchers) determined on the basis of means tests instead of quantity-based lifeline rates.

2. Consider linking subsidies to service levels so as to use "self-selection" as a targeting mechanism. An example would be provision of pre-paid meters (possibly at subsidized tariffs) which allow households to control their total expense on the service.

Taxes

1. DOE, with the help from the industry players and academic institutions, to review whether or not the government is "overtaxing" the energy sector. This may include reviewing the legislations on taxes on electric power and whether or not these can be gradually reduced or phased out.

Demand Management

1. DOE to develop and implement demand-side measures. This may entail conducting an analysis of the potential of DSM and opportunities that the country can exploit.

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## 6. Appendices

### Appendix A. PROPOSED LIST OF INDICATORS FOR EACH LEVEL OF THE EVALUATION FRAMEWORK

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| **Level 0 (Benchmark/Entry Conditions)**<br><br>Evaluation Question: Prior to the implementation of EPIRA, what are the specific conditions, strengths and weaknesses of the country in terms of the following: | | | |
| 1. Weak economic growth realized<br>a. Export growth<br>b. foreign direct investments inflow<br>c. GDP growth<br>d. Employment growth | Export Growth (%), pre-EPIRA period | Bnagko Sentral ng Pilipina Balance of Payments 1985-1999 & Exports of Goods by Commodity 1999-2012 | |
| | GDP Growth (%), pre-EPIRA period | PSA: Annual National Accounts 1946-2010 | |
| | Employment Growth, (%), pre-EPIRA period | BSP: Selected Labor and Wage Indicators 1957-2017 | |
| | FDI prior to EPIRA: Balance of Payments Measure, pre-EPIRA period | BSP: Balance of Payments 1985-1999 | |
| 2. Electricity Industry | | | |
| a. Electricity Supply | | | |
| Reliability | Total Consumption by Sector | DOE: Philippine Power Statistics (1991-2000) | |
| | Total Power Generation | DOE: Philippine Power Statistics (1991-2000) | |
| | Total Installed Capacity | DOE: Philippine Power Statistics (1991-2000) | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| | Total Peak Demand | DOE: Philippine Power Statistics (1991-2000) | |
| Quality | Number of Households experiencing power outages | 1995 Household Energy Consumption Survey, Philippines Statistics Office. | This data may be complemented by anecdotal evidence and interviews from experts. |
| Security | Level of Fuel Imports, in USD | BSP: Balance of Payments & Imports of Goods by Commodity (1990-2000) | |
| Affordability | Energy Generation, by sources | DOE: Philippine Power Statistics 1991-2000. | |
| | Electricity price<br>• Meralco Rates, by customer group<br>• Average electricity prices by distribution utilities | MERALCO: electricity prices per customer group, by quarter, 1990-2000.<br>PSA: Electricity Price Index, 1990-2000.<br>DOE: Historical Electricity Rates 1990-2000, by distribution utilities. | |
| b. Competition | Previous studies | Patalinghug 2005; Navarro et al 2016; Patalinghug & Llanto 2005; Villamejor-Mendoza 2008 | Information on these indicators may be limited to qualitative data. |
| c. Investment and Infrastructure/Modernization | Share of private assets in the generation sector before 2001 | 1988 Philippine Energy Statistics: Installed Capacity and Gross Energy Generation of Electric Utilities by Type of Ownership 1972-1987 | |
| | Revenues of each player in the generation sector prior to 2001 | Patalinghug 2003: Table 6. Financial Performance of Major Players: 2000-2001 | Revenues of players in the Distribution Sector |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| | | | not the Generation Sector |
| | Previous studies | Patalinghug 2005; Navarro et al 2016; Patalinghug & Llanto 2005; Villamejor-Mendoza 2008 | |
| d. Electric grid modernization | System loss | DOE: 2010 Philippine Power Statistics (1991-2000) | |
| | Percentage of system loss to total output | DOE: 2010 Philippine Power Statistics (1991-2010) | |
| 3. Regulatory body governing the electric industry | Previous studies | Patalinghug 2005; Navarro et al 2016; Patalinghug & Llanto 2005; Villamejor-Mendoza 2008 | |
| 4. Social Equity | | | |
| a. Energy Poverty | Energy expenditure as a source of income, by region | Family Income and Expenditure Survey (FIES): Total Disbursement in Cash and In Kind by Region and Item of Expenditure 2000, 1997, 1994, 1991, 1988, 1985 | |
| b. Electrification | Level of Electrification | FIES: Proportion of Households with Electricity by Region, Urban-Rural: 1991, 1994 and 1997 p. 55 | |
| | % of the population who has access to electricity | FIES: Proportion of Households with Electricity by Region, Urban-Rural: 1991, 1994 and 1997 p. 55 | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| | | FIES: Number of Families by Presence of Electricity by Income Decile, By Region, Urban-Rural 1997 p. 221 | |
| c. Inter-customer equity (e.g., existence of cross-subsidies) | Differences in residential and industrial rates | MERALCO Electricity Rates by Customer Class 1946-2000<br>MERALCO Electricity Rates by Customer Class 1975-2000 | |
| 5. Sustainability of Energy | | | |
| a. Share of renewables | Share of renewables in generation mix | DOE: 2010 Philippine Power Statistics (1991-2010) | |
| | Installed capacity of renewables | DOE: 2010 Philippine Power Statistics (1991-2010) | |
