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TLG on

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# Simple Objective, Challenging Reality: Establishing an Electricity Derivatives Market in the Philippines

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In 2001, the Philippines enacted the Electricity Power Industry Reform Act (EPIRA), mandating the implementation of a sophisticated wholesale electricity spot market called the WESM.[1] Starting in Luzon in 2006, the WESM has now operated for over a decade. Over this time, the WESM has largely traded on its robust initial design, yet, to date, has failed to evolve in several critical areas, including market-traded ancillary services and trading of financial derivatives.[2]

The Philippine Electricity Market Corporation (PEMC), which operates the WESM has recently begun evaluating whether to establish an Electricity Derivatives Market (EDM). In this *TLG on*, we focus on some of the challenges associated with developing a successful electricity derivatives market. While the focus here has immediate relevance to a possible forthcoming Philippine EDM, the themes and lessons have a wider applicability across the region.

## Key Points

- An EDM is a desirable and overdue addition to the Philippine WESM, as it would be for any similar electricity wholesale spot market.
- Developing an EDM platform and associated products on a purely technical basis, however, provides no assurance of successful and robust adoption.
- Most of the important constraints and challenges in the Philippines have little to do with technical EDM design or implementation, but rather concern factors such as the low price cap, reliance on long-term power supply agreements, the pass through of many risks to consumers under the current regulatory framework.

1 For our international readers, the Philippine WESM has a similar core 'energy-only' market design to that found in the US market in Texas (ERCOT), and to the Singapore, New Zealand, and Eastern Australian (NEM) markets in the Asia Pacific region.

2 Our first engagement in the WESM, many years ago, involved assessing the readiness of the WESM for ancillary services spot markets.

# Unfinished Business

In other electricity spot markets that bear similarity to the WESM – such as those of Australia, New Zealand and Singapore – derivative instruments of various types and levels of sophistication exist to enable market participants to manage financial risk either more effectively or at lower cost. Yet, in the Philippine WESM, even after over a decade of commercial operation, no tradable derivative products have yet emerged. There is no forward market, no standardised futures or option contracts, and no exchange or trading platform to support longer-term price discovery.[3] The questions, therefore, are whether and how to support development of an effective EDM.

Electricity contract and derivative trading is undeveloped in the Philippine WESM, despite being an important part of an effective and sustainable electricity market.

The absence of a trading platform and robust tradable products represent unfinished business in the WESM for at least two reasons. The first is the hundreds of millions of dollars invested each year in electricity generation capacity, fuel contracts, and other energy infrastructure. The second is the many price-affecting risk factors facing the industry, including seasonality, hydrological and temperature uncertainty, and exchange rate and fuel prices. Yet cost-effectively and usefully operationalising such sophisticated financial features is a challenge in any market, large or small, or in any economy, developed or developing.

One challenge to overcome is the temptation (largely of policymakers and regulators) to cap risk in the underlying spot market so as to "protect" consumers. The more that wholesale market risks are limited via such caps or other non-market interventions or constraints, the less value there is to stakeholders of traded risk instruments and the less likely that sufficient liquidity will ever develop with respect to such instruments.

To that end, we note that the Philippine WESM has extraordinarily low market price caps compared to the Australian and New Zealand markets. Yet efficient investment and behavioural responses to unexpected situations or looming shortages depend on the extent of volatility and unpredictability inherent in WESM prices. To that end, for example, the Australian NEM links the determination of its market price cap with an assessment of what is required to avoid inconsistency with policy objectives of acceptable long-term reliability of supply. No such linkage exists in the Philippine WESM.

