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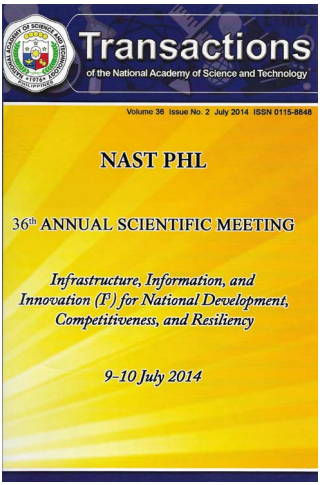

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UNDERSTANDING ELECTRICITY PRICING IN THE PHILIPPINES

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Introduction

In this post-modern era that is increasingly globalized and highly industrialized, electricity is undoubtedly vital and indispensable in securing competitive economic growth of countries. Needless to say, industries cannot thrive, businesses will halt to the ground, the economy will drag, and countries will lag to lethargy if there is no dependable electricity to pump life into industrial production activities. Such is the crucial function of electricity in the national economic life that its inaccessibility, lack, or scarcity is seriously alarming and cries for urgent responsive action from the State, the national leadership, and various stakeholders.

In the Philippines, the electricity system as well as electricity infrastructures used to be run and managed by the State through its government organs. The government oversaw and regulated power generation, supply, distribution, and trading in the market supposedly to ensure that industries, establishments, and the national population even in far flung rural communities have access to and get a fair share of affordable electricity supply. Over time, however, the State seemed to have failed in this function as it could not stem or abate steadily recurring increases in electricity prices while public electric utilities incurred heavy debts and electricity supply problems grew perennial. Hence, as a responsive measure, the Philippine Congress passed in 2001 the Electric Power Industry Reform Act (EPIRA), essentially to restructure and liberalize the electricity market, effectively encouraging the participation of the private sector, allowing it to assume specific roles previously held by the State. The EPIRA law was billed as a smart solution to address the electricity problems, provide more efficient services, ensure uninterrupted supply of sufficient electricity to consumers, and arrest the tendency of electricity prices to spiral. Sadly, even with the EPIRA law, the situation seems to have remained unchanged, if not indeed worsened, as power supply remains a very serious problem. Prices did not decline substantially but rather increased, to the detriment of industries and the national population of electricity consumers.

This paper presents an analysis on Philippine electricity pricing and attempts to offer understanding of certain factors that may explain the condition of electricity prices in the country. It will cite cases of power supply problems and the seemingly inevitable increasing prices that result from electric power dilemma. This paper aims further to be able to provide answers to four basic questions, as follows:

1. Is electricity pricing reasonable in the Philippines?
2. How do Philippine electricity prices and tariff rates compare with those of neighbouring countries?
3. What factors contribute to price variability and escalation?
4. What viable alternatives are available that are advantageous and beneficial to the general population of consumers to cushion the impact of electricity rates?

Understanding the electric power industry

Electricity production and delivery has three components or goes through three phases. Electric power is generated directly at the source and is delivered through step-up transformers. Power generation is now largely held by the private sectors (by traditional clans of tycoons i.e. the Lopez and the Aboitiz families). Generation accounts for 60% of the electricity production phase. Generated electricity passes through transmission lines (normally of about 230-500 kV). Power transmission, accounting for 15% of power delivery services, is captured by the National Grid Corporation of the Philippines (NGCP). GCP, previously a government body but now converted into a private entity, is regulated by the Energy Regulatory Commission (ERC), a constitutional body tasked to regulate the Philippine electric power industry. GCP determines transmission rate per kilowatt hour by distribution utilities (DU), which are private firms or electric cooperatives (i.e. MERALCO in Luzon, VECO in Visayas, and Davao Light and SOCOTECO in Mindanao). Power distribution accounts for 25% of power delivery services. The electricity transmitted is caught up by pole-top transformers or distribution lines and the captured electricity is delivered directly to consumers (ERC: Philippine Electricity Pricing, M3, p 3)

In reforming the electricity industry, the EPIRA law divided the industry into four sectors: generation, transmission, distribution, and supply. In liberalizing the market for electricity generation, competition was necessary. Thus, EPIRA mandated the privatization of the National Power Corporation's (NAPOCOR) generation assets and IPP contracts and the creation of the Wholesale Electricity Spot Market (WESM). WESM is a trading floor for electricity, or an auction market for bulk trading of electricity where power generators compete to sell electricity in a centralized pool. Electric power distributors or bulk consumers buy electricity from this pool.

