

Prepared by Nord Pool Consulting AS

**Comprehensive Technical
Report – Study on the
Development of Electricity
Derivatives market in the
Philippines**

28.06.2017

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2. Executive summary

This report constitutes one of the two main deliverables from the project “Study on the Development of an Electricity Derivatives Market (EDM) in the Philippines“ initiated by PEMC. The project aims to assess multiple aspects of designing and implementing an appropriate electricity derivatives market in the Philippine context. The other deliverable in the project is a legal memorandum focusing on the legal aspect of establishing an EDM, identifying barriers and providing a proposed action plan. This technical report includes a suggested stepwise implementation plan based on both the legal situation and the underlying structure of the Philippine electricity market.

The Philippine wholesale electricity spot market, WESM, produces prices that can be volatile and at times deliver extreme price spikes. This price volatility puts the market participants and investments in significant uncertainty and creates risk. Longer-term markets, or EDMs, have been introduced in many other jurisdictions to mitigate this situation; a similar approach is now considered in the Philippine market. The EDM in the Philippines will constitute the organized medium and long-term market place, which then completes the organized market offering for the market participants creating a transparent and efficient Philippine wholesale electricity market.

The report provides an international case study on EDMs in other jurisdictions, namely Nordics, Singapore, Australia and New Zealand. These EDM markets hold the same basic structure of products and market design; only minor differences are found in the underlying physical market (which are more different by nature). The markets are characterised by centralized and organized trading, cash settlement, futures and option products and the market clearing and settlement based on a definition of a firm physical reference price from the underlying market. Another key design feature is the Central Counter Part (CCP) role.

The proposed high-level conceptual design for the EDM in the Philippines is suggested to be based on centralized trading, clearing and settlement from day one. The EDMs settlement cycle and collateral requirements and management needs to be aligned with the future market operator of the EDM as well as the current settlement cycle in WESM.

Some of the key design elements are:

Stepwise approach

The identified legal phases for the establishment of a fully functional EDM in the Philippines can be summarized as; Step 1 – Current situation without any change in legislation, Step 2 – Issuance of administrative rules and regulations, Step 3 - Changes in Congressional statutes. The phases are arranged in the degree of difficulty to get the changes approved by the Legal instances in the Philippines. Step 1 allows forward contracts and other bilateral contracts, step 2 further opens up for futures contracts settled by actual delivery and step 3 finally opens up for a full EDM adding cash settlement of forwards and futures contracts. In any of the options, the recommendation is that there will still be a possibility to trade bilateral contracts outside the EDM and the EDM will be a voluntary market.

The suggested approach is to establish common features in the EDM from the initial phase until a fully functional EDM are legally feasible in legal step 3. These common features can be listed as standardized product specifications, contract durations, tradable area and the definition of the reference price.

Tradable areas

It is also suggested to start with trading in the Luzon area and then evolve the market to include Visayas when the market is ready.

Products

Physical Forwards traded in a continuous trading platform based on financial market behaviour is proposed as a starting point for the EDM market and at a later stage (phase 3), let these contracts to evolve into cash settled products. Forwards are suggested due to their similarities of bilateral physical contracts and that these contracts are assumed to be more of interest of the fundamental market participants. The main benefit compared to bilateral contracts would be the centralized clearing and also equal access to counterparties. With fundamental market participants we mean market participants that have physical position in the Philippine power market either as a buyer or seller of electricity. The suggested contract durations are month, season (Dry and Wet) and a 2-year duration. The monthly contract is suggested to also be available as a peak load contract.

The potential market participants will in legal step 1 be the fundamental players in the electricity market. During step 2 and 3 the banks and insurance companies will be allowed to participate given that they meet the Securities and Exchange Commission (SEC) requirements. Banks and insurance companies are considered to be liquidity providers and speculators providing well-needed liquidity and competition to the EDM.

Governance

To make the governance efficient and effective it's suggested to structure the supervisory bodies in a way that gives one interface towards the EDM market operator and its market surveillance function. SEC is the suggested supervisory authority for the EDM and SEC will then need to coordinate with other authorities when needed.

Underlying reference price

The proposed reference price for the EDM is a volume weighted average price (VWAP) for all nodes in Luzon. This option will give a good alignment with the physical situation in the WESM. An important point is that the EDM reference price needs to be firm and that reference prices cannot change after its determination.

Challenges

Identified challenges with the establishment of the EDM are firstly the situation where Distribution Utilities (DU) today has low incentives to join the EDM. The already agreed Retail Competition and Open Access (RCOA) will help to increase competition in the retail market services and create incentive for the DUs to participate in the EDM. However, we also note that this has been challenged legally that might slow down or in worst case stop the implementation of it. If this is the case, further work might be needed to get the DU incentivised.

For the phase 2 implementation, another potential challenge is how to nominate the financial forward with physical delivery volumes, as the bilateral contracts today are all assigned to specific production and consumption nodes. The centralized traded contracts will be traded based on a larger area with a combination of nodes, not specific nodes. This challenge needs further investigation to fully understand the impact of the nomination process towards the WESM nodes. Our basic understanding of this would imply that (for step 2 where the EDM contracts will end up with a physical delivery) the same rules for how much you can offer to buy or sell in the EDM will be similar to the WESM rules meaning that you cannot have a position in the EDM outside your technical possibilities.

A long-term market, and in the end, a fully developed EDM will bring potential benefits to the Philippines electricity market and economy. The basic objective with the EDM will be to provide better risk management and hedging opportunities for the participants in the electricity market. An EDM will also provide price transparency of market-determined forward price signals allowing efficient and informed investment decisions.

3. Introduction

3.1. Background

The Philippine electricity market is in a transformation state that aims towards creating a more transparent and competitive electricity market. The Electricity Power Industry Reform Act (EPIRA) of 2001 was implemented “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.”

The first step was to establish the WESM that today is a short-term physical market for electricity. Similar to other spot market around the world WESM has its fair share of volatile prices and sometimes extreme price spikes. This price volatility puts the market participants and investments in significant uncertainty and creates risk. The question faced is how to budget and how to mitigate these risks.

In other jurisdictions, experiencing a similar spot price uncertainty, longer-term hedging markets have been introduced as a mean for the market participants to manage risk and provide hedging opportunities. An Electricity Derivatives Market (EDM) is also considered to provide better transparency and lead to a more efficient and competitive wholesale market creating benefits for the consumers.

This project “Study on the Development of an Electricity Derivatives Market in the Philippines“ aims to assess multiple aspects of designing and implementing an appropriate EDM for the Philippine context. The project shall also deliver an indicative proposal and schedule on how to, in a stepwise manner, implement the market based on specific identified milestones.

3.2. EDM study project objectives and scope

The general objective of the project is to assess the feasibility covering the legal and technical aspects of implementing an EDM, and strategize the phased-in market development providing for the incremental implementation milestones in the potential establishment of a fully functional EDM that is appropriate to the Philippine context. The project length is four (4) months from the date of receipt of the notice to proceed to be issued by PEMC.

Specific project objectives:

1. To identify the benefits that would be provided by an EDM in the Philippines
2. To develop an implementation plan for the achievement of the benefits, which may include the establishment of an EDM in the Philippines
3. To identify policy or regulatory issuances that could help achieve the benefits, partially or in full, within the current regulatory jurisdiction
4. To identify the phases of market development and the corresponding requirements and processes for each of the phases
5. To develop the proposed policy regulations, design, products, and infrastructure, among others
6. To determine the appropriate legal instruments / requirements in the phases of the market development
7. To identify potential risks and provide recommendations to minimize the risks such as but not limited to operational risks, liquidity risks, and legal risks, for a more economical establishment of EDM

Detailed Scope:

A. Preliminary Task

1. Preparation and finalization of an inception report containing the firm's detailed plan, including the study design, methodologies, timeline, on the development of an EDM in the Philippines.

B. Stakeholders Consultation and Needs Assessment

1. Conduct of a seminar to present the design, processes, and requirements, among others in establishing EDM in other jurisdictions, and benefits that an EDM will provide in the Philippines with the Department of Energy (DOE), Energy Regulatory Commission (ERC), PEMC, and other concerned entities as participants
2. Conduct of a consultation workshop with partner generators, speculators, and consumers, as necessary, for their inputs and involvement in the development of an EDM
3. Conduct of final consultation with concerned entities on the comprehensive technical report which covers the technical feasibility assessment and risks measures
4. Coordination with the DOE, ERC, PEMC, Philippine Competition Commission (PCC), Securities and Exchange Commission (SEC), and other stakeholders for concerns relevant to the study

C. Legal Feasibility

1. Review of the Philippine laws and related rules and correlate these with the EPIRA, WESM Rules and ERC issuances; and identification of provisions therein that require amendments specific to the development of EDM, if any.
2. Preparation and submission of a legal memorandum on the appropriate framework, including legal and financial instruments necessary for the development of EDM in relation to the Article 2018 of the Civil Code of the Philippines, and other existing policies and regulatory issuances related to financial instruments. In particular, it shall:
 - a. Define the legal framework for the establishment of an EDM in relation to Article 2018 of the Civil Code of the Philippines;
 - b. Identify electricity derivative products that are consistent with applicable Philippine laws;
 - c. Provide an analysis of the gaps in the rules and issuances, if any, that need to be developed and corresponding agencies that need to issue them in relation to potential products;
 - d. Define the requirements that will enable a third party market operator for the EDM to administer or deal with electricity derivatives; and
 - e. Define the possible role of PEMC in the implementation of EDM in the Philippines

D. Technical Feasibility and Market Development (Comprehensive Technical Report)

1. Development of an implementation plan for the achievement of the benefits, which may include the establishment of an EDM in the Philippines
2. Identification for each of the market development phases of the design, processes, and other requirements (e.g. cost of infrastructure, software development, as well as succeeding operation and maintenance cost against the benefit to the market player or industry) in interfacing of financial contracts.

3. Provision of recommendations on the possible short-term and long-term effect of the specific EDM to the existing Real-Time Energy Market in reference to the design, processes, and requirements identified in item D.1.
4. Establishment of the basic products to be traded in the EDM and recommendation on the products to be offered in the preliminary phases identified for EDM implementation.
5. Presentation and submission of the comprehensive technical report to the PEMC according to an agreed timeline of both parties

3.3. Approach and methodology

The study was divided into some distinct phases and deliverables as indicated in the Terms of references and the tasks and activities specified in the Scope of work.

Our approach consists of splitting up the project deliveries and identifies activities and tasks that would give a good work flow. In the project plan the activities was arranged so that they would give the right input to the next phase in the project.

The key deliverables from the ToR were listed as,

1. Inception Seminar
2. Inception Report
3. Consultation Workshops
4. Legal Memorandum
5. Comprehensive technical report

Within these deliverables there are two main areas covered, technical (and economical) aspects of an EDM and the local legal and regulatory aspects in the Philippines. To be able to engage in this in the most efficient way Nord Pool Consulting teamed up with Gatmaytan Yap Patacsil Gutierrez & Protacio (C&G LAW) as sub consultant for the regulatory and legal parts of the project. We decided to structure our consortium in two work streams, one technical and one legal.

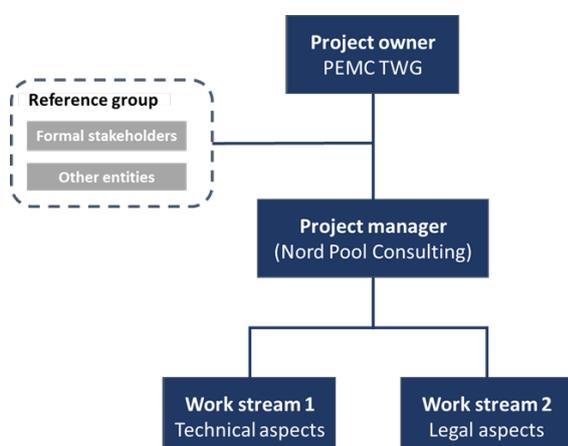


Figure 1. Project organization structure

The reference group consisting of stakeholders and other entities are an important part of the project. During the consultation workshops the project aims to get the view of the reference group and to be able to develop the conceptual design in line with the need of the market needs. During the consultation workshops the project status and preliminary finding will be discussed and questioned by the attendees. During each of the workshops there were plenty of time devoted to questions and feedback on the proposed solutions. Reference group consisted of both WESM participants and potential market participants but also policy and regulatory bodies together with multi-lateral institutions.

4. The need for an EDM in the Philippines

4.1. Basic prerequisites, challenges, alternatives

As briefly mentioned in the introduction chapter, the WESM is occasionally experiencing volatile spot prices and sometimes even extreme price spikes. The purpose of most spot market is to produce marginal prices based on the lowest short-term marginal costs where units with lowest the marginal cost of the production are activated first. Setting the price of the respective area/node is then done using a merit order structure for the generation resources. As result, the economically most efficient production units will earn the most and as a result this drives the development towards a cost-efficient generation stack.

With the basic function a spot market constitutes, the spot market should be expected to produce a volatile short-term electricity price – often called the “*reference price*”. These volatile reference prices shall then create incentives for investing in new production or transmission in areas with high prices for electricity (often called a “*price signal*”). This concept is the same for most other spot market around the world.

The negative side of a volatile spot price is that it puts the market participants and investment plans in significant uncertainty and creates risk, the question faced by many participants is; how to budget and how to mitigate these price risks.

In other jurisdictions also experiencing a similar spot price uncertainty, longer term trading has been introduced as a mean to manage price risk and provide hedging opportunities. These long-term markets have a wide diversity of market design and function, some are organized and some are based on bilateral trading.

The Philippine market has many similarities with the markets discussed below in chapter 5. International experiences and the Electricity Power Industry Reform Act (EPIRA) seek to increase transparency, competition and create reasonable energy prices. These are the basic prerequisites for establishing a longer-term market and if the EPIRA with its transparency requirements shall be taken into consideration an organized market place is to be preferred.

A bilateral market currently exists in the Philippines and could theoretically be an alternative to an exchange based market. However, considering the EPIRA and the increased need for transparency, this might not be the optimal way to go. Also, the nature of the bilateral trading makes it harder for newcomers in the market to get access to good contracts and the transparency of the contract definitions are limited.

To increase the hedging opportunities, participation and liquidity in the market it will be important to invite more participants, not only the fundamental players as generation and consumption. To do this a cash-settled contract is clearly preferable as the participants outside the physical market seldom have physical connection point in the grid. With a cash-settled market it would also make it easier for any participant with the appetite to trade based on the electricity prices as the underlying commodity to get easy access. This could be pure traders, but also other businesses where the electricity price is part of their underlying businesses. This change of moving from physical contract to cash settled ones however would require legal changes in the primary legislation. Another challenge will be to get a firm commitment from the market participants that they will trade in the market and therefore “market led” development will be important.

There are multiple alternatives to longer-term markets design and these concepts will be presented throughout the following chapters of this comprehensive technical report.

4.2. Objectives of establishment and potential benefits of implementing EDM in the Philippines

A longer-term market, and in the end, a fully developed EDM will bring potential benefits to the Philippines electricity market and economy. The basic objective with the EDM will be to provide better risk management and hedging opportunities for the participant in the electricity market. An EDM will also provide price transparency of market-determined forward price signals allowing efficient and informed investments decisions. Also, more transparency leads to a more competitive wholesale and potentially retail market with potential long-term benefits for consumers.

A cash-settled EDM could lead to more independent players in the market increasing competition and potentially consumers would benefit from this more competitive environment.

4.3. DOE market mechanism initiatives and a long-term market

In the frame of Philippines energy market, Department of Energy (DOE) and Energy Regulatory Commission (ERC) have initiated also other market supporting such as Competitive Selection Process (CSP) and Renewable Portfolio Standards (RPS). Even though these two mechanisms don't have direct interaction with the EDM, it is valuable to consider what effect they might have on each other since in the future the fundamentals of derivatives and EDM will show a bigger picture of the contracting and delivery processes with energy as the underlying product.