Instead, the WESM price cap limits hourly prices to levels below PhP32,000/MWh (approximately AUD830).[4] Whereas this might at first seem quite a high value, it is far smaller than the values deemed necessary to support investment sufficient to maintain a high standard of supply reliability in other markets (see Figure 1). To put things in context, the price cap in the Singapore market is SGD4,500/MWh (about AUD4,200/MWh, or about five times higher than in the Philippines), the equivalent price cap in the Australian NEM is AUD14,000/MWh (almost 17 times higher than the WESM), while the New Zealand market has unbounded financial risk with essentially no cap at all![5] Even allowing that reliability of supply might reasonably be less in a developing economy than in a mature one, the difference is stark and will necessarily affect the liquidity of, and value placed on, EDM traded contracts.

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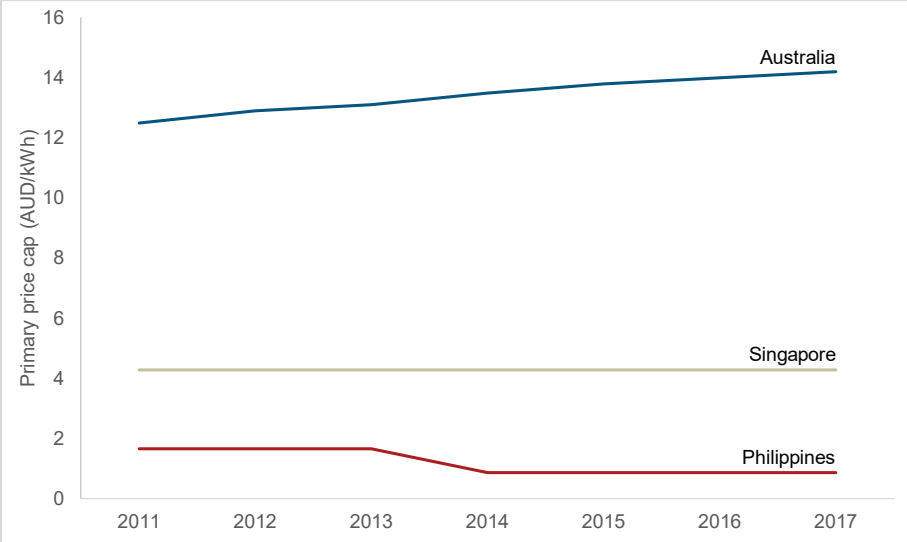
3 A brief note on terminology here. In addition to the spot market, where traders buy and sell for settlement and delivery today, there are the forwards or futures markets that allow traders to buy now for delivery in the future. Futures markets are a simple way of removing price uncertainty: tomorrow's unknown spot price is replaced with today's known futures price. Such contracts can either be standardised and exchange traded (in which case they are referred to as a Futures contract) or bespoke, bilaterally negotiated and traded over the counter (OTC), in which case they are referred to as Forwards. In both, the price is set at the point of contract formation, and settlement, either financially or physically, is compulsory. If you merely want the option (but not the requirement) to sell or buy in the future at a known, fixed price, then a derivative called a put or call option is needed. Buying an option costs money, but gives added flexibility: depending on the actual market price, the owner of an option can either trade through the spot market or exercise the option, whichever gives the better price. There are other, more complicated derivatives, but a fuller explanation lies outside the scope of this article.

4 At the time of writing, this was roughly USD630.

5 New Zealand's significant hydro capacity provides protection against short-term price spikes. New Zealand has historically been more exposed to constraints on total hydro generation (energy) than to constraints on total hydro output at any point in time (capacity).

If too low, market price caps can stifle incentives for innovative and more active use of tradeable contracts.