Generation

Until 1986, NAPOCOR, a government-owned-and-controlled corporation (GOCC), owned and operated the generation and transmission facilities in the Philippines. But continuing electric power crisis in 1980s forced the national government to end NAPOCOR's monopoly in power generation. Government decided to allow the entry of private companies to build and operate power generation facilities. Year 1993 saw the passage of Electric Power Crisis (EPC) Act allowing NAPOCOR to enter into contract with Independent Power Producers (IPPs) to generate and transmit electricity, with the government guaranteeing NAPOCOR's counterpart obligations. NAPOCOR's power generation function was retained and was only to be augmented significantly by the IPPs. The law allowed IPPs to operate under a contract called Purchase Power Agreement (PPA). NAPOCOR would buy the energy outputs of IPPs while it still owned and operated the transmission lines. Thus, when the 1993 EPC law was supplanted by the 2001 EPIRA Act, electricity was already being generated by both NAPOCOR and IPPs.

Another player in the power industry, the distribution utilities, also consisted of private companies or investors securing franchises from the government. The power rates by NAPOCOR and DUs were to be regulated by the ERC.

EPIRA sought to liberalize the electricity market by making generation of electric power competitive and open to market actors. Through EPIRA, NAPOCOR and IPP power generating facilities were privatized. To operationalize this, Congress moved to create the Power Sector Assets and Liabilities Management Corporation (PSALM), a GOCC, to assume NAPOCOR generation assets as well as IPP contracts. PSALM was to manage the sale, disposition, and privatization of NAPOCOR assets and IPP contracts. By 2012, only 7.9% of installed generation capacity was still owned and operated by NAPOCOR and PSALM. The rest were owned by private utilities (CEnergy, 2013:6).

Table 1. 2012 Installed Generation Capacity (in MW) by Ownership

	Luzon	Visayas	Mindanao	Total % Share
NAPOCOR/PSALM owned and operated	246	41	914	7.89
NAPOCOR/ PSALM IPPs	1,642	711	492	18.69
IPPs and DUs owned	6,185	1,311	363	51.64
APOCOR/IPP contracted capacities with IPAs	3,315			21.78
TOTAL	11,388	2,063	1,769	

Source: ERC

Meanwhile, the Philippines sources its energy needs from coal (largest at 30%), hydro and natural gas (24% and 19%, respectively). Geothermal plants account for less than 11% while the combined wind, solar and biomass plants account for only less than 1% (CEnergy, p 7).

In terms of energy output, in 2011, the total generated power was 69,050 GWh, about 67% of which was sourced from coal and natural gas plants. Oil-based plants accounted for 16% of installed generation capacity, while energy coming from renewable sources was only 0.3%.

Transmission

To assume the electricity transmission function of NAPOCOR, another government corporation, the ational Transmission Company (TRANSCO), was created. TRA SCO, wholly owned by PSALM, is mandated to provide open and non-discriminatory access to transmission system to all electricity users as provided for in Section 9b of the EPIRA law (CEnergy, p 8). Following EPIRA, the transmission system was privatized on a 25-year concession contract, with the government retaining legal ownership of the transmission assets through TRANSCO. Such contract was awarded to NGCP in 2007. Since 2009, NGCP (a consortium of private local and foreign power players, *i.e.*, Monte Oro Grid Resources Corporation, Calaca High Power Corporation, and State Grid Corporation of China, has become the system operator, effectively taking over the operation of transmission system, with the ERC as regulator. But because electricity transmission is a public utility operation, NGCP had to obtain a congressional franchise to operate the system (CEnergy, p 12).

A prototype of NGCP-set transmission rates across DUs is shown in table 2 below.

Table 2: Transmission Rates by DUs

	MERALCO	VECO	DLPC
Total Transmission Charge (P/kWH)	0.8816	0.8845	0.7266
Power Delivery Service Charge	286.8995/kW	331.5170/kW	316.8957/kW

Source: NGCP billing, 2012 (in ERC, M3, p 11)

Distribution

Distribution of electricity to end-users by DUs also requires securing a franchise. Like the transmission system, power distribution has been privatized. As provided for in Sections 22 and 23 of the EPIRA, a DU is obligated to provide services and connections for its systems for use of the end-users within its franchise area. It will also provide non-discriminatory access to its distribution system to all users (CEnergy, p 9). A DU is authorized by law to impose and collect distribution wheeling charges and connection fees from all users, provided that such is approved by the ERC (CEnergy, p 13).