Competitive Selection Process (CSP)

CSP mechanism is created to facilitate more transparent and competitive selection process for the power procurement for the Distribution Utilities (DU). Basically, under the regulation of DOE and ERC, the CSP will push all DUs to procure their needed power through CSP, ran by a third party. The competitive selection is regulated to be ran annually with uniform conditions where each procurement round must have at least two qualified bids to be eligible. Each Distribution Utilities may adopt any accepted form of CSP as long as it fulfils prescribed criteria for the terms of reference for the procurement. Finally, it should be noted that EPIRA limits the DUs to procure maximum of 50% of their total demand from an associated firm engaged in generation. The goal of the CSP is then to:

- Provide efficient, competitive, transparent and fair process in the procurement of supply
- To facilitate efficient, transparent and fair process in amending the auction rules and requirements
- To enhance the inflow of private capitals in building new generation capacities
- To promote level playing field among market participants.

The CSP can be seen as transitional tool for the Philippines to create more competitive environment for the procurement of the Distribution Utilities. As stated earlier, the Electricity Derivatives Market for Philippines as suggested in this study does not directly overlap or intersect with the CSP. The CSP is targeted for the DUs and qualified generations for this service. The outcome of the CSP will be bilateral contract between the DUs and the winning Generation Company.

One of the reasons to initiate such market supporting mechanism is to cover the end consumers from the volatile WESM prices. However, a downside for this kind of mechanism is the limitation of the WESM volumes and creation of multiple power auctions. The CSP will in a way split the power wholesale market into two segments where Distribution Utilities are required to procure their power through CSP and rest of the wholesale market will function under WESM. Therefore, it would be preferable to centralize the wholesale market into one marketplace and rather have these trades going through the organized markets. Since one of the drivers for CSP is to cover from the price risk present in WESM, which is a shared incentive with the EDM. When the Derivatives Market has evolved and matured, it may serve as a valid alternative for the CSP where the DUs can procure their required power directly from WESM. This would ensure the competitiveness and transparency of their power procurement. At the same time, they can hedge for the price risk through EDM.

For more information on how the EDM and CSP could work together please see section 8.11 Changes to the settlement and regulated procurement.

Renewable Portfolio Standards (RPS)

RPS is a mechanism introduced by DOE and it mandates power industry players to produce and source a certain percentage of electricity from renewable energy (RE) sources. This will affect all distribution utilities (DUs), licensed retail electricity suppliers (RES), local RES, suppliers of last resort (SOLR), generating companies and authorized distributors in economic zones. The renewable technologies in Philippines include sources such as biomass, waste-to-energy technology, wind energy, solar energy, run-of-river hydropower sources, impounding hydropower sources, ocean energy, hybrid systems and geothermal energy.

The RPS mechanism can have greater effect on EDM. Generally, the RE production always has some volatility in production amounts. When the industry players must source certain percentage of their electricity from RE, they are exposed to both volume and price risk. In certain periods, industry players might not be able to receive the contracted amount of electricity from RE, forcing them to rely to other procurement methods. In addition, if the producers of RE have decided to offer the volumes in WESM and the wholesale prices are lower than expected or even negative, they are exposed to the price risk. For both cases, the EDM offers a very solid risk management tool where the industry players can hedge for these risks. By trading electricity derivatives from EDM, the industry players can fix their financial income to be independent from the volatility of the RE. Thus, having liquid and well-functioning EDM could become very valuable when launching the RPS mechanism.

5. International experiences

In this section, a summary of the most important findings from the study on international experiences on implementation of EDMs in other jurisdictions will be presented.

When designing and developing new markets it is of high importance to take into account experiences from other jurisdictions. During the first consultation workshop Nord Pool Consulting presented a case study on the implementation of EDMs in Nordic/Europe, Australia, New Zealand and Singapore. The study presented the different EDM designs, products, market processes and other requirements in the different jurisdictions. Also, volume developments and liquidity building measures has been in focus along with transparency and counterparty risk.

The underlying short-term physical markets producing reference prices for settlement of the derivatives contracts is important as these physical markets are area/country specific and reference prices needs to be carefully designed to give an appropriate country/area specific index.

At the same time it is important to highlight that it will be important that the market design for an EDM in the Philippines are designed using some of these experiences, but applied to the specific circumstances of the local markets in the Philippines. Even though there are many similarities with some of the markets as discussed below, it is still many details that vary between the different market implementations that is interesting to learn from.

5.1. Prerequisites for implementing an EDM

The prerequisites for implementing a longer-term market or a fully established EDM are usually involving a volatile short-term physical spot price and the need for increased transparency in the market. One of the reasons for having a spot price is to show the underlying physical constrains in production and/or transmission and therefore, a spot price should be expected to be volatile to some extent.

A volatile spot price creates uncertainty for the market participants, generators don't know what they will get paid and consumers don't know how much the price of electricity will be. An EDM will provide risk management and hedging opportunities where market participants can secure prices for the years to come.

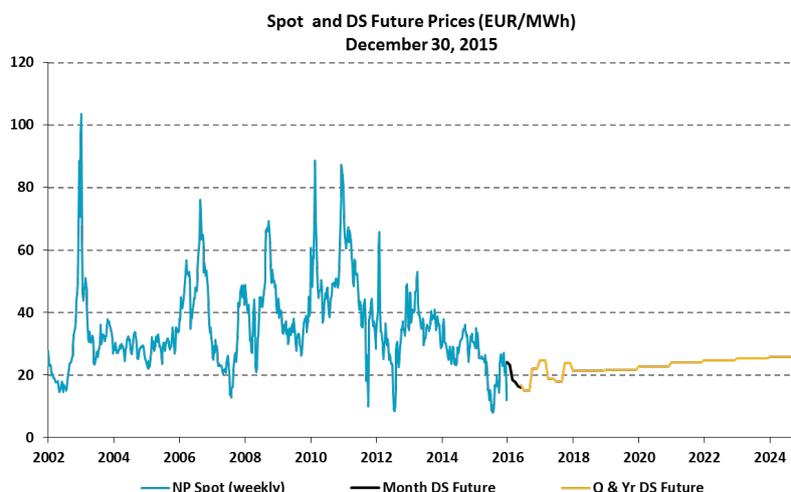


Figure 2: Example of spot price volatility in the Nordics (blue) and the more stable EDM long-term market prices (black and yellow).¹

In markets without an organized long-term market there are usually long-term bilateral contracts traded between parties. These contracts are usually confidential and will not give a future price indication for the overall market. In circumstances where the market has an organised short-term physical market, the spot price will be the only visual and transparent price for the market and as this price often are volatile it might not be the best for anticipating future prices.

Forward price transparency is usually of high value for investments decisions and this is one of the key goals for an organized long-term market; it will provide transparency allowing for efficient and informed decisions. A longer-term market could also lead to a more efficient and competitive wholesale and potentially retail market with long-term benefits for consumers as more independent players may participate in the market hence increasing competition.

Increased transparency could also attract more investment in the electricity generation sector.

¹ Nord Pool and Nasdaq transparency price data

5.2. Underlying physical markets and reference price

To give an overview of the other jurisdictions short-term physical markets, the key information on the market/area are presented in table 1. As can be seen in the table, there is a wide variation in how the physical spot price is calculated and how these markets “form” their respective reference price for settlement of EDM contracts.

	Nordics/EU ²	Australia ³	New Zealand ⁴	Singapore ⁵
Type of market	Net pool	Gross pool	Gross pool	Gross pool
Price methodology	Day-Ahead auction with supply and demand side bidding	Only Generation side bidding and load forecasting	Double sided bidding into calculation rounds of 5 minutes	Only Generation side bidding with load forecasting
Price interval	Hourly	Half hourly	Half hourly	Half hourly
Node/zonal pricing	Zonal	Zonal	Nodal	Nodal pricing for generators, Single price for buyers
Dispatching	Self-dispatch	Central dispatch	Central dispatch	Central dispatch
Consumption	~400TWh	~200TWh	~40TWh	~50TWh
Other associated short-term markets	Intraday market, Balancing market	-	-	-

² <http://www.nordpoolspot.com/How-does-it-work/>

³ ASX Introduction to the Australian Electricity Market_WEB.pdf
Australian Electricity Market report 2015.pdf

<https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM>

⁴ Electricity-in-New-Zealand-2016.pdf from the Electricity Authority webpage

⁵ <http://www.sgx.com/wps/portal/sgxweb/home/products/derivatives/commodities>

	Nordics/EU ²	Australia ³	New Zealand ⁴	Singapore ⁵
Reference price for EDM contracts	Nordic system price, unconstrained regional price calculation	Regional reference nodes, arithmetic average of the NEM final base load/peak half-hour spot prices during the Contract Month/Quarter. ⁶	Two grid reference nodes (Otauhu and Benmore), Arithmetic average of the Wholesale Electricity Market base load (or peak) spot prices on a half hourly basis over the Contract type ⁷	Arithmetic average of all half-hourly USEP. ⁸ USEP - weighted-average of the nodal prices at all off-take nodes in each half hour

Table 1. Summary of other underlying physical markets

All of the above physical markets have their particularity but all of them produce a short-term price that are used to settle the hourly or half hourly trading intervals. The usage of either the nodal or zonal pricing methodology aims both to solve the same challenge of representing physical constrains in the network and the supply and demand situation.

Australia and the Nordics uses the zonal methodology while New Zealand, Singapore and the Philippines uses nodal based pricing.

5.3. EDM structures and designs

In the previous section 5.2 we could see that there are some clear differences the reference markets from the international experiences in how the short-term markets are structured. When we now consider the EDM markets we see a lot more similarity between the different markets and the product offering.

In table 2 the various EDMs are presented with key points giving a quick overview of the fundamental building blocks. What can be seen is that the Nordic market is the most advanced and developed market offering the widest product offering. In the Nordic market it is possible to trade 10 years ahead and also hedge the risk between the system price and the specific area prices (zonal prices). The other three markets are very similar with the same product offering and processes. The trading-horizon is a bit shorter than the Nordics with 2-4 years. All markets have cash settled long-term contracts only.

⁶ ASX_Australian Electricity Futures and Options_Contract Specifications.pdf

⁷ <http://www.asx.com.au/documents/products/ASXNZElectricityFuturesandOptionsContractSpecificationsDecember2015.pdf>

⁸ http://www.sgx.com/wps/portal/sgxweb/home/products/derivatives/commodities/electricity/electricity_futures/contracts

EDM	Nordics/EU⁹	Australia¹⁰	New Zealand¹¹	Singapore¹²
Contracts available	Futures, DS futures, options and OTC. EPADs*	Futures, Options and OTC	Futures, Options and OTC	Futures and OTC
Contract length	Yearly, quarterly, monthly, weekly, daily	Quarterly and Monthly	Quarterly and Monthly	Quarterly and Monthly
Settlement	Cash settled	Cash settled	Cash settled	Cash settled
Tradable horizon	10 years	4 calendar years	3 calendar years	2 years
Tick size	EUR 0.01/MWh	\$ 0.01/MWh	\$ 0.05/MWh	S\$ 0.01/MWh
Contract size	1 MW	1 MW	0.1 MW	0.5 MW
Market makers	Yes	Yes	Yes	Yes
Transparency platform	Yes	Yes	Yes	Yes
Market operator	Nasdaq	ASX - Australian securities exchange	ASX - Australian securities exchange	SGX - Singapore Exchange
Clearing house and collaterals	Collateral call, default fund, daily margin	Collateral call, default fund, daily margin	Collateral call, default fund, daily margin	Initial Margin, Maintenance Margin, Margin Call and default fund

⁹ <http://www.nasdaqomx.com/transactions/markets/commodities/markets/power/nordic-power>

¹⁰ ASX_Australian Electricity Futures and Options_Contract Specifications.pdf

¹¹ <http://www.asx.com.au/documents/products/ASXNZElectricityFuturesandOptionsContractSpecificationsDecember2015.pdf>

¹² http://www.sgx.com/wps/portal/sgxweb/home/products/derivatives/commodities/electricity/electricity_future_s/contractsandSGXFactsheetandwebsite

EDM	Nordics/EU ⁹	Australia ¹⁰	New Zealand ¹¹	Singapore ¹²
Number of areas tradable	One Multiple EPAD ¹³ areas	Four	Two	One
Market surveillance	Yes	Yes	Yes	Yes

Table 2. Summary of EDMs in other jurisdictions

The Nordic market was the first to introduce an EDM and the first contracts tradable were the so-called Financial Forwards. These financial forward contracts were designed in cooperation with the fundamental market participants and other stakeholders in the Nordic power market. The basic idea of the design was to replicate a physical delivered contract to a cash-settled clearable contract. These contracts were later re-named to *DS futures*, “DS” standing for deferred settlement, deferred settlement makes the cash settled contract equal to a physical contract cash flow wise.¹⁴

Later normal futures contracts were introduced together with options and the Electricity Price Area Differentials to allow for hedging the price risk between the regional reference price and the zonal prices.

The other above listed EDMs has a standardised product offering including futures and options. There are some differences in how the respective EDM has decided to structure the contracts towards the underlying zones/nodes. Nordic has one settlement price for the contracts while Australia and New Zealand have multiple reference prices that the contracts are settled upon.

The European Energy Exchange (EEX) offers futures that can be settled in cash but has the possibility to be converted for physical fulfilment. Physical fulfilment in this case means that the futures contracts volume would be transferred from the EEX financial market and then traded at EPEX spot (physical) market. The order is sent in as a price-independent order to buy or sell in the spot market and the order is to be submitted once every delivery month. In case of change in the future position (trading position) a new change bid could be sent in.¹⁵

5.4. Standardized exchange traded contracts vs. bilateral trading

Usually an organized EDM operates together with a bilateral market allowing for both bilateral and exchange based trading. Table 3 presents the basic difference between these two markets.

These markets can be seen as complementary to each other as they allow for multiple options in the way market participants can trade and create a competition between them. Bilateral trading and/or an OTC market usually exist before an organized EDM is introduced. Generally – and especially over time, most other developed markets prefer the organized market place to a bilateral market. This is mainly due to the collateralization with the lowered counterparty risk in an organized market, but also due to the transparency a centralized market provide.

¹³ EPADs = Electricity Price Area Differentials

¹⁴ http://www.nasdaqomx.com/digitalAssets/104/104022_nordic-power-fs.pdf

¹⁵ [phelix-futures-presentation-data.pdf](#)

Over the counter contracts (OTC)	Financial forwards and Futures Contracts
Non-standardized contract	Standardised contracts
Bilateral/OTC contract between buyer and seller	Between seller/buyer and Clearing House
Specifies physical delivery period and delivery points, results in generation by seller and consumption by buyer of the specified volume	Settles against a physical reference price, results in cash flow from seller to buyer (if contract price lower than procurement costs) or buyer to seller (if contract price higher than procurement costs)
Can be cleared through a clearing house if parties agree to	Cleared through a Clearing house
Low transparency (price only known between the counterparties)	Highly transparent market (orders, prices etc.)
No Anonymity	Full Anonymity of counterparties
Non-Regulated market	Highly regulated market
Substantial counterparty risk of not cleared through exchange	Collateral requirements on the exchange minimizes the counterparty risk

Table 3. Basic difference between bilateral trading and exchange based financial forwards and futures contracts

In bilateral physical contracts the main cash flow is between participants (generators, consumers and traders) and equals the total contract value (i.e. time multiplied with agreed volume and price). On the other hand, in financial contracts the cash flow is between Clearing House (i.e. regulated institution) and participants (organized market) and equals the difference between the financial contract price and the underlying reference price.

In bilateral physical contracts the participants must generate/purchase or consume/sell the contract volume. Any deviations are settled as imbalances. In financial contracts, the participants are not committed to generate or consume volumes based on their positions. Their physical participation is a "separate business". However, the financial contract will secure each participant the contract price as total realization value for a potential physical volume, if the participant uses the WESM to realize the contract volume.

Another key difference is that bilateral contracts must be negotiated and administrated before, during and after total delivery period until the contract duration has expired and both parties have settled it. When using an organized market place the contracts will be administrated by the EDM; the contracts will be standardized and the EDM will be the central counterpart. In effect this will bring significant less administration needed by the participants.

5.5. Transparency requirements and Market surveillance

The market regulations and/or the market place license usually define the transparency requirements for the operation of an EDM. Requirements are both aimed at the market participants and the market operator. In the European context, these requirements are defined in European legislation in three main regulations: the REMIT (Wholesale Energy Market Integration and Transparency), CACM (Capacity Allocation – Congestion Management) and Transparency regulation. All these three are integrated parts of the regulation framework for the European Unions internal electricity market.