| b. Investment climate for more sustainable energy sources | Other laws that encourage renewables | Philippine Environmental Policy Act of 1977 (PD 1151)<br><br>National Integrated Protected Areas System Act of 1992 | |
| | Local and foreign investments | DOE: List of Locally-Funded and Foreign-Assisted Projects 2017 | |
| **Level 1 (The Design)**<br><br>Evaluation Question: How does the design of | | | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| EPIRA respond to the specific conditions, strengths and weaknesses of the country? | | | |
| Inputs:<br>a) RA 9136<br>b) Implementing Rules and Regulation of EPIRA<br>c) Power Development Plan<br>d) Transmission Development Plan<br>e) Distribution Development Plan | RA 9136 | Studies, reports and other public documents | |
| | Implementing Rules and Regulation of EPIRA | Studies, reports and other public documents | |
| | Power Development Plan | Studies, reports and other public documents | |
| | Transmission Development Plan (TDP) | Studies, reports and other public documents | |
| | Distribution Development Plan (DDP) | Studies, reports and other public documents | |
| **Level 2 (The Outputs)** | | | |
| Evaluation Questions: How effective has been the contribution of EPIRA to the following: | | | |
| a. Strengthened and purely independent regulatory body for the energy industry | Energy Regulatory Commission created | Studies, reports and other public documents | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| b. Privatized assets and liabilities of the National Power Corporation | Share of NPC's assets and liabilities that have been privatized | DOE: 2017 Power Statistics Gross Power Generation by Ownership in MWh (2003-2017) | |
| c. Enhanced institutional capacity and improved policy for: | | | |
| c.1. Grid modernization | TransCo and PSALM created<br><br>Immediate activities to implemented the TDP and DDP | Studies, reports and other public documents | |
| c.2. Electric industry competition | Previous studies | Patalinghug 2005; Navarro et al 2016; Patalinghug & Llanto 2005; Villamejor-Mendoza 2008 | |
| c.3. Electrification | Number of policies and existence of juridical entities governing these | DOE and ERC reports and documents | |
| c.4. Sustainable energy | Other laws that encourage renewables | Biofuels Act of 2006 (RA 9367)<br>Renewable Energy Act of 2008 (RA 9513) | |
| c.5. Consumer Protection | Consumer protection policies | ERC: Number of policies relating to consumer protection | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| **Level 3 (The Outcomes)** | | | |
| Evaluation Questions: How effective has been the contribution of EPIRA to the following: | | | |
| a) Power supply | | | |
| Reliability improved | Total Consumption by Sector | DOE: Philippine Power Statistics 2001-2017 | |
| | Total Power Generation | DOE: Philippine Power Statistics 2001-2017 | |
| | Total Installed Capacity | DOE: Philippine Power Statistics 2001-2017 | |
| | Total Peak Demand | DOE: Philippine Power Statistics 2001-2017 | |
| Quality improved | Total Power Outages (as experienced by households) | PSA: 2014 Home Energy Reports | |
| Security improved | Level of Fuel Imports | PSA: Imports of Goods 2000-2017 | |
| | Generation mix | DOE: 2015 and 2017 Philippine Power Statistics 1990-2017 | |
| Affordability improved | Electricity price per sector/region | PSA: Electricity Price Index 2001-2016<br>DOE: Historical Electricity Rates 2001-2016 | |
| b) Country electrified | Level of Electrification | DOE: 30th EPIRA Implementation Status: | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| | | Household Electrification Level as of December 2016 p. 59<br>NEA: Status of Energization as of Feb 2018 | |
| | % of the population who has access to electricity | FIES: No of Families by Presence of Electricity by Region and Income Decile 2015<br><br>World Bank Development Indicators | |
| c) Competition in the energy industry improved | Indices/concentration ratios after EPIRA | DOE: 2017 Power Statistics Gross Power Generation by Ownership in MWh (2003-2017)<br><br>DOE: 2017 List of Existing Power Plants: https://www.doe.gov.ph/sites/default/files/pdf/electric_power/existing_power_plants_luzon_visayas_mindanao_offgrid_december_2017.pdf<br><br>DOE: 30th EPIRA Implementation Status Report: Market Share Determination per Grid and National Grid p. 41 | |
| d) Electric grid modernized | System loss | DOE: Power Statistics (2003-2017) | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| | Percentage of system loss to total output | DOE: 2017 Power Statistics (2003-2017) | |
| e) More renewables or prospects for renewables | Share of renewables to total capacity and generation mix post-EPIRA | DOE: 2015 and 2017 Philippine Power Statistics (2001-2017) | |
| **Level 4 (The Impact)** | | | |
| a) Increased Foreign Direct Investment | Foreign Direct Investments post-EPIRA | BSP: Net Foreign Direct Investment by Industry/Sector 2005-2018 | |
| b) Improved social equity | | | |
| Energy poverty alleviated | Share of consumption | FIES: Total Disbursement in Cash and In Kind by Region and Item of Expenditure 2015, 2012, 2009, 2006, 2003<br>PSA: Household Final Consumption Expenditure 1998-2017 | |
| | Regional price trends | PSA: Electricity Price Index 2001-2014<br>DOE: Historical Electricity Rates 2001-2014 | |
| | Regional GDP | PSA: Gross Regional Domestic Product by Industrial Origin 2001-2017<br>PSA: Gross Value Added in Electricity, Gas and Water Supply by Region 2015-2017 | |
| c) Robust economic growth | Export Growth | PSA: Exports of Goods 2001-2017 | |