There are three types of DUs: private-investor-owned utility (PIOU, *i.e.*, MERALCO), local government unit owned-utility (LGUOU, *i.e.*, Davao Light), and electric cooperative (EC, *i.e.*, SOCOTECO in Mindanao).

Table 3: 2011 Number of DUs in the Philippines, by Grid

Grid	PIOUs and LGUOUs	ECs
Luzon	12	56
Visayas	4	31
Mindanao	4	33
Total	20	120

Source: ERC

Transmission supply

An electricity supplier differs from an electricity distributing utility in that the former is engaged in retail supply of electricity. Supply of electricity refers to the sale of electricity by a party (supplier) other than the generator or distributor. The supplier operates in a franchise area secured by NGCP and uses the wire of the DU to supply electricity to consumers within a specified franchise area.

Bilateral contracts and WESM

A bilateral contract is a legal instrument stipulating concessions between buyer and seller of electricity. Sellers are generating companies or electricity generators, while buyers are composed of DUs and bulk consumers as well as wholesale aggregators (CEnergy, p 36).

As has been mentioned earlier, WESM is the trading floor for electricity. At WESM, physical sales of electricity by generators are offered in the gross pool, and all purchases of electricity (i.e. by DUs, bulk consumers, aggregators) are sourced from the pool. Participants at the WESM are the market operator, system operator, and trading participants (or the sellers). From the same pool is electricity sold through bilateral contracts between the generators and the DUs.

Electricity prices at the trading floor are understandably volatile in that trading is done every hour, resulting in 24 hourly prices every single day. Generators offer sales of generated electricity in an auction and submit offers electronically. Generators specify the prices for quantities of electricity supplied to end-users. Generator sells electricity by block (of at least 5 MW for each block). Generator indicates how much electricity it is willing to sell at an indicated price. A market operator orders price offers (called merit order) from lowest to highest. The highest price in the merit order (the price of the last block of offers to be dispatched that meets the market demand) sets the price or the system marginal price (SMP).

Power generators that supply electricity to the grid are mostly located far from the demand area. This causes changes in electricity pricing since the cost of providing electricity to different locations (or nodes) varies relative to transmission capacity constraint conditions and transmission losses (or system loss), resulting in variability of prices.

Bilateral contracts would normally reflect changes in fuel prices, or changes that will cause variability in electricity pricing. In 2011, of the total quantity of electricity traded at WESM, the proportion of electricity to be supplied to end-users (from 88% to 95%) settled at what is stipulated in the bilateral contracts. Electricity generation is thus influenced by prices determined in the bilateral contracts by generation companies and the DUs (CEnergy, p 44).

Structure of Philippine electricity prices

The preceding texts have established how power is generated, transmitted, distributed, and supplied. It would be helpful at this point to examine what consumers exactly pay for on a regular electricity consumption basis and if the charges are exorbitant. A look at the breakdown of electricity charges in the monthly bill issued to consumers by the Philippines' leading distribution utility, MERALCO, shows this bill subgroup: generation, transmission, system loss, distribution, ubsidies, government taxes, and universal charges. Each of these charges is paid for by the consumer and is automatically reflected in the monthly billing.

Generation charge refers to the cost of energy purchased by the distributor (i.e. MERALCO) from power generators through bilateral contracts, or at WESM. Practically, the DU passes generation cost on to consumers based on a formula prescribed by ERC. Generation charge is a result of commercial negotiation between the generator (seller) and the distributor (buyer). These electric power industry actors determine the price of generation and refect this in the bilateral contract. WESM prices, however, vary with nodes. As discussed earlier, this depends on the location of the generator from the demand area. Thus, different distributors have different generation rates, causing price variability. But the same distributors have uniform rate for all their customer classes within the franchise area (*i.e.*, residential, commercial, industrial rate, etc.).

Transmission charge is the payment to the transmission company (*i.e.*, TRA SCO) for the use of the transmission wires (which are owned by the government through APOCOR, which though GCP determines transmission rates through an award) in transporting electricity from the generator to the distributor. Transmission charge may be adjusted through the ERC. Transmission charge has two components: system charge and demand charge. The former is priced in pesos per kilowatt-hour, while the latter, per kilowatt. Demand charge applies only to commercial and industrial customers.

Distribution charge is payment for use of distribution wires in transporting electricity from the distributor to the customers.