**Figure 1: The Philippines' Price Cap is Very Low**




Note: Prices are shown are nominal at current exchange rates.
Source: TLG Research, Australian Energy Market Commission, Singapore Energy Market Company, WESM

The problems associated with low price caps become more profound as market supply and demand tighten – which is just when exposure to the ***possibility*** of higher prices would better incentivise the development, acceptance, and trading of effective risk management contracts (as well as effective supply- or demand-side responses). The tighter the market, the more difficult it is to gain acceptance to increase the price cap to what would be an otherwise appropriate level.[6]

# Evolving Risks

Robust legal and regulatory frameworks are crucial foundational prerequisites to any trading-based regime.[7] In the Philippines, the legislation that underpins the WESM and other aspects of the electricity market is Republic Act 9136, or the Electric Power Industry Reform Act of 2001, otherwise known as the EPIRA. One of the EPIRA's foremost aims is "to ensure transparent and reasonable prices of electricity in a regime of free and fair competition and full public accountability to achieve greater operational and economic efficiency and enhance the competitiveness of Philippine products in the global market." As legislation, the EPIRA has survived multiple political administrations. By proving too hard to change, the EPIRA makes the WESM more robust. Despite being fundamentally robust, the WESM itself has not evolved very much.

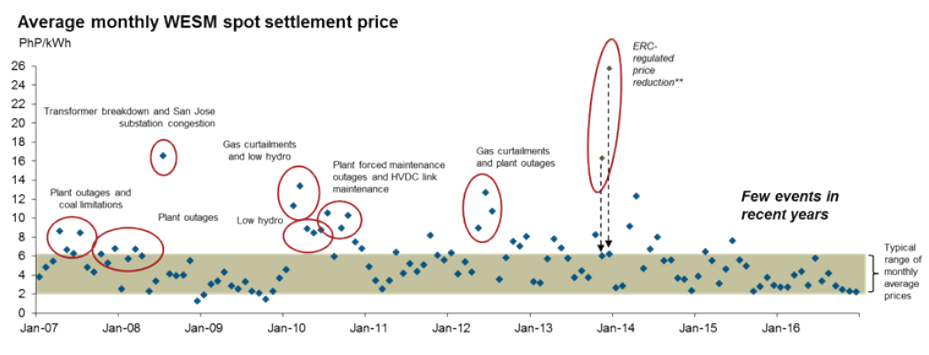
Historically, notable price volatility in the WESM has been the consequence of physical factors, including forced plant outages, transmission system constraints, and (un) availability of gas from the Malampaya field. Periodic El Niño conditions can exacerbate these underlying physical challenges by driving demand higher while at the same time reducing the amount of water available to generate from hydro-based generation capacity. Over time, however, physical disruptions have become less frequent (see Figure 2), giving the superficial appearance of declining risk.

6 It is worth noting here that with the rapid development of over a gigawatt (GW) of new solar and wind capacity together with the expected commissioning of several new coal-fired power stations, the Philippine WESM is entering a period of excess capacity, with much lower average wholesale prices. Consequently, it is one of the better times to take steps to increase the market price cap. Excess capacity in the short term can naturally limit the risk of high prices through the workings of competitive forces. In turn, a higher price cap provides a stronger signal to stakeholders to anticipate and prepare for a world of more volatile prices in the longer term.

7 A broader discussion of regulation (not limited to the Philippines or the WESM) can be found in: Clifton, M, Thomas, M & Earwaker, J (2017) The Practice and Scope of Electricity Sector Regulation in Southeast Asia, TLG on 4(1), The Lantau Group (HK) Limited, available from www.lantaugroup.com.

The WESM is maturing, with seemingly fewer price spikes caused by exceptionally disruptive events.