| EF Level/ Hypothesized Results | Indicators | Data Source | Remarks |
|---|---|---|---|
| | Employment Growth | BSP: Selected Labor and Wage Indicators 2001-2017 | |
| | Economic Growth | PSA: Annual National Accounts 2001-2017 | |

**Appendix C. Regional Summary of Distribution Utilities' Overall Tariff Adjustment**

| Distribution Utility (DU) | Date Approved | OATA (P/kWh) | |
|---|---|---|---|
| | | Proposed | Approved |
| **REGION I** | | | |
| INEC | 2003-06-25 | 0.9591 | 0.0522 |
| LUELCO | 2003-12-29 | 0.1825 | 0.1579 |
| ISECO | 2003-07-25 | 0.5274 | 0.2151 |
| PANELCO I | 2008-06-19 | 0.0000 | 0.0711 |
| CENPELCO | 2004-01-28 | 0.6143 | 0.0964 |
| PANELCO III | 2003-12-29 | 0.5078 | 0.0631 |
| **CAR** | | | |
| ABRECO | 2004-01-14 | 0.4414 | 0.0935 |
| BENECO | 2003-12-03 | 1.1980 | 0.0527 |
| KAELCO | 2005-07-20 | 0.8069 | 0.6132 |
| MOPRECO | 2003-06-25 | 0.8161 | 0.0501 |
| IFELCO | 2003-08-25 | 0.4879 | 0.1120 |
| **REGION II** | | | |
| BATANELCO | 2003-07-29 | 0.5692 | 0.5694 |
| CAGELCO I | 2003-06-25 | 0.4461 | 0.0589 |
| CAGELCO II | 2003-07-30 | 0.5054 | 0.0418 |
| ISELCO I | 2003-12-22 | 0.3182 | 0.1619 |
| ISELCO II | 2004-03-04 | 0.4901 | 0.1830 |
| NUVELCO | 2003-08-04 | 0.0503 | 0.0431 |
| QUIRELCO | 2003-04-08 | 0.3285 | 0.1433 |
| **REGION III** | | | |
| NEECO I | 2005-01-10 | 1.2973 | 0.0111 |