System loss, meanwhile, pays for energy lost when electricity flows through the distribution wires. The customer is also made to pay for electricity that is lost due to theft, or pilferage. RA 7832 (Anti-Electricity and Electric Transmission Lines/Materials Pilferage Act), however, sets a cap on the charge DUs can pass on to customers to prevent abuse i.e. 8.5% of total electricity purchased for PIOUs and 14% for electric cooperatives.

Subsidies have three classifications: lifeline rate subsidy, senior citizen subsidy, and interclass cross-subsidy. Lifeline rates are for low income customers. Senior citizen rates are discount given to senior citizens, while interclass subsidies no longer apply. In the MERALCO bill, only lifeline rate is charged to the customer.

Taxes the customer pays to the government are value added tax, local franchise tax, business tax, energy tax, as well as universal charge. The latter includes environmental charge and missionary electrification charge to support power generation and power delivery system (CEnergy, pp 14-16).

With all these charges directly passed on by distribution utilities to customers, including system loss, the latter could be well overcharged. For a semi-commercial rate, for example, MERALCO charges PhP5.9703 per kWh. The missionary electrification charge may just prove steep since DUs already charge their customers for generation and transmission of electricity to end-users. The latitude given to generation companies and DUs to determine prices at the trading level at WESM through a bilateral contract may cause a spike to prices. Generators and DUs may agree to hold off supply of electricity until the market becomes favourable for these players to set a price most profitable to them.

Although, very recently, the ERC was reported to have set a price cap in electricity trading to ensure fair and reasonable power rate at the WESM. A report by Riza Olchondra says that the ERC, in a May 2014 Resolution # 8, has lowered the WESM clearing price to PhP6,245 per megawatt-hour or PhP6.245 per kilowatt-hour when average prices breach the threshold of PhP8,186 per MWh or P8.186 per kWh over a 72-hour period. This price control, according to ERC, could cut average power spot market rates by about 18.4 percent (CQlaw, 2014).

Electric Services Structure

Meanwhile, the power services structure of the Philippines, as discussed earlier, has four components: generation, transmission, distribution, and supply. Each of these phases of electricity flow before it directly reaches the end-users i charged correspondingly, with each component having sub-charges also borne by customers. In comparison, Indonesia's electricity services structure only has three phases: generation, transmission and system operation, and distribution. There are two major power actors in Indonesia's structure: the IPPs and the customers (CEnergy (b), p 2). Whereas, the Philippines has the IPPs, the DUs, the market operators, and the end-users, with a cluster of regulation or oversight bodies supposedly to ensure cheap prices (i.e. ERC, DOE, Congress, and NEA).

Are Philippine Electricity Prices Really High?

Some studies tend to support observations that Philippine electricity prices are high, if not indeed the highest in the Asian region. The 2011 findings of a study by the Japan External Trade Organization (JETRO) show that the Philippines had the highest electricity rate among 31 cities in Asia. The study averaged the rates for general use of electricity per kilowatt-hour among 5 ASEAN cities, and found the following (CEnergy, p 1):

Table 4. Comparative General Electricity Use among Five ASEAN Cities

General electricity consumption	ASEANCity	Average Rate/kWH
	Manila	U$0.23kWH
	Singapore	U$0.20kWH
	Bangkok	U$0.08kWH
	Kuala Lumpur	U$0.11kWH
	Jakarta	U$0.09kWH

This finding was corroborated by a similar study by the International Energy Consultants (IEC), showing that Philippine electricity prices are costlier than other prices in Asia and the Pacific. The IEC study in particular found that the Philippines ranked 4th among 44 economies, and 2nd in Asia behind Japan.Moreover, the 2012 Doing Business report by World Bank revealed that securing electricity connections in the Philippines is several times costlier than in neighbouring countries. Accessing connection is 762% of income per capita in the Philippines, 78% in Thailand, 96% in Malaysia, and 31% in Singapore.

Comparative Electricity Prices and Tariffs

Between 2004 and 2011, MERALCO, Philippines' largest electricity distribution company, increased prices by an average annual rate of 6.9% to 8.7%. This resulted in price increases. MERALCO captures the largest customer base, about 60% of total electricity consumption. It charges the highest price across customer classes across Philippine regions, as shown in Table 5 (CEnergy, p xiv).