When looking at the international EDMs we can see that the transparency of prices, volumes, market news and other relevant data is well developed and all market operators provide an extensive transparency platform. There is no noticeable difference in how they publish this information.¹⁶

Transparency of trading data and information is of course extremely important in building market confidence and trust. This is the single most important source for giving the market participants the information needed to make informed decisions and trust that they have access to same data as others. Forward curve price discovery is of high importance in the jurisdictions examined and access to data is a key part of this.

The expression “- No trust, No trade” is highly relevant and should be considered when designing a market.

Figure 3 shows the process in how the rules, transparency and market surveillance will build confidence and trusts and as an output create more liquidity, with that better pricing. This spiral of market development is what is the goal where the increased trust will create more liquidity that will create more trust and so on.

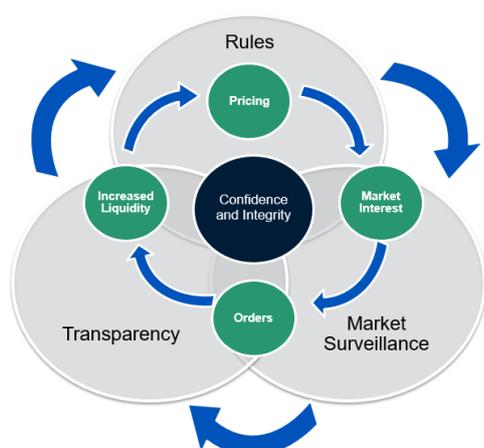


Figure 3. Transparency, market surveillance and clear rules create trust and liquidity and relevant prices.

¹⁶ Nasdaq, SGX and ASX webpage

The Role of Market Surveillance

All examined international markets have a market surveillance function and it is clear that this is a crucial building block in the evolution of a liquid market. Market surveillance is an instrument/tool to build market confidence, liquidity, and integrity. Market Surveillance is following the market pattern and participant’s activity day by day and hour by hour, supervising that the participants are acting according to the market conduct rules, market ethical guidelines and the market rules as specified in the various regulations and contractual obligations of being a market participant. The introduction of and surveillance unit and increased transparency requirements lower risk of misconduct in the market.

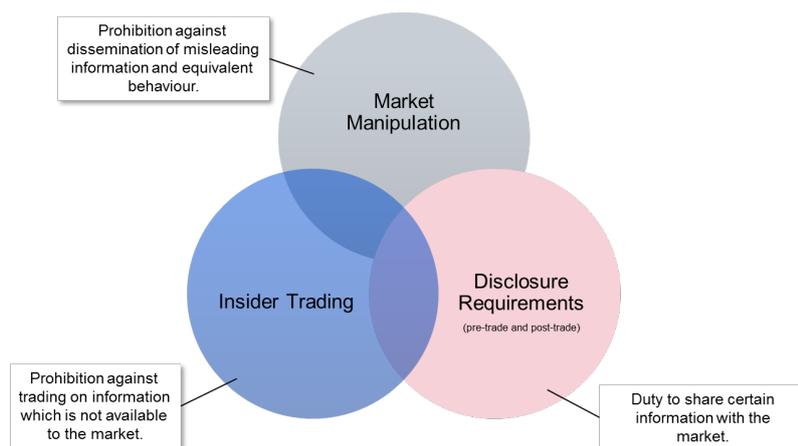


Figure 5. Market surveillance focus areas

The Market Surveillance units of the other jurisdictions have a clear reporting structure within the EDM market operator and towards the regulatory authorities. There is usually an overlap between regulation and different authorities in the examined markets.

The experience from all the markets is that clear sanctioning rules shall be implemented, so that misconduct can be sanctioned in a proper and efficient way.

5.6. Market makers and liquidity providers

All of the EDMs examined have had market makers from the initiation phase and launch of the markets. This will ensure that there will always be at least one buyer and seller in the market at all times. In addition, there has also been a strong need for a firm commitment from the market participants and other stakeholders. A clear experience from the Nordics, these stakeholders have been involved in the design and development of the market including its products from an early stage through their involvement in the Customer Advisory Board of the different markets.

In New Zealand, ASX launched the market with one market maker, this approach did not get the market going so in 2010 all generators-retailers signed up and the number of committed parties was then raised to four. Still there were low trading activity due to a too wide bid and ask spreads. By October 2011 the regulator stepped in and new market making agreements with a tighter bid-ask spread were introduced. This got the market going and the trading volumes and open interest finally saw a positive trend.¹⁷

¹⁷ <http://www.emi.ea.govt.nz/Reports/Gallery?category=WWholesale>, <https://www.ea.govt.nz/monitoring/year-in-review/2015>



Figure 6. Development of Open interest¹⁸ of futures and options in New Zealand¹⁹

In November 2015, a change was made in the New Zealand market so that futures and options contracts could be traded at a 0.1 MW sized contract. This was done to attract smaller participants and to create further liquidity building.

The New Zealand market is a highly vertical integrated market that is seen as having a negative impact on the liquidity development. The need of a hedging contract market is less in a highly vertical integrated market as many companies do this internally.

In Australia, the market is characterised by low vertical integration that can be seen as positive for building liquidity, as there is a need to participate in hedge market. There has also been a high focus on counterparty risk in Australia which makes the exchange traded products stand out as a good solution.

Other liquidity providers that are not specified as market makers are usually the category speculators. Speculators are usually banks and other trading entities that do not have an underlying physical production or consumption. These entities take risks in the market and trade to gain profit. This activity provides a source of liquidity and is welcome when building an EDM market.

¹⁸ Open interest is the total number of open or outstanding (not closed or delivered) options and/or futures contracts that exist on a given day.

¹⁹ <http://www.emi.ea.govt.nz/Reports/Gallery?category=Wholesale>

5.7. Counterparty risk and Clearing house

To handle the counterparty risk all market operators in the foreign EDM jurisdictions uses a clearinghouse structure with collateral requirements. The introduction of a centralized clearing counter party is one of the most important design aspect and advantage of organized electricity markets. In bilateral markets the delivery contracts and deal negotiations are done independently between the two parties. This provides certain amount of flexibility and business opportunities for the market participants. However, this also holds a major risk since the negotiation process can be expensive and assessing the reliability of the counterparty can be difficult. This is called a counterparty risk where the bilateral contract holders must bear the risk of the other one going default or otherwise refusing to respect the contract.

In order to overcome this risk, modern exchanges with separate clearinghouses provide security for the market participants by functioning as a central counterparty for all market participants' trades. This fundamental aspect of power markets is illustrated in Figure 7. In the traditional bilateral trading, each market participants have bilateral contracts between each other. One step further in this model is to net the purchases and sales as one bilateral contract to decrease the complexity and cost of maintaining multiple contracts. In mature power markets, all this contracting is replaced by having one contractual counterpart towards the exchange or the clearinghouse. All purchases and sales go through the market place, as well as the monetary flows. In this model, the market participants do not have to be concerned who actually is buying or producing their electricity since they only need to deal with the "middle man" which is the exchange.

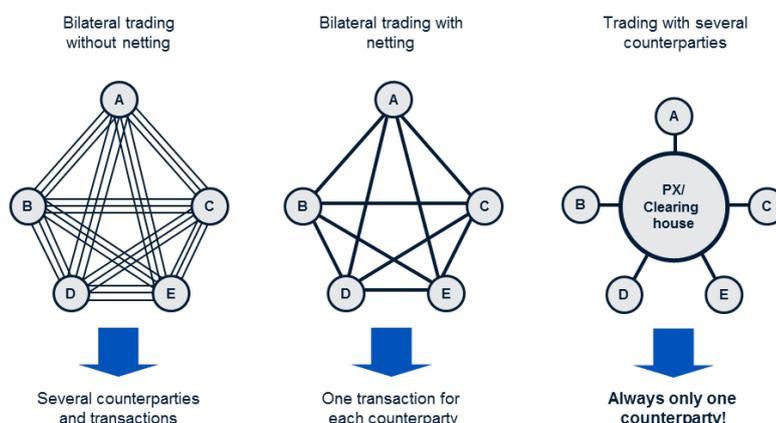


Figure 7. From bilateral trading to Central Counter Party trading.

In Europe, there are two distinctive models of organizing the Central Counter Party (CCP) function for the organized markets. In the first model, the CCP role is organized in-house at Exchange organization. In other words, Nasdaq (for example) handles all market clearing and settlement in house, as well as collects and secures collaterals from market participants to cover from counterparty risk.

The major advantage of this model is simplicity for market participants – “one-stop shop”. In many cases, this also reduces the collateral (monetary securities market participants need to post to CCP) requirements. Additionally, choosing to include the clearing and settlement function

within the Exchange makes the communication and customer service more straight-lined towards the market participants.

The second option for organizing the CCP and clearing functions is to completely separate them from the physical trading functions and trading platforms. In other words, the Exchange will be responsible to operate and maintain only the trading platforms whereas the CCP and clearing functions are operated and maintained by an independent Clearing House. This model is in use with EEX (European energy exchange) and ECC clearinghouse. The advantage of this model is to allow the clearinghouse to specialize in the clearing business. However, for this to be profitable business the clearing house should consider offering also services to other products such as gas, which may give certain market participants advantage for cross-commodity margining.

Another important aspect of longer-term trading is the fact that in terms of the cost of trading in organized markets, the collateral management is the costliest function for the market participants, underlying the importance of this topic. Therefore, an important task in every market setup where the market is a central counterparty to all trades is to have an efficient and transparent collateral management in place. This could be based on a set of generic requirements:

- ▶ Credit Cover is collateral or security that is required to be posted as a guarantee against a Participant's Credit Risk.
- ▶ In the event of a payment default, this Credit Cover can be utilised by the clearing entity (Exchange/Clearing House) to satisfy the Participant's outstanding financial obligations.
- ▶ A Participant may meet its Credit Cover requirements by posting a combination of types of collateral accepted by the clearing entity.
- ▶ In the event of the failure of a Participant to pay an invoice in full, Posted Credit Cover will need to be accessible in a timely manner such that the clearing entity can meet all payment obligations of the market.
- ▶ The actual rules for calculation of the required credit cover shall be created as part of the detailed design in such manner that the market is not exposed to any unnecessary risk.
- ▶ It is a clear design principle that the market shall be fully collateralized and that the clearing entity should not in any case come in a situation where it cannot pay the sellers in the market. The key is to keep the market secure in all situations
- ▶ To ensure this, the clearing entity is required to have an efficient risk and financial management

ASX and SGX have their respective clearinghouse-business in-house and they are both acting CCP for their market. Also, the collateral structure is similar between ASX, SGX and Nasdaq where you have a collateral call based on a minimum level, daily positions and an obligatory default fund.²⁰

²⁰ SGX Factsheet and website

5.8. Summary of reference markets

The below sections will summarize the key points of the examined markets with their emerging resemblances and their prominent differences. As can be seen the markets are structured in a similar way with only minor differences reflected by the underlying physical market. The collateral requirements are to a large extent similar between the examined markets.

5.8.1. Nordics and the European Union

First market to be launched in the world and are today highly developed. The EDM concept is part of the European Union's market design for the EU internal markets for electricity defined in the Forward market network code.

The main concept includes:

- Fully functional EDM, cash settled contracts
- CCP in-house for the exchange traded contracts and also acting as a generic CCP at an external clearing house
- Financial forwards, futures and options products. In the Nordics: price area differentials contracts.
- A non-mandatory market
- Bilateral trading/OTC market is allowed outside organized market, some also offers clearing of standardized OTC contracts through their clearing house
- Possibility to convert a future into a price independent DAM order to convert a financial future to a physical delivery (EEX).²¹

5.8.2. Australia

Compared to the European markets this is a fairly new market but with impressively well-developed liquidity and sophistication.

- Fully functional EDM, cash settled contracts
- CCP in-house at ASX exchange organization
- Futures and options products
- A non-mandatory market
- Bilateral trading/OTC market is allowed outside organized market

5.8.3. New Zealand

The New Zealand market is run by ASX and has a very similar offering as the Australian market. The New Zealand physical market is different to the Australian one, giving another reference price formation.

- Fully functional EDM, cash settled contracts
- CCP in-house at ASX exchange organization
- Futures and options products
- A non-mandatory market
- Bilateral trading/OTC market is allowed outside organized market

²¹ phelix-futures-presentation-data.pdf

5.8.4.Singapore

The exchange market is operated by SGX - Singapore Exchange.

- Fully functional EDM, cash settled contracts
- CCP in-house at SGX exchange organization
- Futures and options products
- A non-mandatory market
- Bilateral trading/OTC market is allowed outside organized market

6. Key regulatory and legal aspects from Legal Memorandum

This chapter will give a brief introduction to the findings from the Legal memorandum work stream and present the legal changes and its phases needed to establish a fully functional EDM. This Comprehensive Technical Report and its content will be built on these three legal phases presented in table 4. This Table has been prepared by C&G Law as part of the Legal Memorandum. The full Legal Memorandum is a separate document.

Each phase is presented with the legal regime together with structure, market operator, derivatives product offering and potential market participants. The Securities and Exchange Commission (SEC) is regarded as the natural regulating body for the EDM and should be the authority that approves participants and the market design.

	Step 1	Step 2	Step 3
Legal Regime	<p>Current legislation: Article 2018 of the Civil Code in effect</p> <p>Onapal is good law</p> <p>SEC commodity futures rules suspended</p> <p>BSP regulations allow banks to trade in cash-based derivatives</p> <p>IC regulations allow insurance companies to trade in certain derivatives with certain banks</p> <p>But subject to SEC opinion confirming that forwards do fall under the definition of commodity futures contracts</p>	<p>Changes in administrative issuances: Lifting of suspension or passage of new SEC commodity futures rules</p> <p>Passage of rules allowing banks – and consequently insurance companies – to trade in electricity derivatives</p>	<p>Changes in statute: Repeal of Article 2018 of the Civil Code or amendment to carve out application to electricity derivatives</p>
Structure	Exchange and/or OTC market	Exchange and/or OTC market	Exchange and/or OTC market

	Step 1	Step 2	Step 3
Operator	Exchange: SRO ²² OTC: registered broker, dealer or salesman of a broker or dealer in an OTC market or a group thereof which shall act as an SRO	Exchange: SRO OTC: registered broker, dealer or salesman of a broker or dealer in an OTC market or a group thereof which shall act as an SRO	Exchange: SRO OTC: registered broker, dealer or salesman of a broker or dealer in an OTC market or a group thereof which shall act as an SRO
Derivatives	Forwards	Options Forwards/Futures settled by actual delivery	Options Forwards/Futures settled by actual delivery or cash settlement
Participants	Electricity industry participants All other entities that meet SEC requirements Excludes banks and insurance companies	Electricity industry participants All other entities that meet SEC requirements Banks Insurance companies	Electricity industry participants All other entities that meet SEC requirements Banks Insurance companies

Table 4. Legal phases for an implementation of a fully functional EDM²³

²² SRO means Self-Regulatory Organization and is (a) an organized Exchange under Section 33 of the SRC, (b) a registered clearing agency under Section 42 of the SRC, (c) a registered securities association under Section 39 of the SRC, and (d) other SROs under Section 40 of the SRC. SROs have been authorized by the SEC to: (a) enforce compliance with relevant provisions of the SRC and rules and regulations adopted thereunder, (b) promulgate and enforce its own rules which have been approved by the SEC, by their members and/or participants, and (c) enforce fair, ethical and efficient practices in the securities and commodity futures industries including securities and commodities exchanges. (See Rules and Regulations Implementing the Securities Regulation Code, Rule 3, Section 3.1.22; see also Securities Regulation Code, Chapter 10).

²³ Table produced by C&G Law as part of the Legal memorandum of the EDM study

7. Short-term physical wholesale market – WESM

In the international examples examined in chapter 5, we can see that the different EDMs derive their settlement prices from the underlying short-term physical market. This should also be the case for the Philippines as the link to the physical market is vital to create a useful and liquid EDM.