| | | | |
|---|---|---|---|
| NEECO II-AREA I | 2004-01-20 | 0.6410 | 0.4725 |
| NEECO II-AREA II | 2004-09-15 | 0.6339 | 0.3040 |
| PELCO I | 2002-11-15 | 1.4442 | 0.2719 |
| PELCO II | 2004-02-18 | 1.8521 | 0.0095 |
| PELCO III | 2004-01-28 | 1.1102 | 0.1613 |
| PERSCO | 2003-12-29 | 0.5530 | 0.0670 |
| SAJELCO | 2004-05-21 | 0.3100 | 0.1771 |
| TARELCO I | 2003-12-29 | 0.6148 | 0.0392 |
| TARELCO II | 2004-02-04 | 0.2543 | 0.0185 |
| PENELCO | 2003-06-25 | 0.2010 | 0.1325 |
| ZAMECO I | 2003-08-06 | 0.8693 | 0.1822 |
| ZAMECO II | 2005-03-07 | 0.2355 | 0.2185 |
| **REGION IV-A** | | | |
| AULECO | 2003-12-29 | 0.3743 | 0.3743 |
| BATELEC I | 2008-09-15 | 0.3240 | 0.3240 |
| BATELEC II | 2004-02-04 | 1.0866 | 0.0342 |
| FLECO | 2003-07-25 | 0.9051 | 0.1358 |
| QUEZELCO I | 2004-01-12 | 0.2079 | 0.2079 |
| QUEZELCO II | 2003-09-25 | 0.5231 | 0.1066 |
| **REHION IV-B** | | | |
| OMECO | 2003-07-10 | 0.0951 | 0.3458 |
| LUBELCO | 2004-03-29 | 1.5600 | 1.5600 |
| MARELCO | 2003-12-29 | 0.2082 | 0.0444 |
| TIELCO | 2003-09-25 | 0.4599 | 0.1056 |
| BISELCO | 2003-07-14 | 2.4605 | 0.3538 |
| PALECO | 2004-01-28 | 0.2077 | 0.0281 |
| ROMELCO | 2003-12-29 | 0.3942 | 0.1384 |
| ORMECO | 2004-01-13 | 0.1167 | 0.1167 |
| **REGION V** | | | |
| ALECO | 2004-02-11 | 0.3624 | 0.0690 |
| CANORECO | 2003-06-25 | 1.4465 | 0.3431 |
| CASURECO I | 2003-06-25 | 2.3704 | 0.2922 |
| CASURECO II | 2003-07-07 | 0.2985 | 0.0270 |
| CASURECO III | 2003-12-29 | 1.5864 | 0.4559 |
| CASURECO IV | 2004-08-05 | 0.9949 | 0.6412 |
| MASELCO | 2004-03-03 | 1.3195 | 0.3394 |
| FICELCO | 2003-08-15 | 0.8067 | 0.6333 |
| SORECO I | 2002-11-15 | 0.8303 | 0.2831 |
| SORECO II | 2003-12-29 | 1.5848 | 0.6193 |
| TISELCO | 2003-08-14 | 1.7855 | 1.7855 |
| **REGION VI** | | | |
| AKELCO | 2008-08-14 | 0.7542 | 0.7542 |
| ANTECO | 2003-12-22 | 0.5129 | 0.1094 |
| CAPELCO | 2004-06-24 | 0.3406 | 0.1906 |
| ILECO I | 2003-06-25 | 0.02354 | 0.0544 |