Table 5. Composite Prices by Customer Class and Regions (Php/kWH)

Region	Customer Class			
	Residential	Low Voltage Commercial	Low Voltage Industrial	High Voltage Industrial
NCR	10.26	10.81	9.69	8.37
Luzon	10.13	10.52	9.55	8.33
Visayas	9.57	8.71	8.78	8.66
Mindanao	7.04	6.58	6.55	6.19
All regions	9.77	10.08	8.93	8.08

Comparative Prices among ASEAN Countries

Comparing prices among 5 ASEA countries yields the following data (CEnergy, p xv):

Table 6. 2011 Comparative Electricity Retail Prices (Php/kWH)

Country	Residential	Low Voltage Commercial	Low Voltage Industrial	High Voltage Industrial
Philippines	9.77	10.08	8.93	8.08
Singapore	9.58	9.58	9.24	8.29
Indonesia	2.26	7.16	5.53	4.70
Malaysia	3.28	6.25	5.50	4.96
Thailand	4.79	5.82	5.54	4.99

Data show that Philippine retail prices are closer to that of Singapore but are 400% higher than residential prices in Indonesia. Tax levies may explain these differences. The Philippines' levy on tax is 9% while it is only 6% in Malaysia and 7% both in Singapore and Thailand, although higher in Indonesia at 10%.

In terms of electricity tariffs, the succeeding table shows charges across customer classes by MERALCO.

Table 7. MERALCO Electricity Tariffs by Customer Class (from 2004 to 2011)

	Residential	Low Voltage Commercial	Low Voltage Industrial	High Voltage Industrial
Price per kWH (nominal) 2004 2011	5.70 10.25	6.87 10.81	5.83 9.70	5.24 8.37
Average annual change (%)	8.73	6.69	7.54	6.92
Price per kWH 2004 2011	4.52 5.85	5.44 6.17	4.62 5.53	4.15 4.78
Average annual change (%)	3.76	1.81	2.62	2.02

When compared with ASEA countries, the succeeding data show tariff rates with adjusted taxes and subsidiesacross customer classes (CEnergy, pxvi)

Table 8. Comparative Electricity Tariffs after Adjusting for Taxes and Subsidies

Country	Residential	Low Voltage Commercial	Low Voltage Industrial	High Voltage Industrial
Philippines	8.95	9.24	8.22	7.42
Singapore	8.95	8.95	8.63	7.43
Indonesia	6.02	7.51	7.39	6.16
Malaysia	5.70	8.54	7.81	7.30
Thailand	6.15	7.11	6.85	6.33

Despite adjustment for taxes and subsidies, Philippine tariffs are still higher, although the gaps between countries are not significant. This is because electricity industry in the Philippines is largely private-sector led, while industries in Indonesia, Malaysia, and Thailand are managed by public utilities. The difference in market structure accounts for difference in prices. If these data are to be any gauge, it may be surmised at this point that electric power industry managed by state-owned infrastructures may be better off than that operated largely by the private sector. On

this premise, the EPIRA law, which sought to liberalize the market by welcoming private sector players as operators of power utilities, may not have worked to effectively lower prices of electricity.

Does Insufficient Generation Capacity Result in Higher Electricity Prices?

Previous data have shown that prices of electricity in the Philippines are indeed higher than those in ome ASEA countries. The difference could be somewhat attributed to differences in electricity service structures (i.e. electricity provision goes through four layers), and to market structures (i.e. state-managed vs. private-led).

But what i the core problem? What essentially causes steady hike in electricity prices despite a wide playing field and many private actors (i.e. over a hundred di tribution utilities) in the electric power industry, as envisioned by the EPIRA law, and various sources of energy (i.e. coal, hydrothermal, etc.)?

Case 1: Malampaya Shutdown

A comprehensive report by Iris Gonzales reveals that lack of power plants that will augment generation capacity to provide steady supply of electricity and sufficient energy outputs is the core of the problem that leads, inevitably, to price increases (PhilStar, 2014). Earlier this year, the Supreme Court issued a Temporary Restraining Order enjoining MERALCO from implementing a power rate hike, which would bloat generation charge to as much as Php 3.44 per kWH. The increase stemmed from higher power co ts as a result of the month-long shutdown of the Malampaya gas field in offshore Palawan from ov. 11 to Dec. 10, 2013. This prompted three power plants sourcing gas from Malampaya to utilize the more expensive liquid fuel. The three plants sourcing power from Malampaya are the 1,200-megawatt Ilijan combined cycle natural gas plant owned by Kepco Philippines Corp. and the 1,000-MW Sta. Rita and 500-MW San Lorenzo natural gas facilities owned by First Gen Corp. of the Lopez group. This was aggravated by unplanned outages by several other power plants, which also tightened supply, jacking up prices at the WESM, where MERALCO also sources its power requirements.