7.1. High level background of WESM

The Electric Power Industry Reform Act (EPIRA) of 2001 lay the foundation for the WESM based on the Section 30 of Republic Act No. 9136. WESM commenced commercial operations in the Luzon grid on 26 June 2006. Four years into the commercial operations in Luzon, the Visayas grid was integrated into the WESM and commenced commercial operations on 26 December 2010.²⁴ Before WESM launched operations, the trading was done bilaterally and in an un-organized market.

The objectives of the WESM are expressed in the WESM Rules and they are primarily to; establish a competitive, efficient, transparent and reliable market for electricity where²⁵:

- A level playing field exists among WESM Participants;
- Trading of electricity is facilitated among WESM Participants within the spot market;
- Third parties are granted access to the power system in accordance with the EPIRA;
- Prices are governed as far as practicable by commercial and market forces; and
- Efficiency is encouraged

WESM operates in Luzon and Visayas grids with 135 Generator Resource Trading Nodes and 258 Customer Load Resource Trading Nodes in Luzon. In Visayas there are 69 Generator Resource Trading Nodes and 110 Customer Load Resource Trading Nodes.²⁶

The majority of the Philippine generation capacity is within the Luzon grid and it is also here where the highest consumption, including the population of Manila, is located. The overall generation mix can be summarized as 43% coal, 31% nature gas, 15% geo-thermal, 8% hydro, 2% oil based and 1% renewables.²⁷

In 2015 8% of the total energy volume was settled through the spot market the rest was based on bilateral contracts.²⁸ The number of market participants has grown since the launch of WESM. This growth is considered to be caused by the privatization and transition process of the National Power Corporation (NPC) generation assets and energy contracts. There are also new participants entering the market.

In the early stages of the WESM the market was highly concentrated around a few participants, but today there are a concentration of four participants having ~60% of the market share. Figure 8 below shows the market concentration in the WESM where the last year's developments can be found. As mentioned in WESM 10th Anniversary SPECIAL report, the market participants:

²⁴ http://www.wesm.ph/inner.php/about_us/wesm/wesm_history

²⁵ http://www.wesm.ph/inner.php/about_us/wesm/wesm_history

²⁶ Market Network Model Issue No. 131

²⁷ 2006-2016 Igniting Transformation Special 10th Anniversary Edition

²⁸ 2006-2016 Igniting Transformation Special 10th Anniversary Edition

“SMC, AP, FGC, and PSALM are accounting for ~63% of the total WESM registered capacity by the end of the March 2016 billing month”.

As can be seen, the WESM is currently considered a moderately concentrated market. To have a high concentration in the physical electricity markets is not uncommon and the Philipppian situation is not too bad and shall not hinder the implementation of an EDM or create additional market dominance potentials.

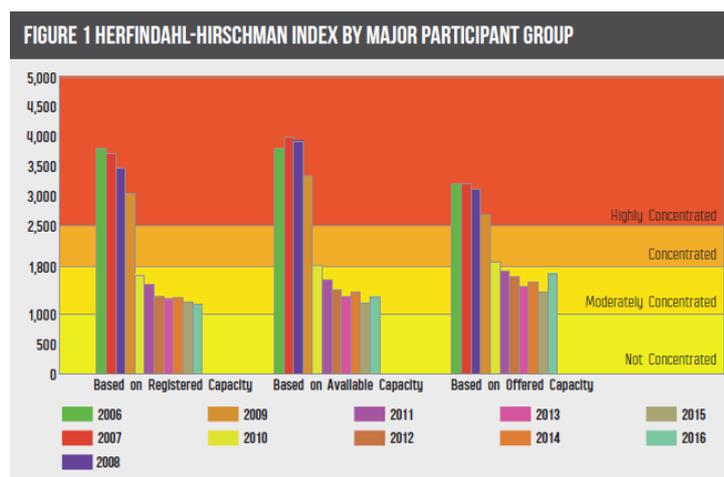


Figure 8. Market concentration²⁹ in the WESM, Herfindahl- Hirschman Index³⁰

7.2. Basic WESM market structure and price formation

The WESM is a gross pool with nodal pricing and net settlement. “All” energy is traded through the market; both bilateral volume and exchange settled volume and therefore the WESM could be considered a mandatory market. For the formation of the hourly prices WESM uses generation side bidding with a load forecasting for the demand side. Locational Marginal Pricing is used and the marginal price is computed at each node or location in the power system to reflect cost of transmission line loss and/or congestion. WESM operates in both the Luzon and the Visayas grids and is responsible for the central dispatch function.

WESM is only settling the part of the spot traded quantity that is not bilateral contracts based on the marginal prices; the bilateral contracts are all settled outside WESM. WESM has also a plan to include the operation of a Reserve Co-optimization market and also considering incorporate demand bidding.

²⁹ WESM 10th Anniversary SPECIAL report, 2006 2016 Igniting_Transformation_Special_10th_Anniversary_Edition

³⁰ HERFINDAHL-HIRSCHMAN INDEX (HHI) - is a commonly accepted measure of market concentration that takes into account the relative size and distribution of participants in the market. The HHI is a number between 0 and 10,000, which is calculated as the sum of squares of the participant's market share. The HHI approaches zero when the market has very large number of participants with each having a relatively small market share. In contrary, the HHI increases as the number of participants in the market decreases, and the disparity in the market shares among the participants increases. The following are the widely used HHI screening numbers: (1) less than 1,000 - not concentrated; (2) 1,000 to 1,800 - moderately concentrated; (3) greater than 1,800 - concentrated; and (4) greater than 2,500 - highly concentrated. The HHI is calculated using the (i) registered capacity, (ii) registered capacity net of outage, (iii) offered capacity, (iv) metered quantity, and (v) spot transaction (metered quantity net of bilateral contract declarations). (Information taken from the monthly monitoring report that PEMC produces.) http://www.wesm.ph/inner.php/downloads/monthly_market_monitoring_indices

7.3. WESM Price caps and regulatory interventions potential effect on the EDM

Due to soaring prices and unusually high price spikes during end of 2013 Energy Regulatory Commission's (ERC) has introduced price caps to control the WESM price ceiling. According to market theory, price caps are to be avoided to the extent possible as these interfere with the market forces and, the relative low, WESM price cap could potentially have a negative effect on the use of the EDM as the price risk is (to some extent) limited, "capped".

At times with high demand and scarce supply the price caps might interfere with the price setting in the WESM. If the reference prices for the settlement of a future EDM is derived from the spot market these price caps will interfere with the long-term market. These regulatory interventions create political and regulatory risks for the market participants. It is also important to secure enough incentives and encouragement to maintain investments in production and transmission.

WESM price caps:

- Primary offer price caps: PHP 32,000.00 / -PHP 10,000.00
- Secondary price cap: 168-hour rolling average

However, it's not that often the caps are activated, secondary price cap with 168-hour rolling average have not been activated since September 2014. However, we would recommend revisiting the price cap with the goal of increasing it to a level that will ensure that it will not interfere with the EDM.

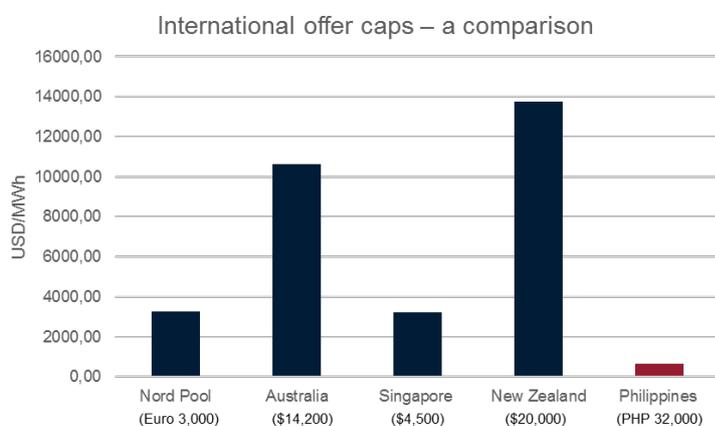


Figure 9. A comparison of international offer price caps with the one of WESM (Currency rates dated 03.05.2017)

7.4. WESM transparency data

One of the EPIRA requirements was to ensure transparency into the Philippine electricity market. WESM has addressed this and are today providing an extensive transparency package.

The WESM transparency data currently consist of:

1. Market Bids and Offers
2. Market Prices and Schedules
3. Ex-ante and Ex-post LWAP
4. Market Re-Run Results
5. Marginal Plants
6. Administered Price
7. HVDC Schedule
8. Net Settlement Surplus
9. Must-Run Unit Generation Price Index
10. Price Substitution Methodology for Congestion
11. Daily PEN-MRR-PSM-AP Summary
12. Final Market Prices

It is suggested that this will provide enough transparency data to satisfy the future EDM market participants.

7.5. WESM Market surveillance

PEMC has the dedicated market surveillance committee (MSC) and the PEMC market assessment group (MAG) that is responsible for the monitoring and surveillance of the spot market. The monitoring activities are a continuous operation where the team monitors and collects information on the trading in the market.

The MAG group has a dedicated system designed for monitoring of the market. This system is to some extent automated to provide assistance in the daily monitoring. The market assessment group publish assessment reports on the developments in the market.

It will be important to align and create cooperation between these two committees and their equivalent committees for the EDM.

WESM and PEMC Governance structure

The WESM is governed by an Interim Board, the Philippine Electricity Market Board that is chaired by the DOE Secretary. The Board is a 15-man body consisting of representatives from each sector of the electric power industry, as well as independent members.

Under the PEM Board are the different Governance Committees, which assist the PEM Board in fulfilling the functions of self-governance. The Governance Committees consist of the Rules Change Committee, the Technical Committee, the Market Surveillance Committee, the PEM Audit Committee, and the Dispute Resolution Administrator.

PEMC is the Market Operator of the WESM and it has also the governance units, the Market Assessment Group, and the Enforcement and Compliance Office.

The WESM members are composed of the Trading Participants, who are either Generator Participants or Customer Participants; Network Service Providers, referring to NGCP and the

distribution utilities; Ancillary Service Providers, who can be generators or loads; wholesale and retail Metering Services Providers, and the System Operator.

The DOE also supervises the WESM through its policy-making and planning functions which include promulgation of the WESM Rules and its amendments. The Energy Regulatory Commission is responsible for regulating pricing and competition in the market.

Below is a drawing of the high level governance structure for WESM and PEMC.

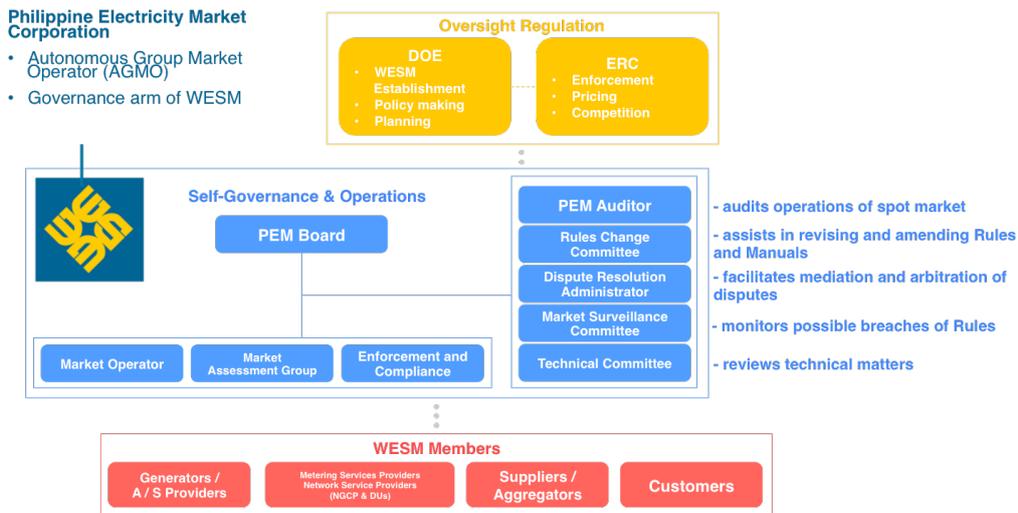


Figure 10. WESM and PEMC Governance structure

8. Proposed High-Level Conceptual Design of the EDM in the Philippines

This chapter summarizes the proposed EDM high-level market design for the Philippines. Some suggestions are clear recommendations; others are presented as options.

8.1. Key Market Design

The EDM will constitute the organized longer-term market place in the Philippines that then completes the organized market offering for the market participants. As seen in the figure 10 WESM will have a central role in the market being the short term physical price setting mechanism. The WESM will in addition provide reference prices to the EDM based on an agreed principle discussed in section 8.5 below. WESM will also continue to operate the centralized scheduling of all physical volumes in the market. It is not envisioned that the introduction of the EDM will change the key operations of the WESM.

As shown below there will still be a possibility to trade bilateral contracts on the side of the organized market, even though the volume later needs to go through the WESM. The EDM will be a voluntary market and the aim is to allow for cash settlement of the EDM contracts.

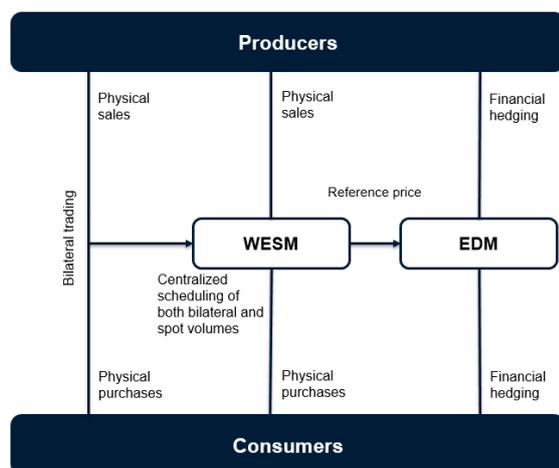


Figure 11. Philippine high-level market overview when a fully functional EDM is established.

There are essentially four different ways in how to organize and structure the ownership of the EDM (regulated from the Supervisory Authorities):

- PEMC as both operator and clearing house;
- PEMC as market operator with an outsourced clearing house business;
- Both the EDM operations and clearing house is outsourced to another market operator
- A private initiative being allowed to be the market operator (instead of PEMC)

As PEMC is currently the hub in the market it will in any case be important to secure a good collaboration and an extensive information sharing cooperation between the EDM operator and PEMC.

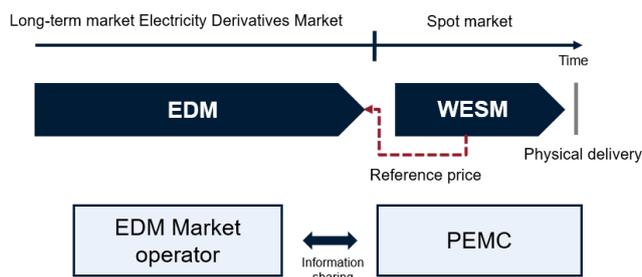


Figure 12. Philippine organized markets and market operation responsibility

8.2. Market Organization and Governance Structure

To get suitable market organization and an efficient governance structure the recommendation is to create a structure based on that the EDM would be a voluntary market. Based on this, it will require a different governance setup compared to WESM structure.

The Supervisory authorities will be the overall regulatory and monitoring body of the EDM. As also discussed in the Legal memorandum there are multiple Supervisory Authorities that will have an overlapping authority over the EDM. To make the governance efficient and effective, it is suggested to structure the Supervisory bodies in a way that gives one interface towards the EDM market operator and its market surveillance function.

Example of this structure can be found in the Nordics where there are inter - supervisory bodies agreements on information sharing, investigation processes and responsibilities. In this Nordic case, it's the Financial Supervisory Authority in Norway that has then main responsibility over the EDM market place and the Financial Supervisory Authority in Sweden that is the main regulator for the Clearing House. The equivalent for Philippines is the Philippine Securities and Exchange Commission (SEC). More information on this topic is found in the legal memorandum delivered within the EDM study. Our recommendation is that SEC will be the main regulatory body for the EDM and be the focal point for the EDM operator.