| | | | |
|---|---|---|---|
| ILECO II | 2003-12-03 | 0.2292 | 0.1655 |
| ILECO III | 2004-01-26 | 0.4266 | 0.1645 |
| GUIMELCO | 2004-02-27 | 0.3156 | 0.2928 |
| VRESCO | 2003-07-25 | 0.4572 | 0.0007 |
| CENECO | 2004-02-04 | 0.5703 | 0.1096 |
| NOCECO | 2003-12-22 | 0.5354 | 0.3094 |
| **REGION VII** | | | |
| BANELCO | 2003-08-15 | 0.4410 | 0.1599 |
| BOHECO I | 2004-02-18 | 0.0227 | 0.0227 |
| BOHECO II | 2003-12-29 | 0.7171 | 0.3365 |
| CEBECO 1 | 2003-03-28 | 0.2744 | 0.2744 |
| CEBECO II | 2004-01-21 | 0.3339 | 0.3339 |
| CEBECO III | 2004-09-30 | 0.1761 | 0.0924 |
| CELCO | 2004-09-30 | 0.5085 | 0.3370 |
| NORECO I | 2004-02-04 | 1.1200 | 0.1562 |
| NORECO II | 2004-12-29 | 0.3109 | 0.0492 |
| PROSIELCO | 2003-08-14 | 0.0584 | 0.3512 |
| **REGION VIII** | | | |
| BILECO | 2003-12-29 | 0.5885 | 0.2542 |
| LEYECO I | 2004-03-12 | 0.9109 | 3980.0000 |
| LEYECO II | 2004-02-04 | 0.2048 | 0.0615 |
| LEYECO III | 2004-01-21 | 0.6012 | 0.4923 |
| LEYECO IV | 2003-06-27 | 0.1997 | 0.1434 |
| LEYECO V | 2004-02-27 | 0.7763 | 0.5056 |
| SOLECO | 2003-12-29 | 0.5144 | 0.5089 |
| SAMELCO I | 2004-08-05 | 0.1961 | 0.1800 |
| SAMELCO II | 2004-08-05 | 0.1778 | 0.1778 |
| ESAMLECO | 2004-02-11 | 0.2384 | 0.2384 |
| NORSAMELCO | 2004-05-14 | 0.4041 | 0.1120 |
| **REGION IX** | | | |
| ZAMELCO | 2003-06-25 | 0.6067 | 0.0267 |
| ZAMSURECO I | 2004-02-04 | 0.0625 | 0.0625 |
| ZAMSURECO II | 2002-11-15 | 0.0248 | 0.0189 |
| ZANECO | 2003-03-28 | 0.2520 | 0.0453 |
| **ARMM** | | | |
| BASELCO | 2004-05-20 | 2.3605 | 1.1527 |
| CASELCO | 2004-06-07 | 0.8506 | 0.1651 |
| SULECO | 2005-07-21 | 0.5759 | 0.2711 |
| SIASELCO | 2005-07-20 | 0.5860 | 0.3211 |
| TAWELCO | 2005-01-10 | 1.1184 | 0.3893 |
| LASURECO | 2005-05-23 | -0.2457 | -0.2457 |
| MAGELGO | 2003-12-12 | 0.3445 | 0.1838 |
| **REGION X** | | | |
| FIBECO | 2003-09-12 | 0.4736 | 0.2131 |
| BUSECO | 2003-12-29 | 0.0230 | 0.0069 |

| | | | |
|---|---|---|---|
| MOELCI I | 2003-12-29 | 0.5441 | 0.5441 |
| MOELCI II | 2004-02-27 | 0.3679 | 0.1017 |
| MORESCO I | 2008-09-08 | 0.6864 | 0.6864 |
| MORESCO II | 2008-09-08 | 1.7655 | 1.7655 |
| CAMELCO | 2008-09-08 | 1.9521 | 1.9521 |
| LANECO | 2004-06-23 | 0.5458 | 0.3808 |
| **CARAGA** | | | |
| ANECO | 2004-01-26 | 0.2912 | 0.2307 |
| ASELCO | 2004-01-21 | 0.1640 | 0.0831 |
| DIELCO | 2006-02-15 | 0.1853 | 0.1853 |
| SURNECO | 2003-12-29 | 0.9303 | 0.1088 |
| SIARELCO | 2003-04-08 | 0.2605 | 0.0327 |
| SURSECO I | 2003-12-03 | 0.2534 | 0.0733 |
| SURSECO II | 2003-09-05 | 0.8198 | 0.0504 |
| **REGION XI** | | | |
| DANECO | 2004-02-06 | 0.2866 | 0.0668 |
| DASURECO | 2004-06-24 | 0.2780 | 0.0675 |
| DORECO | 2004-01-23 | 0.8576 | 0.4062 |
| **REGION XII** | | | |
| SOCOTECO I | 2008-06-01 | 0.1555 | 0.1555 |
| SOCOTECO II | 2004-02-04 | 0.2681 | 0.1767 |
| COTELCO | 2003-12-03 | 0.3740 | 0.0356 |
| SUKELCO | 2004-08-05 | 0.2223 | 0.2118 |
| **PRIVATELY INVESTED-OWNED UTILITIES (PIOUs)** | | | |
| MERALCO | 2003-03-20 | 1.2280 | 0.0540 |
| AEC | 2004-06-23 | 0.5300 | -0.0598 |
| VECO | 2003-01-29 | 0.3600 | 0.0682 |
| SFELAPCO | 2003-12-08 | 0.2219 | 0.0000 |
| DECORP | | 0.4972 | 0.0641 |
| CLPI | 2003-03-20 | 0.2762 | 0.1469 |
| CEPALCO | | 0.3900 | 0.0921 |
| VECO | 2004-08-30 | | |