The central problem, the report writes, is the lack of, or need for, more generation capacities which can come from more power plants built, according to Department of Energy (DOE) Secretary Jericho Petilla, warning that severe power shortages could be experienced in years 2015 and 2016, if there would still not be enough generation capacity. From 2001 to 2013, the report says, the peak demand of electricity increased by 2,659 MW while the increase in installed capacity contributed by additional power plant during the same period only amounted to 652 MW. During the same time, the

Luzon peak demand alone had grown by 2,659 megawatt or 47 percent from 5,646 MW to 8,300 MW. Yet, no new major base load plant has been constructed and added to the Luzon grid other than the coal-fired plant of G Power in Mariveles, Bataan, with a reported installed capacity of 652 MW and current dependable capacity of 495 MW. Accordingly, demand has outgrown new base load capacity addition by around 2,000 MW over this period.

Seemingly, the generation problem could not be immediately remedied because, observers say, the EPIRA rendered government regulators virtually toothless, hence failing to bring electricity prices down. The national government itself looks helpless to intervene since the same EPIRA law prohibits it from engaging in power generation. Instead of a boon, the EPIRA law, as this case shows, has become a bane to the electric power industry.

Supply Costs

A paper by John Molina of the KPMG Global Energy Institute analyses the supply costs charged to end-users for every kilowatt of electricity transmitted. The writer compares supply costs MERALCO charges its customers with the costs of supply of electricity in neighbouring countries, and found that local costs are lamentably higher (KPMG Report, 2013-2014 Edition).

Molina writes that Meralco's cost of generation supply was US$0.1440/kwh or PhP6.2697/kwh in January 2012. This reflects theblended costs of supply from its independent power producers (IPPs), its transition supply contracts (TSCs) with the NAPOCOR, and the WESM, and its costs for ancillary services. The APOCOR component of Meralco's total cost of supply has averaged PhP5.6885/kwh.The WESM component of Meralco's total costs of supply has averaged US$0.1082/kwh or PhP4.715/kwh in 2012.At peak, however, average WESM tariffs increased to as high as US$0.2014 or PhP8.77/kwh (the average clearing price in the second quarter of 2012).Meralco's total costs (excluding ancillary services) are approximately US$0.1328/kwh.

Molina observes that people bemoan this ostensibly higher cost of supply compared to Asian neighbours. In the Philippines, power supply tariffs reflect actual costs of supply. Asian neighbours, Thailand, Indonesia, Malaysia, Korea and Taiwan, on the other hand, enjoy government subsidies that reduce their average tariffs. In the Philippines, customers pay for subsidy charges.

Another significant contributing factor to the high supply cost, Molina further writes, is the intrinsically high cost of producing and delivering electricity in Luzon, and the Philippines generally, because of the country's dependence on imported fossil fuels. As of end-2011, imported oil and coal plants comprised 49% of the energy mix.

Fuel for these plants is paid at full international market prices. In addition, domestic gas plants, which comprise approximately 18 percent of the energy mix as of end-2011, are supplied indigenous natural gas at prices that are pegged to international prices.

Case 2: The Mindanao Power Crisis

The alarming recurring power outages in Mindanao stem largely from "precariously low power reserves", or "insufficient baseload generating capacity in the region". A 2012 paper analysis on the Mindanao power crisis by Adoracion avarro of the Philippine Institute for Development Studies (PIDS) writes that the Mindanao grid has only 37.31% baseload generating capacity, compared to Luzon and Visayas grids with 63.94% and 71.88%, respectively. To stem the crisis, even peaking plants in Mindanao were used to act as baseload power plant, which has very mall reserve margin that can put the Mindanao power grid at risk. The DOE acted by ordering power generators to make their capacities available during peak hours. ewly privatized power barges were also deployed.

avarro asserts that inadequate baseload generating capacity is the root cause of the problem. Baseload or base demand is the "*more or less constant part of the total demand in an electric power system per unit of time.*" Baseload plants are generating plants that can produce energy at a constant rate. The Mindanao region not only runs short of baseload generating capacity but also relies heavily on hydropower—which constitutes about 51% of generated power in that region. But hydroelectric plants cannot be relied on as it can provide only limited baseload capacity since water level is not constant and may run low during long drought spells.