**Figure 2: The WESM is Moving Beyond Simple Event-Based Disruption**



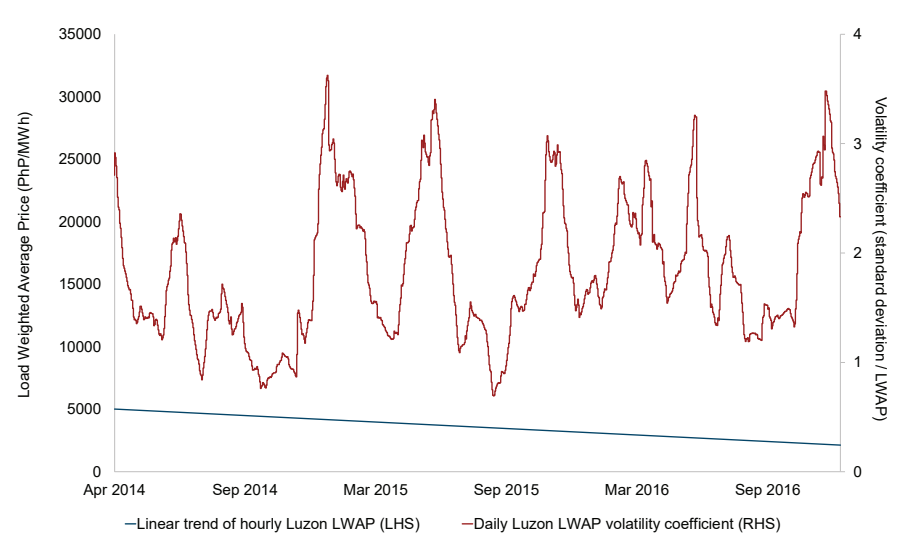

Source: TLG Analysis and WESM

In fact, it is more accurate to suggest that the nature of WESM price risk is shifting. Even as some of the more historically notable physical disruptive factors seemingly reduce in severity or at least frequency, WESM prices have remained volatile. The reduction in the frequency of physical factors, such as plant outages and gas curtailments, has not and cannot remove all risk: an energy-only market like the WESM will always be highly exposed to natural forces of supply and demand. These forces are amplified in the WESM by the Philippine power sector's underlying exposure to weather and hydrological variation, including seasonal as well as multi-year variations in temperature and rainfall.

We can measure the degree of volatility in prices at any point in time by constructing a moving average ratio of the standard deviation of prices to the average level of prices. The standard deviation gives insight into the spread of prices. By dividing the standard deviation by the average price over the same period, we form a useful index of volatility that can be compared across time. Effectively, this ratio indicates how much risk exists as a percentage of the average price, which in turn indicates what level of exposure exists. The closer the ratio is to zero, the more certain revenues associated with WESM price exposure would be (all else equal). Using this measure, we can see that WESM prices have remained volatile, even as the average WESM price has fallen (Figure 3).

Yet, even as average WESM prices have fallen over time (for various reasons), price volatility (risk) remains.

**Figure 3: WESM Price Volatility Has Remained, Even as Average WESM Prices Have Fallen**




Source: TLG analysis of WESM price data

## Achieving Liquidity is Not Simple

The goal is not just the existence of an EDM, but its active use (liquidity).

The point of an EDM is to stimulate forward price discovery and support a richer palette of contracting options (tenor, type, etc.). A market with few trades is of limited value in terms of either price discovery or risk management. The associated EDM operationalisation costs would be wasted. In this respect, experience drawn from other small markets, like those in New Zealand and Singapore, is the most relevant for the Philippines. Larger markets like Nord Pool in Europe, PJM in the USA, or even Eastern Australia's NEM, have the scale to support even imperfectly designed arrangements. Smaller markets, in contrast, have proven much less forgiving of ill-conceived proposals to launch derivative markets that do not meet stakeholder needs.

For example, with mixed success, Singapore has sought for several years to develop a liquid futures market. Singapore depends on market makers to support trading. The use of market makers per se is not unusual, but the costs attributable to the incentives required appear to have been very high. When the surcharge (renamed a 'Market Development and Systems Charge') was almost doubled on 1 July 2016, the increased costs represented about 1% of the average retail price to contestable consumers. Even having a traditional approach and structure and a high level of awareness and understanding provide no assurance that the overall effort will prove cost-effective.

Singapore's experience highlights how difficult, and potentially expensive, it is to make a trading market work in a small electricity market.