Source: 13th EPIRA Status Report

**Table 18. Share of Families with Electricity by Region, 1985-2001.**

| Region | 1985 | 1988 | 1991 | 1994 | 1997 | 2000 | 2003 | 2006 | 2009 | 2012 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Philippines** | **57.7** | **59.9** | **61.7** | **66.0** | **70.4** | **76.0** | **77.0** | **82.1** | **85.7** | **88.8** | **91.1** |
| NCR | 97.8 | 97.6 | 96.6 | 98.4 | 99.5 | 99.3 | 99.1 | 97.7 | 98.9 | 98.4 | 99.0 |
| CAR | 40.8 | 51.7 | 48.2 | 56.0 | 56.6 | 66.9 | 72.9 | 79.4 | 83.5 | 89.8 | 93.3 |
| Region I | 67.5 | 70.0 | 71.7 | 73.9 | 75.9 | 83.0 | 85.2 | 89.8 | 93.7 | 94.6 | 95.7 |
| Region II | 55.6 | 61.3 | 57.9 | 61.6 | 63.2 | 72.8 | 73.8 | 81.1 | 86.6 | 90.4 | 94.9 |
| Region III | 78.9 | 82.8 | 84.4 | 86.2 | 91.0 | 93.3 | 92.8 | 94.2 | 94.7 | 95.5 | 97.4 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Region IV-A | 75.5 | 78.1 | 83.2 | 87.8 | 90.1 | 93.9 | 92.4 | 92.5 | 93.6 | 95.6 | 96.9 |
| Region IV-B | 20.3 | 23.0 | 30.3 | 34.5 | 44.1 | 52.9 | 53.8 | 63.1 | 71.0 | 77.5 | 86.1 |
| Region V | 44.8 | 40.7 | 43.8 | 51.1 | 57.3 | 60.9 | 64.7 | 72.0 | 78.4 | 84.0 | 88.3 |
| Region VI | 34.6 | 43.5 | 45.0 | 53.5 | 57.3 | 63.7 | 69.1 | 76.7 | 81.5 | 86.1 | 88.3 |
| Region VII | 39 | 43.6 | 48.4 | 54.3 | 59.1 | 66.7 | 69.5 | 77.6 | 80.6 | 85.7 | 88.3 |
| Region VIII | 26.4 | 33.2 | 36.7 | 42.7 | 46.8 | 55.2 | 60.7 | 73.3 | 83.1 | 87.5 | 86.4 |
| Region IX | 42.9 | 45.7 | 45.9 | 48.3 | 49.0 | 53.9 | 54.9 | 65.1 | 70.7 | 73.3 | 80.8 |
| Region X | 55.1 | 57.9 | 53.8 | 59.9 | 64.9 | 70.1 | 68.2 | 76.6 | 81.6 | 84.7 | 86.6 |
| Region XI | 47.6 | 50.2 | 51.2 | 53.7 | 63.8 | 72.0 | 67.5 | 75.7 | 78.1 | 83.9 | 87.8 |
| Region XII | 39.1 | 46.7 | 46.5 | 51.2 | 61.1 | 65.6 | 64.5 | 69.9 | 76.6 | 77.4 | 83.1 |
| CARAGA | 58.1 | 61.1 | 54.1 | 55.6 | 57.2 | 65.1 | 64.9 | 79.6 | 84.2 | 87.0 | 91.2 |
| ARMM | 28.2 | 20.8 | 21.5 | 23.9 | 34.9 | 39.5 | 35.0 | 49.6 | 56.0 | 58.1 | 54.7 |