Another proposed structure is the EDM Market Advisory Board that mainly consist of market participants but are led by the EDM market operator having the Secretariat function. It's important to get a broad representation of the different types of market participants in the market to be able to get a market representative feedback on topics discussed. This advisory board will not have any formal powers but will be involved in the market development and provide the market participants view on what shall be prioritized. In this sense it is more of a reference group. However, the main reason to have this board is to ensure that the offerings from the EDM will be in line with the market participants needs.

The EDM market rules will be develop based on input from the Supervisory authorities, EDM market operator and the EDM market advisory board. These market rules are then part of the membership agreement to join the market.

As is discuss further under the chapter 8.9. transparency of prices and other market data is vital to create trust in the market. These publication requirements will be governed by the Supervisory authorities but also managed from the EDM market operator side. The EDM market surveillance

function will monitor that the transparency requirements are followed, both for the EDM and the Market participants.

The market rulebook is proposed to include of the following topics,

- Market rules
- Trading rules
- Settlement and Clearing rules
- Collaterals rules
- Membership agreement
- Fee schedule
- Confidentiality and transparency requirements

For more information on proposed rulebook structure please see the Legal memorandum.

The Market surveillance team will monitor to detect possible breaches, report illegal behaviours and ensure a fair and efficient market. If breaches are found the unit will report suspicious activities to the EDM market operator board and to the relevant authority. More on the market surveillance unit under section 8.10 Market Surveillance below.

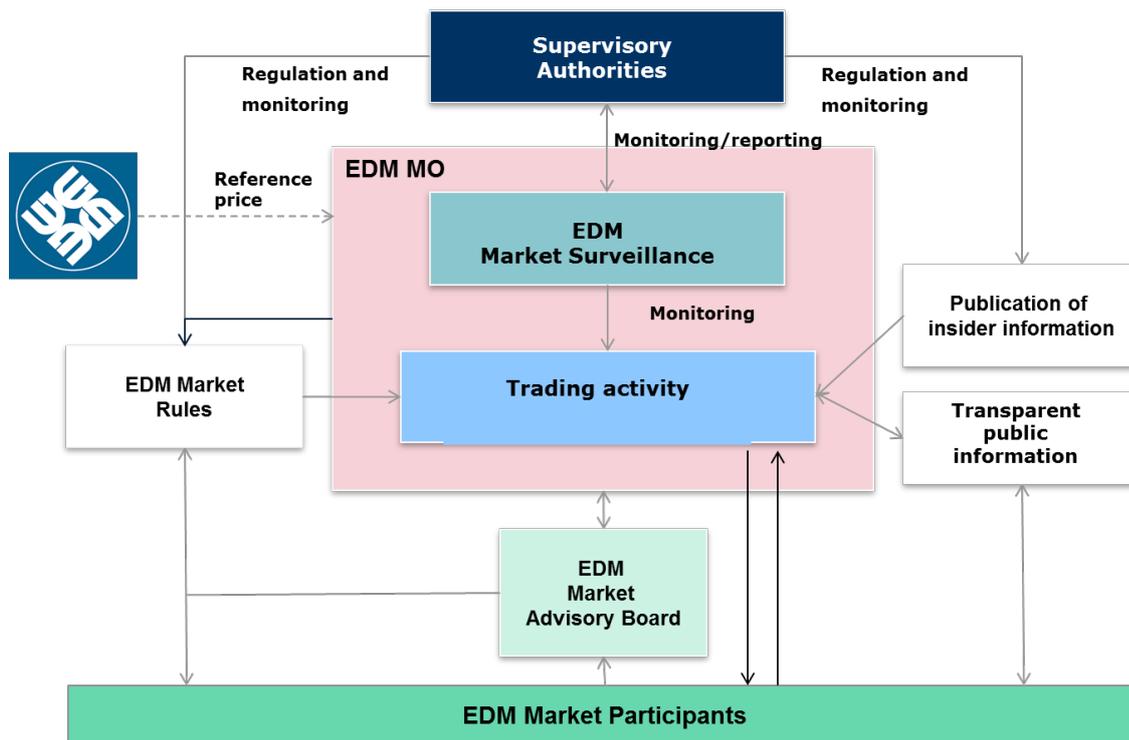


Figure 13. Suggested market organization and governance structure

8.2.1. Role of and Inter-Linkages Among Governing Bodies

As mentioned above, the Supervisory authorities will have an overlapping authority over the EDM. These authorities include Securities and Exchange Commission (SEC), The Bangko Sentral ng Pilipinas (BSP), Department of Energy (DOE), Energy Regulatory Commission

(ERC), Philippine Competition Commission (PCC), and the Market Surveillance unit at the EDM market operator. Due to this it is suggested to structure the supervisory bodies in a way that gives only one supervisory interface towards the EDM market operator and its market surveillance function. In this way both the EDM market operator and the market participants know where to turn in case of questions and/or breaches of rules. We would suggest that SEC should act as this focal point towards the EDM operator.

For more information on Inter-Linkages among governing bodies please see the Legal Memorandum.

8.2.2. Potential EDM participants, Membership and Registration

It will be important to secure a firm commitment from the market participants and other stakeholders in the market to attract liquidity and to build market confidence. Below some of the initial actions on how to ensure this is presented with focus on identifying who the potential market participants can be and how to attract them to the EDM.

There are essentially two groups of market participants identified by the study; firstly the fundamental players, meaning the generators, consumers and directly connected customers (Industry); and secondly the speculators and liquidity providers such as; banks, insurance companies, pure trading entities and trading departments at energy companies involved in speculation.

The two categories of potential participants have very different reasons for entering the market. The fundamental players are in the market for *hedging opportunities* that the EDM provides and they will use this as part of their risk strategy. The liquidity providers on the other hand are in the market to make profit on risk-taking and speculation on the electricity price.

The fundamental players consist of the Philippine supply and demand side that is active in the WESM. The number of market participants in the WESM has grown since the launch and the WESM can be considered moderately concentrated with a concentration of four participants having ~60% of the market share and the rest is share by approximately 40 participants.

The generators have a clear role in the future EDM and it is relatively easy for them to see reasons for joining. However, as of now, the demand side has no or little incentive to reduce cost and hedge. The issue is that the Distribution Utilities (DU) are now operating under a “cost pass through principle” where whatever cost the DU faces on electricity prices can be passed on to the consumers. It is crucial for all markets to have strong demand/supplier side participation and it will be important to mitigate this for the future EDM of the Philippines.

Depending how well the Retail Competition and Open Access (RCOA)³¹ policy is implemented and to the extent it has influence in the market, there might be need for further regulatory interventions. Mitigation processes could be to add additional incentives like for instance incentive-based regulation for the DUs create a clear unbundling of distribution and supply and potentially introduce profit incentives for the DUs.

³¹ http://www.wesm.ph/inner.php/the_market/retail

The legal phases and implementation of changes to the legal framework will also have an impact on who will be able to trade. During the legal step 1, electricity industry participants and all other entities that meet SEC requirements will be allowed to trade in the long-term market. At this stage, the banks and insurance companies are excluded from participation in the market as currently pure financial derivatives' trading is forbidden.

During legal steps 2 and 3 the banks and Insurance companies will be allowed to participate given that they meet SEC requirements. Banks and insurance companies are considered to be liquidity providers and speculators. Their role in the market is to take on risk with the aim of creating profit. This will increase liquidity and the possibility of traders meeting counterparty in the market.

Right now, it's only the banks and insurance companies that are authorized to deal in derivatives in the Philippine markets and it's the Bangko Sentral ng Pilipinas (BSP) that gives the permission for participants to engage. The existing derivatives are mostly within the areas of interest rate and foreign exchange trade.

It is also important to recognise that until full retail competition is implemented, the EDM will be a market for the contestable players and the captive customers shall be covered under the CSP.

8.3. Market type and EDM Products to be traded

Steps in legal implications

The final findings from the Legal Memorandum show that there are certain steps in the introduction of the type of tradable products in the Philippines that could be envisioned. The identified phases with associated and allowed markets can be summarized as:

- Step 1 – Current situation without any change in legislation;
- Step 2 – Issuance of administrative rules and regulations; and
- Step 3 - Changes in Congressional statutes.

The steps are essentially arranged in the degree of difficulty to get the changes approved by the required legal bodies in the Philippines.

As shown in figure 13 below, step 1 allows for financial forwards with physical delivery and other bilateral contracts, step 2 further opens up for futures settled with physical delivery and step 3 finally opens up for a full EDM adding cash settlement of forwards and futures contracts. The contracts in step 3 would then be possible to settle by cash settlement. Options would also be allowed from step 2 onwards.

Legal process



Figure 14. Legal steps and allowed products and market types

8.3.1. Nomination of financial forwards with physical delivery in the WESM

The bilateral contracts today are all assigned to specific production and consumption nodes and the volume is sent through WESM for centralized scheduling. If an exchange traded longer-term physical contract (Forward) is traded by the area Luzon with a combination of nodes, not specific nodes, the contracted volume would later need to be assigned to specific nodes.

This challenge needs further investigation to fully understand the impact of the nomination process towards the WESM nodes. Our basic understanding of this would imply that (for project implementation phase 2 where the EDM contracts will end up with a physical delivery and are open only for the fundamental players) the same rules for how much you can offer to buy or sell in the EDM will be similar to the WESM rules meaning that you cannot have a position in the EDM outside your technical possibilities.

If the contracted volume shall be distributed on to several nodes accounting for physical constrains in the network and that potentially also multiple counterparties are in connection to the trade, there might be a complex task to nominate the traded volume. We would in this case expect that both buyers and sellers would have to nominate the values from their trade in the EDM as there is no longer a one-to-one bilateral relationship between the buyer and seller, and the EDM market operator will not have sufficient information (what specific node) that will be used for the transaction.

8.3.2. Standardizing of products in the EDM

To simplify the market implementation process and independent of which market type that is implemented, it is suggested to standardize the products and have the same type of products over all market/legal phases. In the initial stages of the EDM the products shall be based on the idea of highly standardized products and pooling of liquidity to a few contract types (products). It is suggested to start with only 4 products.

Monthly contracts are a given choice and this contract length is used in all other international case examples investigated as part of this study. It has been seen as “not too long not too short” and is widely used in the starting phase of electricity derivatives markets.

Then the next contract is suggested to be a seasonal contract to allow for hedging of the different seasonal variations existing in the Philippines. Based on the feedback during the stakeholder consultation workshops, the recommendation is to have a wet and a dry season contract.

To mimic the existing bilateral “market” and to meet, to some extent, the habit of the market participants we additionally suggest introducing a 2-year contract. This is built on the knowledge that a lot of the bilateral contracts today are traded with a length of 24 months.

Therefore, as a summary, these are the initial products to be introduced:

- Month
- Season (Wet and Dry)
- 2-year

The monthly contracts are suggested to come in baseload and peak load format, the longer contract types are suggested to only come in baseload from the start. However, based on feedback from the market participants this could be changed if there is a need a longer-term peak contract. The reason of having only baseload for the longer-term contracts is to pool liquidity around few contracts. Peak period shall be defined as [07:00 - 19:00]³² to follow the consumption pattern.

We also see this Peak product to also serve as a potential offering for Renewable Energy Sources allowing especially solar power to be allowed to use this “daytime” product to actually hedge some of its outcome.

As the preparations for a full develop EDM will take time, it is suggested to launch an organized market based on financial forwards with physical delivery as soon as the issuance of administrative rules and regulations has been successfully implemented. This product offering will provide the same product specifications as the full functional EDM with the exemption of cash settlement. As this would mean an extra phase for the implementation of the cash settled EDM there is a question mark if the transitional phase (with physical delivered contracts) is really required. As stated in the consultation workshop, one opinion is that with the introduction of rules for cash-settled futures by SEC as provided for in the SRC, this will cancel the current obstacle in article 2018 (as discussed in the Legal Memorandum). If there is consensus on this, it would be possible to move directly to step 3 with cash settled contracts in the EDM from day one

As discussed in the Legal Memorandum and above in the chapter 5, there are multiple contracts types available in the electricity derivatives markets around the world. The question is, what type of contract will be suitable for the Philippines context?

In the international experiences listed above, Futures and Financial Forwards are the most common contract types. In the Philippine case, the choice is between either Futures or Financial Forward contracts; both choices are presented below providing their respective pros and cons.

Option 1 - Financial Forwards

If the expected market participants are mostly fundamental players then Financial Forwards is preferable as these contracts replicate a physical delivered contract. The deferred settlement makes the cash flow equal to the one in connection with physical delivery. This option is very efficient and cost effective if the financial/bank sector allows for the use of bank guarantees as collateral facilities. If this is not possible, forwards tends to become an expensive alternative.

In figure 15 the settlement process of a Financial Forward is presented and the most noticeable difference to a Futures contract is that the Forward contract doesn't have any cash flow in the trading period.

³² Needs to be discussed further with market stakeholders to fit the actual demand patterns in Luzon.

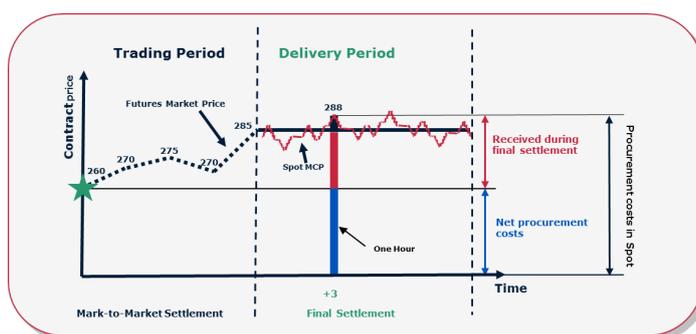


Figure 15. Settlement process for a Financial Forward contract.

Option 2 - Financial Futures

Futures are a highly standardised product and well known in most commodity markets around the world. A Future contract is a viable solution if the aim is to attract banks and other international trading participants in the hope of create liquidity. The issue is that Futures will change the cash flow for fundamental players introducing a daily mark to market settlement which can be resource demanding especially if they are not used to this financial trading pattern from earlier.

As discussed above, if bank guaranties are not available as collateral or there is no efficient way of posting collaterals for the financial forward contracts the Futures contract provides a more cost-effective solution.

In figure 16 below the major difference between a forward and a future is presented with the settlement structure including a daily market to market settlement.

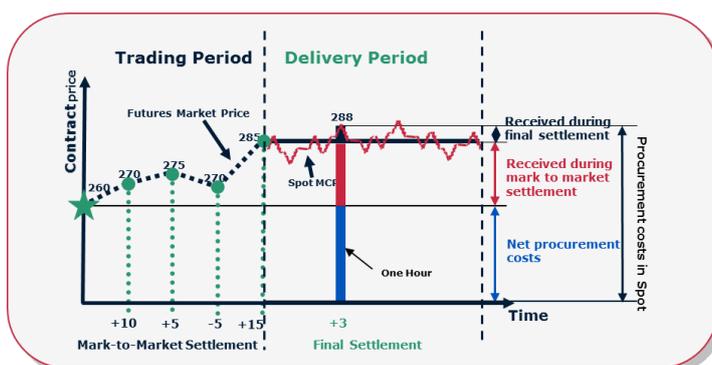


Figure 16. Settlement process for a Financial Futures contract.

Need assessment feedback from consultation workshop

Feedback from stakeholders and the consultation workshops can be summarized as:

Fundamental participants don't have a firm experience of futures trading in the Philippines but are experienced in bilateral physical trading. Potential speculators and liquidity providers do have some experience with futures contracts but not within commodities.

Many of the bilateral contracts toady are for 24 months and a contract mimicking these contracts were considered to be useful for the participants.

Proposed solution for the Philippines EDM

Based on the international experiences and on the situation in the Philippines, Physical Forwards are proposed as a starting point for the EDM market. These contracts will then at a later stage, (step 3) of the legal implementation, have the possibility of cash settlement. Forwards are suggested due to their similarities of bilateral physical contracts and that these contracts are assumed to be more of interest of the market participants. For more information on the different phases and legal steps please see the chapter 10. Stepwise implementation plan for the establishment of an EDM.