As an alternative to reliance on market makers, baseload monthly contracts were developed and listed on the Singapore exchange (SGX). Arguably shorter contract periods align better with commercial and physical needs of participants, for example when hedging planned plant outages. Open interest for SGX USEP Monthly Base Load Electricity Futures, however, stood at just 15 lots as of 27 April , an amount that is utterly insignificant.[8] Designing instruments to be traded gives no assurance that the instruments will, in fact, be traded.

The challenges faced by Singapore are interesting because Singapore at least started with a trading orientation and an existing trading platform. In contrast, the Philippines currently has no trading platform for derivatives. Following the closure of the Manilla International Futures Exchange (MIFE) during the Asian Currency Crisis in 1997, there has been little derivative trading in the country even outside the electricity sector. Most derivative transactions involve over-the-counter (OTC) derivatives offered by banks (principally for currency exchange rate hedging and Interest Rate Swaps). Since banks are most often the counterparties in these deals, regulation has mostly been enacted by the Bangko Sentral ng Pilipinas (BSP). Thus, right from the start, the business environment and attitudes to trading in the Philippines are significantly different from those in other jurisdictions.

The perception of financial risk and the value of instruments designed to allow stakeholders to manage their exposure to such risk is not only directly related to the level of the price cap, but also to the amount of time that the market can spend at that price level – regulated in both the Philippine and Australian markets via a "secondary" price cap of PhP6,245 (approximately AUD163) in the WESM versus AUD625/MWh in the Australian market.[9] All the best work to design a derivatives market will amount to nought unless the spot market is a sufficiently wild and untamed place fraught with very

8 Even with the incentive, the question arises whether the efforts have been cost-effective or properly targetted. Singapore electricity stakeholders can already partially hedge their positions by participating in hedge markets for traded oil products given that the natural gas used to generate over 95 percent of Singapore's electricity is price-linked to HSFO or Brent Crude.

9 Primary price caps are designed to prevent individual instances of extreme pricing; secondary caps prevent above normal prices extending over some set period, even when that price is below the primary cap. The Australian NEM has a cumulative seven-day price cap of AUD210,100, equating to an average of AUD625 for the preceding 336 half-hour intervals. The WESM uses a rolling seven-day average price.

real financial risk for which it is valuable to manage using various forms of contracts and derivative instruments. One of the most important aspects of a successful EDM concerns ensuring all the other prerequisites are met and that there is sufficient fundamental risk exposure that participants see inherent value in various traded risk management instruments.

## Risks Beyond Price Volatility

Low price caps are by no means the only way in which the Philippine regulatory framework differs from elsewhere in the region. In at least three distinct other areas, Philippine regulatory practice differs from that found in markets based on a similar fundamental design:

Thre are important differences between the WESM and other markets.

- how regulation and the regulatory process affect stakeholder incentives for managing risk;
- how the power sales agreement (PSA) approval process works; and
- what options and approaches are available to hedge against network congestion.

Currently, the ability to secure ERC-approved long-term power sales agreements (PSAs) is the most comprehensive way for market participants to manage risk. These contracts protect against WESM risks to the extent that they cover a generating unit's potential output. They also tend to be long-term in nature – much longer term than commonly found in other merchant markets of similar fundamental design. It will only be as older PSAs approach expiry or as expanded retail competition triggers PSA clauses that protect the off-taker from being over-contracted that WESM exposure will increase materially.

Generators and retailers in the WESM may enter into bilateral contracts for a maximum quantity of electricity (measurable in kWh), with the actual quantity often defined "after the event" based on retail load.[10] To take a simple example, a small Electric Cooperative (EC)[11] may have just one contract for the whole of its load with a single generator. The generator supplies whatever that EC needs at the agreed price, providing the amount is within the maximum capacity defined in the contract. What residual price risk does this retailer have? In this case, the day-to-day risk is carried by the generator. The EC carries the risk that the generator goes bankrupt (credit risk) or that their load suddenly rises to a level greater than that agreed. Such risks may be very large if they occur, but their occurrence can usually be rendered sufficiently improbable during the process of choosing how much to contract and whom to contract from.