Table 9: Generating Capacity Mix in Mindanao (2011)

Fuel Type	Capacity (MW)	
	Installed	Dependable
Coal	232	201
Oil-based (diesel)	622	469
Geothermal	108	102
Hydro	1,038	827
Solar	1	1
Biomass	21	7
Total	2,022	1,616

Source: DOE

Citing the Philippine Distribution Development Plan 2010-2019, avarro writes that Mindanao peak demand could reach 1,823 MW in 2019, and the generating capacity requirement is 2,206 MW. Yet, as shown in Table 9, the total dependable

capacity per MW is only 1,616. This could lead to capacity shortfall, which would threaten to further worsen the power crisis and usher in more severe power shortages, to the detriment of the Mindanao economy.

Philippe Reveilhac (2014), citing the survey conducted by the Philippine Chamber of Commerce and Industry (PCCI), presents the estimated losses to three economic growth pillars in Mindanao, namely, agriculture, industry, and service sector, due to continuing power shortage.

Table 10: Revenue Loss of per Hour Power Shortage in Mindanao and Effects to Business Operations

Revenue Loss of per Hour Power Shortage		Major Effects to Businesses by Current Rotational Brownouts	
Estimated Revenue losses	**Percentage (%)**	**Effects**	**Percentage (%)**
Less than P50,000/ hour	83	Equipment breakdown	23
P51,000 to P100,000/ hour	4	Revenue losses	20
P101,000 to P200,000/ hour	4	Delayed production operations/cancellation of transactions	35
More than P200,000/hour	4	Low output of production	12
Not specified	4	Partial labour lay-off	9
		Others	2

Source: PCCI (in Reveilhac, 2014)

Rotational brownouts in Mindanao, data show, have biggest impact on production operations, equipment breakdown, and revenue losses, while revenue loss of less than P50 thousand due to power shortage per hour is at highest at 83%.

In Mindanao, the annual average growth rate for electricity demand is at 4.28% from 2010-2019, yet, current baseload generating capacities, unless augmented, will not be able to meet this demand. Thus, the high prices of electricity in Mindanao are easily explainable. It is explained in economics parlance in the law of supply and demand. There is high demand for electricity, yet there is very little supply of it due to lack of power plants that can generate enough electricity. With high demand and low supply, electricity prices expectedly soar—with adverse effects on business and economy in Mindanao.

To avert the Mindanao power crisis, Navarro proposes the following short term solutions: 1) continue the rehabilitation and sustain the operations of the Agus and

Pulangui hydropower plants; 2) minimize the bureaucratic hurdles in the building up of electric cooperatives' embedded generation capacities up to the extent allowed by law; and 3) promote interruptible load program for large consumers in which a DU and the participating customer agree on contract to partial or full deloading or di connection for certain periods of time. For some medium to long term solutions, avarro advances the following: 1) come up with a definite decision on the privatization of the Agus and Pulangui hydropower plants and implement a reforestation and watershed management program; 2) facilitate the entry of new baseload capacity commitments; 3) explore the aggregation of demand and the use of large volume auctions for baseload capacity contracting; 5) accelerate the development of renewable energy projects; and 6) pursue the interconnection of the Visayas and Mindanao grids.

Conclusions

Data and discussions in this paper can be synthesized and conclusions can be made, thus:

1. Electricity prices in the Philippines are indeed much higher than those in neighbouring countries in the ASEA region. This is due largely to electricity provision service structure, and market structure that induce high rates in electricity prices and tariffs. Supply costs are unreasonably high, and securing connection is also a lot costlier than in the neighbouring 4 countries in ASEAN.

2. The central problem is the very low power generation capacity since there are not enough power plants to supply needed volumes of electricity for baseload needs. The promise of the Malampaya gas field for source of liquid fuel could not be permanently relied on, as its recent shutdown worsened the energy problems.

3. Relegating generation, transmission, and distribution functions to the private sector as envisioned by the EPIRA law does not seem to have worked to better services and to steady the prices of electricity or to bring them down. Regulatory bodies i.e. the ERC are virtually toothless in stemming rising prices as well as the tendency for profiteering conduct of market players. The practice of bilateral agreements in sale of electricity at WESM between generators and distribution utilities can be vulnerable to manipulations since the two players are allowed to determine the prices and quantities of electricity traded.