	Month	Wet season	Dry season	2-year
EDM Transitional phase (Physical delivery)				
Luzon Forward Baseload	x	x	x	x
Luzon Forward Peak	x	(x)*	(x)*	(x)*
Continuous market evolution phase (Cash settled)				
Luzon Forward Baseload	x	x	x	x
Luzon Forward Peak	x	(x)*	(x)*	(x)*
Additional products?*** (options, quarter, yearly, weekly)				

* Potential peak contracts also for the seasons and 2-years contracts depending on market participants view and needs.

***Additional product offering needs to be further evaluated based on the outcome of the initial phases of the EDM

Table 5. Suggested contracts and type for the initial and continuous stages of the Philippine EDM.

The financial forwards both with and without physical delivery are to be traded in a centralized market concept. In a centralized market the buyers and sellers meet in the market place (at the exchange) and the counterparties will be anonymous to each other during the whole trading and settlement process. In this way both buyers and sellers have the exchange (or clearing house) as their sole counterparty. The clearinghouse will be responsible to ensure that the sellers gets paid and that the buyers pays on time. The trading will be conducted on an IT based infrastructure where the traders will have a full overview over the market at all times.

As can be seen in the table above the financial forwards will have physical delivery in the EDM Transitional phase but will later at the project phase 3 be cash-settled, this change will be possible when the legal step 3 has been implemented. The possibility of physical delivery will then be removed.

Depending on who will operate the EDM, the settlement cycle will be adjusted to the owner's internal processes. The basic outline of this process will be that the financial forward contracts are settled during the delivery phase of the contract, with the WESM reference price and by the settlement periods determined. To cover the risk of a counterparty going default, collaterals shall be posted towards the clearinghouse, for more into please see chapter 8.6.

8.4. Area covered by the EDM

The fundamental starting point is to cover an as large area as possible with the new EDM; this gives maximum potential liquidity ("pool liquidity") and serves the most participants possible. On the other hand, there are significant differences in production, consumption and prices in Luzon and Visayas grids and a common price/area could be misleading for both areas. In this case, the longer-term market could end up being unattractive for both of the areas.

It will be important to pool the liquidity at one place and towards one reference price in the initial stage so that you do not spread the liquidity on too many contracts and areas and ensuring that the reference price is really seen as a reference. A stepwise approach is advised in the implementation of the number of tradable areas. A similar approach was also used when WESM was launched as previously discussed in chapter 7.

Proposed stepwise approach for tradeable area:

- Step 1 - Start the EDM only in the Luzon area.
- Step 2 - Add area for Visayas or integrate in the Luzon area when the liquidity has matured
- Step 3 - Add area for Mindanao or integrate in the common market

There might be potential hedging opportunities for participants located in Visayas to hedge in the Luzon contracts. This would not give a tight hedge but could potentially be a useful addition to the long-term bilateral market in Visayas. This practice of hedging in a neighbouring market can be found in other markets and especially in the Nordic market. In the Nordic financial market, there are participants from 20 countries trading in the market but only 11 countries in the underlying physical reference price.

We would recommend doing a more detailed analysis of the possibility of combining step 1 and 2 as the WESM currently covers both. This should include interaction with the potential market participants to get their views on this as well as doing simulations of the effects of the various options.

8.5. Reference Price Determination for the EDM

In the Philippine market, there are close to 600 different nodes distributed on consumer and generation nodes. Each node has hourly values of both price and volume and these values are affected of the nodal network structure, the market situation of transmission, demand and supply. Sometimes the WESM price cap also affects these prices.

Looking at the international experiences presented above, the reference prices used for settlement in the EDMs are different for each jurisdiction. There is the Nordic System price that

is an unconstrained regional price calculation³³, the Australia and New Zealand solution with regional reference nodes and arithmetic average spot prices³⁴ and in Singapore the electricity derivatives are settled on the Arithmetic average of all half-hourly Uniform Singapore Energy Price (USEP) prices. The USEP is the uniform price of energy that applies for settlement purposes for all energy injections or withdrawals that are deemed to occur at the Singapore hub. It is the weighted-average of the nodal prices at all off-take nodes in each half hour.³⁵

So, each market has established a reference price that has been considered the most appropriate one for the specific market, regulation and needs. A reference price needs to be firm and reflect the underlying situation in the physical short-term market.

Looking at the Philippine case with its the number of nodes and the structure of the nodal network, it is proposed not to head in the direction of a separate reference node. This is due to the fact that the nodal network is under constant development and one node can have very different values to another and would not be representative. The two possible reference price calculation methods presented below will be taking into account all nodes in the Philippine market. This approach is believed to be the most sustainable for the future development of the EDM and WESM.

The two calculation options analysed are,

- Option 1 - Volume Weighted Average Price of all nodes
- Option 2 – Arithmetic average of all node prices

The consumer nodes are take-off points where the volumes consumed by consumers are indicated and measured. The generators nodes are production nodes where the electricity is push into the grid but these nodes can on the other hand also be take-off nodes at some instances as the power plants sometimes consumes more power than they produce.

We have performed a simplified calculation of a reference price simulation for the different proposed reference price calculation options. The simulation has then looked at prices and volumes for the last 12-months, and focusing specifically on the Luzon area. Nodal price and volumes data was produced and delivered by PEMC to Nord Pool Consulting.

If it would be considered necessary to create a special calculation method, similar to the one used in the Nordics “System price”, this would then need to be discussed in detail with PEMC to investigate if and how the internal systems can calculate this price. This solution would then constitute a third, Option 3 - PEMC separate unconstrained index calculation.

As described in the section 8.4, the idea is to start off with only one area, Luzon. The reference prices in this study are therefore only calculated for the area of Luzon.

Volume weighted average price

The volume weighted average price is increasing the influence the price of nodes with based on their volumes. The normal approach to this is to use the formula:

³³ <http://www.nordpoolspot.com/TAS/Day-ahead-market-Elspot/Price-calculation/>

³⁴ ASX_Australian Electricity Futures and Options_Contract Specifications.pdf

³⁵ <https://www.emcsg.com/marketdata/guidetoprices>, Source: SGX Factsheet and website

$$P_{vwap} = \text{SUM}(P_j * V_j) / \text{SUM}(V_j)$$

P_{vwap} is Volume Weighted Average Price,
 P_j is price of node j ,
 V_j is volume of node j ,
 j is each individual node that exist over the defined period of time,

To be able to do this simulation the nodes were separate into Load nodes, Generation nodes and Generation consumption nodes (which are the same as generation nodes but for a specific time interval they are consuming). The separation of the generation nodes is due to the fact that these nodes sometimes consume power and to get the calculations right this separation was needed. With reference to VWAP, the volume variable V in the calculation above is built up by the final volumes $(XLAQ+XAILQ)/2$ for load nodes and $(XAGQ+XAIGQ)/2$ for generation nodes. For the price variable P , the final prices $XANP_LOAD$ is used for load nodes and $XANP_GEN$ for generation nodes.

Not all listed nodes have been active during the 12-month period so the simulation was done on the nodes that have both prices and volumes; this cuts the number on active nodes to 218 for consumer nodes and 135 for the generation nodes in Luzon.

The arithmetic average price was calculated based on the standard formula,

$$P_{avg} = \text{SUM } P_j / n_j$$

P_{avg} is the arithmetic average price,
 P_j is the price of node j ,
 n_j is the number of nodes,

Simulation results:

Figure 16 presents the daily average of the volume weighted average price and the arithmetic average price, for the last 12-month, and as can be seen there are not a lot of differences between these two calculation options on an average daily basis. The VWAP is constantly a bit higher than the arithmetic average; the difference seems to be higher when prices are high. This was expected, as the prices usually are a bit higher at the nodes with large and intensive consumption.

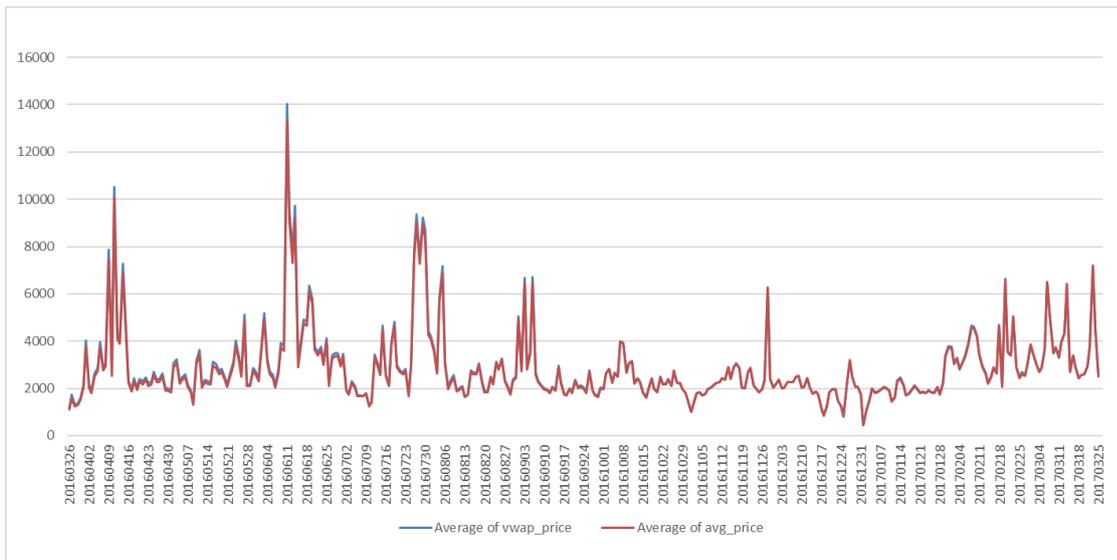


Figure 17. Daily average of the VWAP and the arithmetic average price for all nodes in Luzon (PHP)

The months that stood out was May and June 2016, where the prices were volatile and generally high, during this period we can see that the VWAP is constantly higher than the arithmetic average. Seen over the whole year and per hour, the VWAP was PHP 73.06 higher than the arithmetic average. The maximum hourly price difference between the two options was PHP 1640.97, which is a considerable difference. To get a more detailed view of the price movements figure 17 showing only two months were produced.

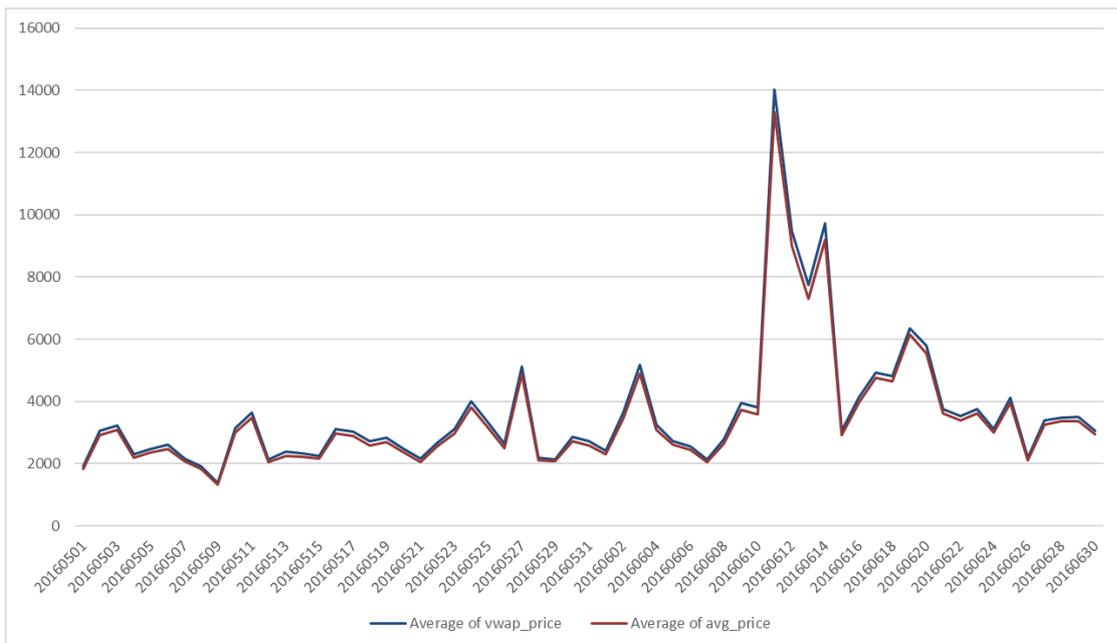


Figure 18. Daily average of the VWAP and the arithmetic average price for all nodes in Luzon (PHP), May and June 2016.

To get even more into the details an hourly graph was created for the days with extreme price movements and prices. As can be seen in figure 19 the price difference between the two options is bigger at higher prices.

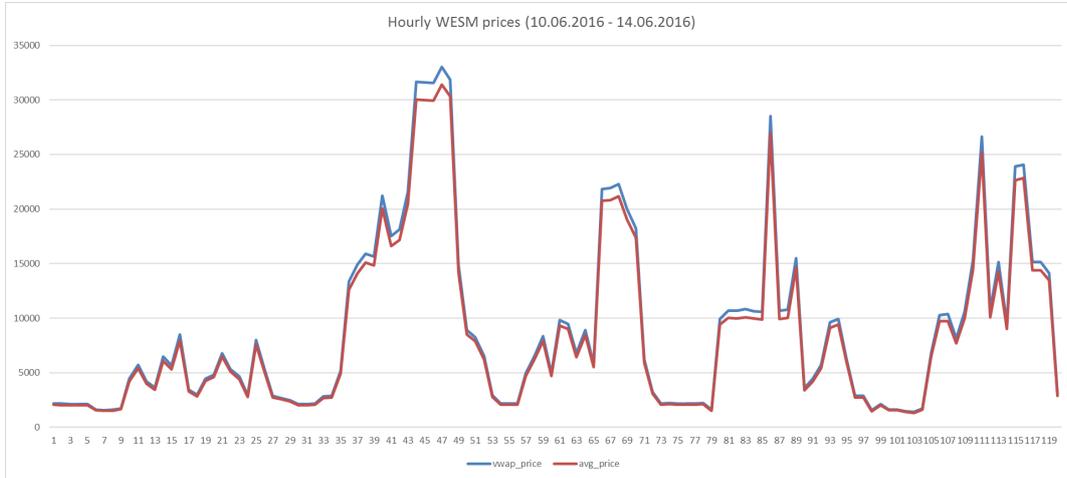


Figure 19. Hourly WESM prices (PHP) for Luzon (10.06.2016 - 14.06.2016)

This conclusion is also supported by the scattered graph presented in figure 20, where we see that the trend shows little difference at prices up to ~6000PHP and then we see a slight difference that builds up the higher the price gets.

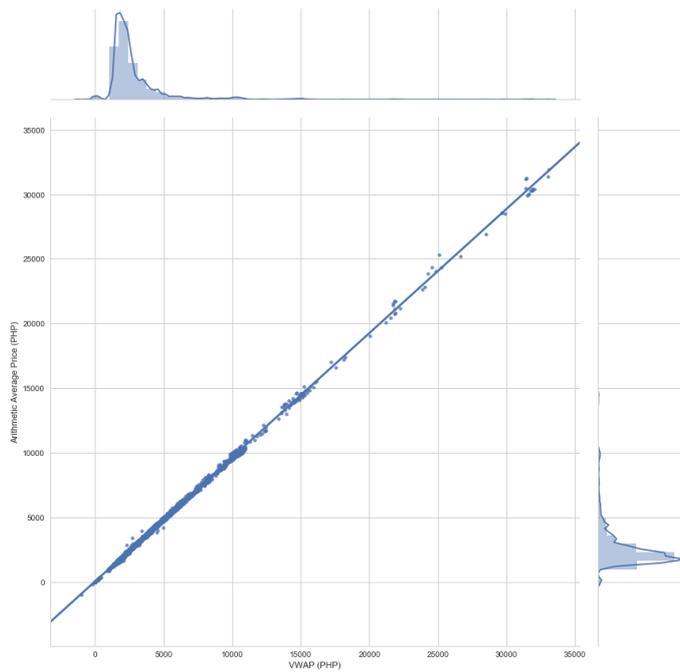


Figure 20. Presents the spread of prices between VWAP and the arithmetic average price for all nodes in Luzon (PHP).³⁶

³⁶ The chart presents a simple linear regression model, on the sides histograms represents the distribution of data by forming bins along the range of the data and then drawing bars to show the number of observations that fall in each bin. The line in the histograms graph is a kernel density estimate (KDE), https://en.wikipedia.org/wiki/Kernel_density_estimation

Conclusion

The conclusion is that the choice of reference price calculation methodology will have an impact on the settlement of the EDM. The hourly differences can sometimes be large and it will be important to have a close connection to the physical underlying market. The proposed solution is to use VWAP for all nodes in Luzon as reference price for the EDM contracts. This option will give the liquid nodes a good alignment with the reference price. A problem could be that less liquid nodes feel that the reference price is not representing their situation, but we don't see this as a major obstacle.