Market participants currently hedge their risk in other ways, reducing the likelihood they will find as much value in an EDM.

It is also important to look at the impact of the risk on the companies involved. For example, should a generator default, and the EC purchases from the WESM without the protection of a contract, then the regulatory regime allows the EC to pass the associated costs through to consumers meaning that the EC itself is not actually exposed. In fact, each month, ECs can utilise the flexible generation charge to pass through such costs to customer bills. Whereas the resulting lower risk to the ECs is understandable, it does not facilitate the development of an active EDM.

Network congestion and ancillary services arrangements can also have a major impact on the operation and viability of an EDM. The derivatives used to hedge volatile energy prices typically see generators pay out the difference between contract price and prevailing energy market price when that price is above the contract price and conversely

10 This is the most common type of contract but other forms exist.

11 A type of end-user owned, not for profit utility in the Philippines

require retailers to pay generators if energy price is below the contract price.[12] As a result, generators will receive an agreed price for the contracted volume but only if they can dispatch that volume. In a volatile market this situation leaves generators at risk of financial loss in the presence of network congestion or when required to provide some ancillary services.

Generators have only limited control over network congestion, particularly in a world in which renewable energy is supported by Feed in Tarrifs and thus may choose to locate somewhere without full consideration of the economic value associated with that location. Congestion and ancillary services risks will influence perceptions of the value of an EDM. Some (usually much larger) markets, like PJM in the US, incorporate transmission risk contracts (e.g. Financial Transmission Rights). Other markets like Singapore and New Zealand have struggled to provide similar levels of contractual protection against locational price differences. And, the WESM's ancillary services markets have not even been operationalised yet.

Finally, the requirement to gain regulatory approval for every contract may also undermine the development of a liquid derivatives market. Approval often takes months to obtain and is based on a cost-plus framework rather than on a market-based framework, which makes the whole approvals process inconsistent with market-based risk management approaches such as an EDM. PSAs in the Philippines are exceptionally long-term compared to those found in similarly designed markets such as Australia, New Zealand, and Singapore. The availability of such long-term PSAs reduces WESM exposure and the need for re-contracting or systematic contracting portfolios that must be continuously adjusted or refreshed through trading. Finally, the ERC's cost-based approach favours contracts tied to individual power stations – mimicking a physical contracting structure – rather than with a portfolio of units or on a purely financial basis, which further differentiates the Philippines from markets with a more market-based or financial contract orientation.

PSA approval processes and constraints will likely impede development of the EDM.

## Conclusion

EDMs are a critical part of market design to allow participants to hedge price volatility. In their absence participants and policy makers will look to other means to manage or artificially supress risk, often at the expense of market efficiency, as has occurred with the Philippine's extremely low price caps.

Successful implementation and administration of an EDM depends on far more than getting certain technical and operational design features correct. The participants expected to find the EDM valuable need to face risks of a sufficient magnitude and character. Otherwise, they can largely manage their risks without the benefit of an EDM. At the same time, the overall market context matters enormously, and the Philippine WESM clearly has many idiosyncrasies that complicate the task of successfully implementing an EDM unless or until many of those idiosyncrasies are fully resolved.

Significantly for the WESM, the ERC has been trying to implement a competitive selection process, in a bid to foster greater competition and to reduce any perception of "sweetheart" deals between Distribution Utilities and their associated generator arms. An EDM could provide valuable benchmark reference prices against which the ERC to can assess the reasonableness of PSAs being submitted for approval. But before an EDM can work effectively, many other factors need to be addressed, most particularly a rethink of the extremely low WESM price cap(s) and the overall regulatory regime that insulates the distribution utilities so completely from WESM-related risks.

12 This is the most common type of derivative contract used in electricity markets, but there are others such as caps which are used for peaking load.

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