4. The EPIRA law has, it seems, become a bane instead of a boon to the electric power industry since it virtually ties the hands of government to step in to avert power crisis. The law prohibits the government from engaging in power

generation activities. Thus, electricity prices, whenever a power crisis looms, cannot be helped from soaring.

Key Challenges

What are urgently needed to avert the electricity generation problems in the Philippines? Sharad Somani (KPMG, 2013-2014 Edition) outlines the following:

1. Continued capacity addition– The three regions in the Philippines viz. Luzon, Visayas and Mindanao will require substantial capacity addition in the coming years. Out of the expected capacity addition of close to 13,000MW until 2030, only 1,800MW has been committed. It would be critical to ensure that the market signals are robust enough to allow for these capacity additions to happen.

2. Grid connectivity and strengthening– The fact that the installed capacity in the country will increase a fair bit, sufficient investment needs to happen in strengthening the transmission and distribution infrastructure. In addition, the island grids also need to be interconnected. Mindanao is currently not connected with the Luzon-Visayas grid. This will entail huge capital expenditure that needs to be sustained by the sector. ERC will play an important role in allowing for recovery on investment with appropriate regulated returns for this transmission infrastructure.

3. Regulatory framework– The success of power industry regulation depends to a great extent on the robustness of the regulatory framework and the market mechanisms. A proactive and prudent approach to maintaining a clear framework, which is equitable and balanced, would be critical to ensure longer term sustainability of the power sector.

Opportunities and the Way Forward

KPMG sees that the Philippine power sectors offer a great many opportunities for the private sector (both domestic and international) in the years to come. Somani writes that in the generation sector capacity addition of over 13GW, coupled with setting up of high capacity interconnectors between different parts of the Philippines, would mean large opportunities for investment by the private sector. KPMG estimates an aggregate investment opportunity of about US$25 billion until 2030. The opportunity looks big, Somani says, and the sector has the players who could potentially handle that level of investment requirements. To make this move more effective, Somani suggests the following:

1. Capacity development for the existing stakeholders to thrive in the changed environment;

2. Potential partnerships across the generation, transmission and distribution sectors;

3. Possibility for new players to enter the competitive markets in the Philippines to supplement the efforts of the existing players (as also suggested by avarro in the PIDS study); and

4. Philippine power companies moving to other competitive markets like Singapore, Australia andUK to learn and leverage their expertise (Meralco and First Pacific buying 70 percent stake in 800MW Combined-Cycle Gas Turbine or CCGT in Singapore is one such example).

Furthermore, for the Philippines to move forward and ride off electricity and energy problems, to mitigate the impact of high prices, to save on and efficiently use energy, technological innovations have to be pursued. Innovation means "*the use of new ideas, technologies, or ways of doing things, in a place where people have not used them before*" (Ugbe, 2010:15). Innovation draws from the idea of novelty. ovelty, say Ploeg et al., "*is a new way of doing and thinking, a new mode that carries the potential to do better, to be superior to existing routines*" (in Knickel et al., 2008: 889). The authors opine that innovation is confined not only to technological innovation, but also to "*successful change in production, consumption and distribution routines... the capacity within regional society or economy, to continuously improve processes of production, products, patterns of cooperation, etc.*"

One prototype of innovation initiative—which promotes wise and efficient use of energy—is the construction of high performance green buildings, and the establishment of smart cities for the future should be advocated with the national government and the industrial sectors. Philippe Reveilhac (p 14) writes that the framework for green buildings and smart cities envisions the quality of present life as it approaches future life and has these features: 1) focus on environmental impact of construction (green design); 2) focus on efficiency and operational performance over time; 3) smart and green come-together to deliver smart buildings; 4) use of renewable energy; 5) connect to electrical vehicles; 6) net zero energy and positive energy buildings; and 7) carbon neutral buildings, micro grids and eco-cities. Reveilhac says that designing green buildings requires understanding building life cycle costs (which is: Building Life Cycle Costs = Capital Investment + Operation Costs). Energy management with green buildings minimizes ongoing costs, which is 75% of the life cycle cost of the building.

Final Remarks

The electricity power problems may linger for a long time, and electricity rates may continue to be unpredictable, but the national population may choose to be somehow unburdened by power interruptions and high electricity prices. Technological innovations are a key to cushion the impact of electricity price upsurges. Energy demand growth may not be stopped, but people can change the way they use energy and reduce emissions of carbons through smart technologies, and eventually realize the savings from energy reduction.

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