Another very important point is that there have to be established firm rules on how the reference price shall be calculated. These rules shall be part of the market rulebook and they should be presented in a transparent way.

Availability of firm WESM prices

Depending on when the settlement of the EDM contract shall be conducted there are different needs on data availability, but the EDM market participants will be very eager to have the reference price for the EDM as soon as possible.

After the next WESM system upgrade the final WESM prices will be available in (close to) real time.³⁷

The important point here is that the EDM reference price needs to be firm and that prices will not change after its determination. The market will lose trust if the price is changed subsequently. Currently there is an opening for ERC to change the WESM price retrospectively. This cannot be the case for the EDM reference price.

Our recommendation is therefore to create a unique EDM reference price based on a VWAP calculation of the final WESM prices at a specific time.

8.6. Clearing, Settlement and Collaterals

Another important design aspect and advantage of organized electricity markets is the introduction of a centralized clearing counter party (CCP) also in the longer-term trading. The CCP takes on the counterparty risk for all transactions and guarantees settlement and payments. One of the considerations that are important in the establishment of the EDM is who to operate this. The operations of a Clearinghouse are extremely capital-intensive, and it requires procurement of expensive systems and demands secure operations.

It is suggested to move to a centralized cleared market structure from day one of the operation of the EDM. In general there are two options for the structuring of the EDMs Clearing house that are presented below. The final solution for the operations of the clearinghouse is strongly linked to the operator (and owner) of the EDM and therefore most likely will be decided together with the ownership structure of the EDM. The option of choice will differ depending on who will be the market operator of the EDM.

Option 1 - CCP role in-house at Exchange organization

³⁷ PEMC

In this option, the exchange will be responsible for all clearing and settlement. The exchange will also determine and secure collaterals from the market participants. The major advantage of this model is simplicity for market participants where they have a “one-stop shop” concept while trading in the EDM and all contractual relationships will be with the same party.

This structure is desirable if the EDM market operator has a solid financial status and is considered appropriate to take on this task of being the CCP.

Option 2 - CCP role outside of the exchange organization

In this option, the exchange will be responsible to operate the trading only; the CCP and clearing functions are operated and maintained by an independent clearinghouse. The advantage of this model is to allow the clearinghouse to specialize in the clearing business and in most cases this would mean to use an existing clearinghouse whereas they will have the required systems to operate and also have the financial strength to take on clearing of the Philippines EDM.

This setup could be desirable if the EDM market operator is not capable of taking on the capital-intensive clearing and settlement business. The market operator could team up with a bank or another clearinghouse involved in other commodity markets or sectors as gas, oil etc.

This option could also be desirable if the independent clearinghouse also offers services to other products such as gas, oil or other commodities, which may give certain market participants an advantage of cross-commodity margining and thereby could be seen as an advantage for the market participants. The drawback of this option is that the market participants need two memberships (Exchange and Clearing house) that could lead to increased cost for market participation.

Settlement cycle

The choice of settlement cycle will depend on who will operate the EDM and the availability of firm reference prices. When the operator of the EDM has been chosen the settlement cycle will preferably be aligned with internal settlement structures for simplicity and efficiency.

Collaterals

The overall market design principle is that the market shall be fully collateralized and that the clearinghouse should not in any case come in a situation where it cannot pay the sellers in the market. In the event of the failure of a participant to pay an invoice in full, the posted Credit Cover will need to be accessible in a timely manner such that the clearing house can meet all payment obligations of the market. To accomplish this an efficient and transparent collateral management process needs to be in place.

The choice of settlement cycle and timeline for payment will of course affect the needed collateral structure.

The collateral call shall be based on and include a minimum level, daily positions and if deemed necessary a contribution to obligatory default fund. There should also be an opening in the clearing rules for the clearinghouse to request an extra margin call if circumstances require.

Proposed basic collateral setup could include:

- Base collateral
- Daily margin call (Variation margin and/or Initial margin)
- Default fund contribution

Again, based on the choice of operator, these might already be chosen by the operator and the setup of this is not a core design of the market – the important design is that the market will be fully collateralized.

8.7. Trading Fee Structure

It is suggested to split the trading fees into two parts, one fixed and one variable and dependent on traded volume. Reasonable fee levels are important and fees should be kept to a minimum or based on discounts in the initiation of the market to attract participation. The basis for the fee structure shall always be to have sufficient income to support the operational cost of the market.

Entrance fee

For new participants entering the market.

Annual fixed fees

It's suggested the EDM shall have an annual fixed fee to cover basic cost; this lowers the risk of a major impact of periods of time with low volumes. Could split out a specific technology fee to cover IT costs.

Variable fees

The other part of the cost recovery is proposed to consist of a volume-based trading fee. This option could increase the number of contract traded and could hence increase liquidity. It is possible to consider a split between trading and clearing fees depending on the ownership structure.

Other potential offerings that would affect the fees would include market maker agreements and potential gross agreement fees.

8.8. Infrastructure Requirements

One important part in building market confidence and trust is to have a secure and, easy to use IT infrastructure including trading and back office systems. In the EDM trading community today there exists several vendors for these systems.

The trading system could be preferably web based trading client (no need to download client) with API possibilities for trading using an internal company wide trading system or other third party software. The back-office system should provide a clear and easy monitoring of collateral requirements.

It's strongly advised to procure systems either as software or service of an existing EDM trading system and associated backend infrastructure. As there are many vendors it should be easy to have a competitive tender for this. Another main reason for suggesting this is that to build and maintain such a complicated real-time system is hard, time-consuming and costly – which all together means a very high risk.

When procuring the centralized market place for bilateral contracts there should be focus on procuring a platform that are flexible enough to handle both the centralized physical forwards and later the cash settled EDM forwards.

8.9. Transparency

Transparency is vital for the market as it builds confidence and trust. The expression “No trust, No trade” is highly relevant and the EDM needs to have transparency as a priority. Transparency brings lower risk of misconduct and the introduction of a market surveillance function is pushing the participant to fair market behaviour.

Prices and volume data transparency will provide a forward curve price discovery that will be of great use for a wide variety of market stakeholders. Our recommendation is to build a market surveillance function as outlined below.

8.10. Market Surveillance

As mentioned above a market surveillance function is an instrument and a tool to build confidence, liquidity and integrity in the market. A surveillance unit is crucial and shall have priority when setting up the organization. The primary focus is to supervise that the participants as well as the exchange and clearinghouse is acting according to overall market regulations, market conduct rules, market ethical guidelines and market rules.

The unit needs access to all trading relevant data and so that they can follow the market and participant’s behaviour and actions day by day and hour by hour. It’s suggested that a MoU shall be in place with the equivalent department/function at WESM, to share data and information between the two markets to ensure that no cross-market abuse will take place.

The market surveillance unit shall have the authority to request data from market participants and make site visits to collect information of interest. There should also be declared in the market rules that the market surveillance unit has sanctioning rights over the market participants.

The sanction rights could be split up into administrative and criminal sanctions. Administrative sanctions could be used for smaller occurrences with either a smaller fee or publicly disclosed information on what the market participant has done. If a market participant has been found guilty of a serious crime, criminal sanctions should be imposed. Criminal sanctions would be up to the supervisory authority to handle, with the assistance of the market surveillance unit at the EDM. Criminal sanctions would be based on the applicable Philippine law and the supervisory authority coordinating the investigation would need to take the case to court.

The unit shall report to the supervising authorities and to the board of EDM. A whistle-blower platform is suggested to open for anonymous tips from the market participants.

It is important to establish an effective and efficient investigation and case processing procedure. Figure 21 shows a generic approach to investigation and case processing.

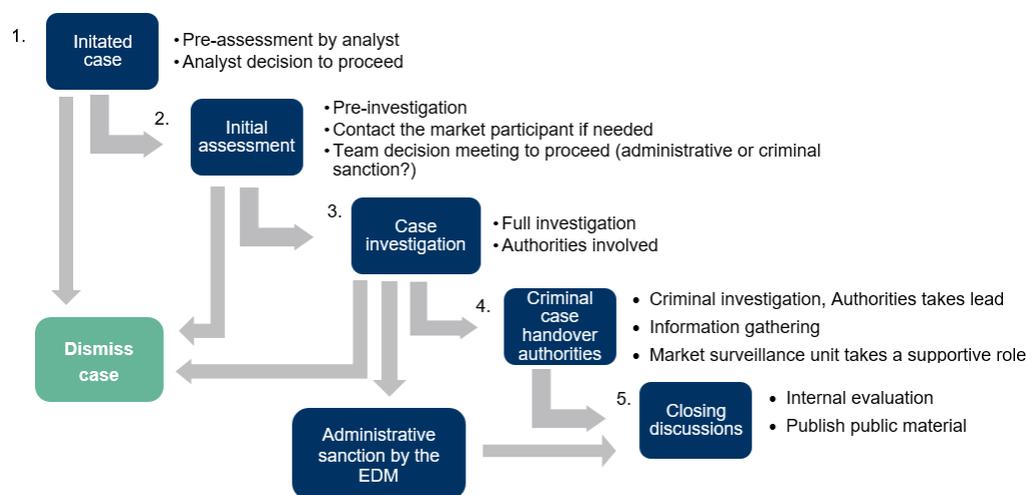


Figure 21. Potential case handling process with in the EDM operator

The market surveillance unit shall also create risk assessment on potential market abuse in the Philippine market. As the WESM will provide the reference price for the EDM it will be important to also have a good understanding of what is happening in WESM, as market manipulation with, for example, intentional power plant outages and similar situations needs to be monitored on a daily basis. Here the collaboration between WESM and the EDM is of high importance.

Currently WESM have a Market Surveillance committee. If the EDM will be operated by PEMC, it should be considered to join this committee with the EDMs market surveillance team. However, as this is not concluded yet, the description in the document is based on a separate unit.

Market abuse could be, in short, summarized by the definitions of market manipulation and insider trading. The following section is a short summary of what these two illegal behaviours constitute and how they are defined in the European context.

Market manipulation means:

(a) entering into any transaction or issuing any order to trade in wholesale energy products which:

(i) gives, or is likely to give, false or misleading signals as to the supply of, demand for, or price

of wholesale energy products;

(ii) secures or attempts to secure, by a person, or persons acting in collaboration, the price of one or several wholesale energy products at an artificial level, unless the person who entered into the transaction or issued the order to trade establishes that his reasons for doing so are legitimate and that that transaction or order to trade conforms to accepted market practices on the wholesale energy market concerned; or

(iii) employs or attempts to employ a fictitious device or any other form of deception or contrivance which gives, or is likely to give, false or misleading signals regarding the supply of, demand for, or price of wholesale energy products;

or

(b) disseminating information through the media, including the internet, or by any other means, which gives, or is likely to give, false or misleading signals as to the supply of, demand for, or price of wholesale energy products, including the dissemination of rumours and false or misleading news, where the disseminating person knew, or ought to have known, that the information was false or misleading.

When information is disseminated for the purposes of journalism or artistic expression, such dissemination of information shall be assessed taking into account the rules governing the freedom of the press and freedom of expression in other media, unless:

- (i) those persons derive, directly or indirectly, an advantage or profits from the dissemination of the information in question; or
- (ii) the disclosure or dissemination is made with the intention of misleading the market as to the supply of, demand for, or price of wholesale energy products;”

Attempt to manipulate the market is also considered an abuse and shall be considered a case for investigation and prosecution.

Inside information:

“‘inside information’ means information of a precise nature which has not been made public, which relates, directly or indirectly, to one or more wholesale energy products and which, if it were made public, would be likely to significantly affect the prices of those wholesale energy products”

Whether or not information can be regarded as inside information must be assessed on a case by case bases. Determining what is inside information is not straightforward, for instance identical information may or may not constitute inside information depending on the current market situation, because in a strained situation the information may be more likely to affect prices significantly.

8.11.Changes to the settlement and regulated procurement

When the full EDM with cash-settled contracts is introduced, this will have effect on the contracting structure of all market participants where their procurement (or selling) of power will be divided between the physical procurement of the required power and the potential hedging of the price of the power through the EDM.

For the generation side, this will not have a huge effect on their management of their portfolio as in effect, a financial contract combined with the physical selling of power in effect does not change from selling this through a bilateral contract (with physical delivery). The only change is that you will have two payment streams; one covering the selling of the physical power through the spot market (WESM) and then the second stream from the EDM that will ensure that the contract price for the given volume from the financial contract is the effective price paid for the power.

The basis for the EDM is the introduction of a financial contract between two parties that reduces exposure for volatile energy prices. The basis of the financial contract is an agreed power price (strike price) and the financial contract will then facilitate payments around this agreed strike

price based on the market reference price. The participants in the financial contract will pay the difference between the contracted price and the actual market price.

In the wholesale market these financial contracts will replicate the bilateral contracts, this can be used to get generators, to sell their volumes on the free market (power exchange) with prices based on supply and demand without forcing them to take on the full risk of volatile prices.

This can be illustrated by the following simple numerical illustration of the difference between a bilateral contract arrangement and how this will be settled with a financial contract. The key take away from this is that when moving from a bilateral physical contract to a financial contract, nothing is basically changing for the contract holder. The financial outcome will be exactly the same in both cases. However, with the financial contact the physical trade of power will flow through the WESM.

In this simple example, it is assumed that a generation company has a bilateral contract with an agreed price of 52\$/MWh and is producing 7MWh in each hour. This results in a turnover of 364€\$ for each hour (See table below)

The turnover is calculated as:

$$\text{Contract price} \times \text{Volume} = \text{Turnover with bilateral contract}$$

HOURLY	CONTRACT PRICE		VOLUME		TURNOVER WITH B. C.
1	52		7		364
2	52		7		364
3	52		7		364
4	52		7		364
5	52		7		364
6	52		7		364
7	52		7		364
8	52		7		364
9	52		7		364
10	52		7		364
11	52		7		364
12	52		7		364
13	52		7		364
14	52		7		364
15	52		7		364
16	52		7		364
17	52		7		364
18	52		7		364
19	52		7		364
20	52		7		364
21	52		7		364
22	52		7		364
23	52		7		364
24	52		7		364

Table 6 Bilateral contract specification and turnover

This bilateral contract can be traded as a financial contract with the same terms; still the plan is to produce 7 MW at a price of 52\$/MWh.