Source: FIES (several years)

**Table 19. Power Generation by Utility (in million kilowatt hours), 1981-2016.**

| Year | Total | National Power Corporation | Independent Power Producers | | | | Self-Generating Industries | Non-NPC* |
|---|---|---|---|---|---|---|---|---|
| | | | National Power Corporation | Rural Electric Companies | Private Utilities | Manila Electric Company | | |
| **1981** | **18,583** | 15,988 | | 222 | 368 | | 2,005 | |
| **1982** | **19,406** | 17,307 | | 92 | 324 | | 1,683 | |
| **1983** | **21,454** | 18,693 | - | - | 2,761 | … | - | |
| **1984** | **21,180** | 18,731 | - | 42 | 1,677 | … | 730 | |
| **1985** | **22,767** | 18,717 | - | - | 4,050 | … | - | |
| **1986** | **21,797** | 19,271 | - | - | 2,526 | … | - | |
| **1987** | **22,642** | 20,958 | - | 85 | 521 | 274 | 804 | |
| **1988** | **24,538** | 22,920 | - | 55 | 457 | 261 | 845 | |
| **1989** | **25,573** | 24,087 | - | 33 | 110 | 359 | 984 | |
| **1990** | **26,327** | 24,798 | - | 33 | 134 | 283 | 1,079 | |
| **1991** | **25,649** | 25,451 | - | 35 | 163 | … | - | |
| **1992** | **25,870** | 25,538 | - | 43 | 289 | … | - | |
| **1993** | **26,579** | 26,421 | - | 40 | 118 | … | - | |
| **1994** | **30,459** | 25,092 | 5,265 | 32 | 70 | - | - | |
| **1995** | **33,554** | 22,138 | 11,197 | 73 | 53 | 93 | - | |
| **1996** | **36,707** | 23,816 | 11,788 | 93 | 138 | 872 | - | |
| **1997** | **39,797** | 23,202 | 15,500 | 82 | 97 | 916 | - | |
| **1998** | **41,580** | 24,541 | 15,143 | 273 | 766 | 857 | - | |
| **1999** | **41,432** | 39,257 | - | 123 | 1,220 | 832 | - | |
| **2000** | **45,290** | 40,978 | - | 73 | 1,026 | 3,213 | - | |
| **2001** | **47,048** | 42,302 | - | 67 | 967 | 3,712 | - | |
| **2002** | **48,468** | 38,269 | - | 78 | 1,075 | 9,046 | - | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **2003** | **52,940** | 39,385 | - | 55 | 2,146 | 11,354 | - | |
| **2004** | **55,956** | 41,958 | - | 58 | 2,276 | 11,664 | - | |
| **2005** | **56,567** | 40,497 | - | 36 | 2,048 | 13,986 | - | |
| **2006** | **56,785** | 17,299 | 23,173 | 121 | 1,883 | 14,309 | - | |
| **2007** | **59,611** | 15,588 | 26,156 | 48 | 3,406 | 14,413 | - | |
| **2008** | **60,821** | 13,191 | 27,972 | - | - | - | - | 19,658 |
| **2009** | **61,934** | 10,219 | 27,400 | - | - | - | - | 24,315 |
| **2010** | **67,743** | 4,576 | 14,725 | - | - | - | - | 48,442 |
| **2011** | **69,176** | 5,685 | 9,536 | - | - | - | - | 53,955 |
| **2012** | **72,922** | 5,707 | 9,875 | - | - | - | - | 57,340 |
| **2013** | **75,265** | 5,458 | 8,912 | - | - | - | - | 60,895 |
| **2014** | **77,261** | 5,109 | 8,382 | - | - | - | - | 63,770 |
| **2015** | **82,412** | 4,164 | 8,747 | - | - | - | - | 69,501 |
| **2016** | **90,798** | 3,155 | 7,223 | - | - | - | - | 80,420 |

Source: 2017 Phlippine Statistical Yearbook Table 14.5.