In this case the generator has to sell the electricity through the WESM. The WESM price may fluctuate for each hour, creating also fluctuating turnover for each hour. The WESM turnover for the generator is calculated as

$$\text{WESM Price} \times \text{Volume} = \text{WESM Turnover}$$

and is shown in the table below

HOUR	WESM PRICE	VOLUME	TURNOVER IN WESM
1	26,87	7	188,09
2	26,97	7	188,79
3	26,8	7	187,6
4	26,17	7	183,19
5	27,3	7	191,1
6	28,22	7	197,54
7	38,75	7	271,25
8	51,31	7	359,17
9	54,05	7	378,35
10	50,24	7	351,68
11	45,20	7	316,4
12	46,01	7	322,07
13	41,47	7	290,29
14	42,90	7	300,3
15	44,90	7	314,3
16	49,72	7	348,04
17	60,07	7	420,49
18	71,45	7	500,15
19	67,87	7	475,09
20	52,85	7	369,95
21	42,50	7	297,5
22	37,62	7	263,34
23	32,95	7	230,65
24	29,24	7	204,68

Table 7. Turnover from selling the electricity through the WESM

In the financial contract, the generators contract price (which was the bilateral contract price) will be compared to the hourly WESM prices. The difference between these two will be calculated to find out how much the WESM price deviates from the financial contract price. The price difference is calculated simply as:

$$\text{Contract price} - \text{WESM Price} = \text{Price difference}$$

and illustrated in the table below

HOUR	CONTRACT PRICE	WESM PRICE	PRICE DIFFERENCE
1	52	26,87	25,13
2	52	26,97	25,03
3	52	26,8	25,20
4	52	26,17	25,83
5	52	27,3	24,70
6	52	28,22	23,78
7	52	38,75	13,25
8	52	51,31	0,69
9	52	54,05	-2,05
10	52	50,24	1,76
11	52	45,20	6,80
12	52	46,01	5,99
13	52	41,47	10,53
14	52	42,90	9,10
15	52	44,90	7,10
16	52	49,72	2,28
17	52	60,07	-8,07
18	52	71,45	-19,45
19	52	67,87	-15,87
20	52	52,85	-0,85
21	52	42,50	9,50
22	52	37,62	14,38
23	52	32,95	19,05
24	52	29,24	22,76

Table 8. Price difference between the financial contract and the WESM

Based on the calculated price difference, the required money transfer is calculated so as to reach the turnover in accordance with the contract price of the financial contract. When the WESM price is below the contract price, the generator is paid the difference needed to cover the shortfall. When the WESM price is above the contract price, the generator is required to pay back the additional revenue. In this example, the generator will receive an additional revenue

from the financial contract counterparty for hours 1-8, 10-16 and 21-24. In hours 9 and 17-20 the WESM price was higher than the strike price and the generator has to pay back the difference to the financial contract counterparty. The financial contract money transfer will be calculated as:

$$\text{Price difference} \times \text{Volume} = \text{Financial Contract Transfer}$$

and is presented in table below

HOUR	STRIKE PRICE	WESMPRICE	PRICE DIFFERENCE	VOLUME	TURNOVER IN WESM	FIN. CONTRACT TRANSFER	TOTAL TURNOVER	TURNOVER WITH B. C.
1			25,13	7		175,91		
2			25,03	7		175,21		
3			25,20	7		176,4		
4			25,83	7		180,81		
5			24,70	7		172,9		
6			23,78	7		166,46		
7			13,25	7		92,75		
8			0,69	7		4,83		
9			-2,05	7		-14,35		
10			1,76	7		12,32		
11			6,80	7		47,6		
12			5,99	7		41,93		
13			10,53	7		73,71		
14			9,10	7		63,7		
15			7,10	7		49,7		
16			2,28	7		15,96		
17			-8,07	7		-56,49		
18			-19,45	7		-136,15		
19			-15,87	7		-111,09		
20			-0,85	7		-5,95		
21			9,50	7		66,5		
22			14,38	7		100,66		
23			19,05	7		133,35		
24			22,76	7		159,32		

Table 9. Calculation of the financial contract transfer

The generators total net turnover will be the sum of the revenue received from the WESM and the money transfer carried out with the financial contract counterparty. As can be seen in the table below, the final financial statement for all hours is exactly the same as with the bilateral contract.

The total turnover is calculated as:

$$\text{Turnover in WESM} + \text{Financial contract Transfer} = \text{Total Turnover} = \text{Turnover with bilateral contract}$$

HOURLY	CONTRACT PRICE	WESM PRICE	PRICE DIFFERENCE	VOLUME	TURNOVER IN WESM	FIN CONTRACT TRANSFER	TOTAL TURNOVER	TURNOVER WITH B. C.
1					188,09	175,91	364	364
2					188,79	175,21	364	364
3					187,6	176,4	364	364
4					183,19	180,81	364	364
5					191,1	172,9	364	364
6					197,54	166,46	364	364
7					271,25	92,75	364	364
8					359,17	4,83	364	364
9					378,35	-14,35	364	364
10					351,68	12,32	364	364
11					316,4	47,6	364	364
12					322,07	41,93	364	364
13					290,29	73,71	364	364
14					300,3	63,7	364	364
15					314,3	49,7	364	364
16					348,04	15,96	364	364
17					420,49	-56,49	364	364
18					500,15	-136,15	364	364
19					475,09	-111,09	364	364
20					369,95	-5,95	364	364
21					297,5	66,5	364	364
22					263,34	100,66	364	364
23					230,65	133,35	364	364
24					204,68	159,32	364	364

Table 10. Net turnover of the IPP following conversion of bilateral contracts to a financial contact.

In this example, the generator will sell the power to the WESM and receive the corresponding revenue from there. In addition to that, the financial contract will then cover any shortfall in, or transfer any excess, revenues, compared to the provisions of the bilateral contract, on top of the WESM outcome. Eventually, the total turnover of the generator will match its turnover as it would be with the implementation of the bilateral contract. The figure below illustrates the WESM price in comparison to the Contract Price and the table below provides the full picture of the assumptions and calculations used in the example.

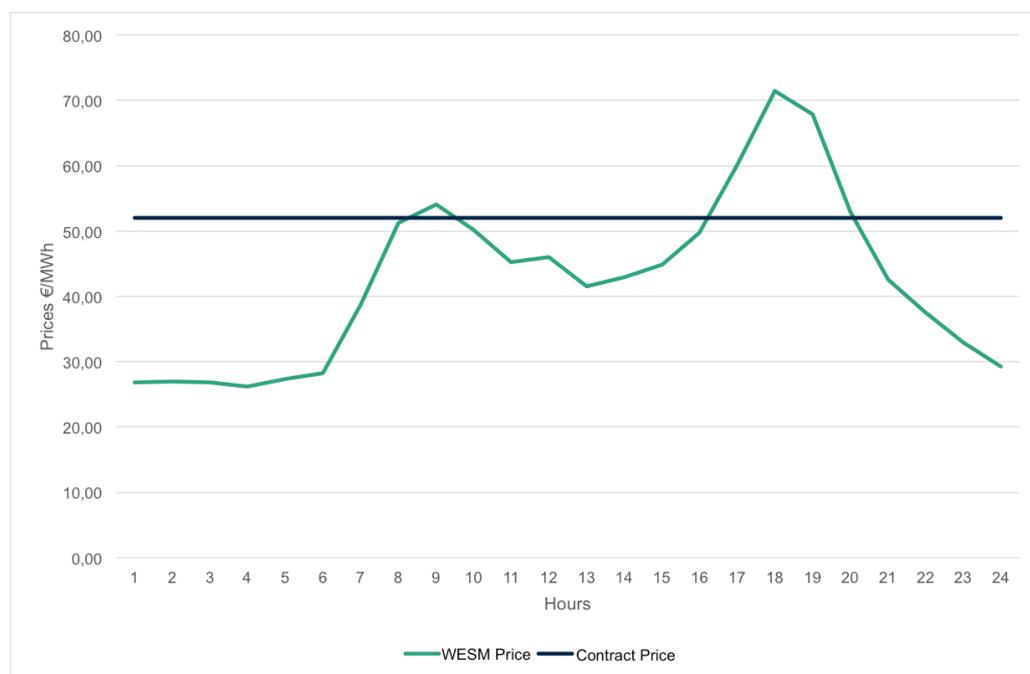


Figure 22. Illustration of financial contract price differences with the WESM price

HOURLY	CONTRACT PRICE	WESMPRICE	PRICE DIFFERENCE	VOLUME	TURNOVER IN WESM	FIN CONTRACT TRANSFER	TOTAL TURNOVER	TURNOVER WITH B. C.
1	52	26,87	25,13	7	188,09	175,91	364	364
2	52	26,97	25,03	7	188,79	175,21	364	364
3	52	26,8	25,20	7	187,6	176,4	364	364
4	52	26,17	25,83	7	183,19	180,81	364	364
5	52	27,3	24,70	7	191,1	172,9	364	364
6	52	28,22	23,78	7	197,54	166,46	364	364
7	52	38,75	13,25	7	271,25	92,75	364	364
8	52	51,31	0,69	7	359,17	4,83	364	364
9	52	54,05	-2,05	7	378,35	-14,35	364	364
10	52	50,24	1,76	7	351,68	12,32	364	364
11	52	45,20	6,80	7	316,4	47,6	364	364
12	52	46,01	5,99	7	322,07	41,93	364	364
13	52	41,47	10,53	7	290,29	73,71	364	364
14	52	42,90	9,10	7	300,3	63,7	364	364
15	52	44,90	7,10	7	314,3	49,7	364	364
16	52	49,72	2,28	7	348,04	15,96	364	364
17	52	60,07	-8,07	7	420,49	-56,49	364	364
18	52	71,45	-19,45	7	500,15	-136,15	364	364
19	52	67,87	-15,87	7	475,09	-111,09	364	364
20	52	52,85	-0,85	7	369,95	-5,95	364	364
21	52	42,50	9,50	7	297,5	66,5	364	364
22	52	37,62	14,38	7	263,34	100,66	364	364
23	52	32,95	19,05	7	230,65	133,35	364	364
24	52	29,24	22,76	7	204,68	159,32	364	364

Table 11. Financial contract conversion

For the demand side the “technical” effect of the management of this will follow the same logic. However, there will be a change from the current setup where the demand-side is divided into two segments;

- The contestable consumers – meaning the consumers that are not part of any regulatory regime and therefore are exposed to buying power either from the spot market or through freely negotiated bilateral contracts; and
- The captive (or regulated) consumers that are under a regulated regime.

For the contestable part of the market, the changes to their financial management will follow the same pattern as the generation side where some portion of their portfolio would be bought through financial contracts in the EDM and their settlement cycle will be similar to the generators (as illustrated above).

For the captive part of the market, there are two other changes that will have effect on their behaviour through the implementation of the EDM.

Firstly, with the gradual implementation of RCOA where a larger share of the demand side will be moved to become contestable consumers means that consumers in these segments will become exposed to more competition and thereby would most likely move some part of their portfolio into the EDM.

However, until full retail competition is implemented, there will be a portion of the market that will be in the captive segment, meaning that they will be under a regulated regime where their tariffs will be set by ERC. The CSP (Competitive Selection Process) has been created to facilitate more transparent and competitive selection process for the power procurement for the Distribution Utilities (DU) and the main reason to initiate such market supporting mechanism was to cover the end consumers from the volatile WESM prices as the current regulation allows the DUs to pass-through their procurement costs for power to their end-consumers.

The EDM should be seen as an alternative to the CSP as the goal of the EDM is very similar – to reduce the effect of the volatility in the underlying physical spot market. As an effect of this, it is expected – and this should be supported by ERC – that the EDM should be a valid procurement method under the CSP regulation allowing the DUs to use the EDM as the market mechanism for CSP.

The current implementation is essentially creating bilateral contracts for this that is kept out of the market – both physically and financially. With the use of the EDM as a valid option for the CSP, it would become a liquidity provider for the EDM as well as strengthening the underlying spot market in WESM while still keeping the main objectives as defined for the CSP.

9. Liquidity building measures

In this chapter measures aimed at creating increased liquidity are listed and explained. The list of measures consists of various means used in other jurisdictions and shows some of the international experiences. Some measures have already been touched upon earlier in this report but are here explained in detail.

The founding building blocks for a liquid market can be summarised as:

“Trust, trading opportunity, fair and secure”.

In table 12 the measures are listed together with what the measures potential and desired effect could be.

Measures	Potential effect
Standardized contracts	Increase trading opportunities, as the market participant will have a more level playing field as the contract structure is standard and there will be less use for lawyers.
Trustworthy and firm reference price used for settlement of the contracts.	Increase trust by ensuring a firm and timely reference price from the WESM. As discussed in the previous sections, the reference price is important and the definition of this needs to be understood and trusted by any potential market participant.
Unbundling and aim for low vertical integration in the market	Increases the need for hedging opportunities, as this cannot be handled internally. This means that in most competitive markets, the various roles in the market will be unbundled to ensure that most trading is done in a transparent manner through the organized market place.

Measures	Potential effect
<p>Market Makers</p>	<p>The key benefit of market makers is that they always provide a buy and a sell bid with an agreed spread meaning that at any time, you will find a potential counterpart to buy/sell from in the market. This increases trading opportunities, as there are always orders in the market. Perhaps not the most attractive prices but at least one can trade at any time.</p> <p>Market makers are a well-known and well-used tool in all kinds of markets – both financial and physical.. We would strongly advise to use market makers at least in the initiation phase of the market.</p> <p>Market makers will be asked to submit orders in the market to create a buy and sell spread thereby increasing the possibility of trades in the market.</p> <p>Market makers can be brought into the market by:</p> <ul style="list-style-type: none"> • Government policies/ regulation /laws (Hard measure) • Individual agreement between EDM operator and participant (Softer measure) • Standardized general market makers agreements (Soft measure)
<p>Low threshold for entry, meaning easy accession procedures and equal access</p>	<p>Increase trading opportunity for even small players</p>
<p>Transparency in data</p>	<p>Increases trust in the market and ensure that even the smaller players will have access to the main fundamental market data.</p>
<p>Clearing house as a neutral and secure counterpart</p>	<p>Creates a fair and secure market as the counterparty risk is reduced. This is also a cost-efficient way of handling the settlement and collaterals.</p>
<p>All members to follow the same rules.</p>	<p>To ensure a fair market the rule book needs to be equal to everyone trading, breaches of the rules needs to be monitored and sanctioned and there is no special treatment of any kind of market participant.</p>

Measures	Potential effect
<p>Market surveillance and regulatory supervising</p>	<p>Is a tool to build confidence, liquidity and integrity in the market. This is the “backstop” for the smaller market participants knowing that there is somebody watching what is happening in the market at all times and thereby “protect” everybody.</p>
<p>Introduction of speculators into the market</p>	<p>Other liquidity providers are often called speculators. Speculators are usually banks and other trading entities that do not have an underlying physical production or consumption or are just the trading department of a power company. These entities take risks in the market and trade to gain profit. It is a huge benefit for the fundamental market players that their activity provides a source of liquidity and is very welcome in the EDM market.</p> <p>Of course the same rules apply to them that for the others and market surveillance will monitor their activity in line with all market participants.</p>
<p>Allowing DUs to use the EDM as a CSP market mechanism</p>	<p>The EDM should be seen as an alternative to the CSP as the goal of the EDM is very similar – to reduce the effect of the volatility in the underlying physical spot market. As an effect of this, it is expected – and this should be supported by ERC – that the EDM should be a valid procurement method under the CSP regulation allowing the DUs to use the EDM as the market mechanism for CSP.</p>

Table 12. Liquidity building measures

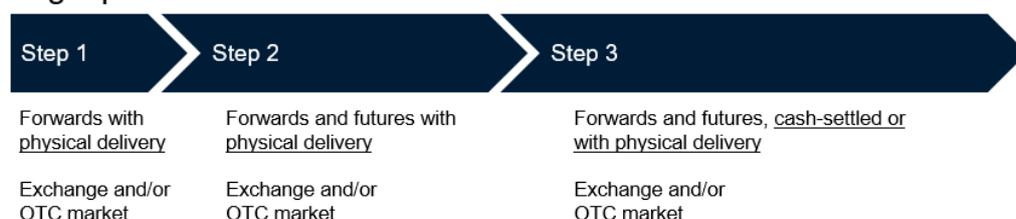
10. Stepwise implementation plan for the establishment of an EDM

In this section, the stepwise market development and strategized approach to the multiple parallel processes will be discussed. In the Legal Memorandum there are three steps identified; in the Terms of reference there were three phases identified; and in our proposal we also identified the three generic phases of a market establishment. Below the incremental implementation milestones are presented with the aim of the establishment of a fully functional EDM that is appropriate to the Philippine context.

As briefly discussed above it is suggested to have one regulatory body that are the main supervising authority, in the case of the EDM this regulatory body is suggested to be the Philippine Securities and Exchange Commission (SEC).

The road to a full-functional EDM is affected by many parallel processes that need to be aligned and structured in a way that gives an appropriate and effective workflow. Some of the major processes identified are legal and regulatory processes, an implementation project process and a market organizational and ownership process.

Legal process



Implementation project process



Organizational process



Figure 23. The three major parallel processes affecting the stepwise implementation plan

As described above in this report and as also discussed in the EDM study Legal Memorandum the current Philippine electricity market has a bilateral market for long-term trading of physical contracts. This market can be characterized by decentralized trading with low transparency. To take the full step from this and into a cash-settled EDM there are some major regulative and legal challenges to overcome.

The Legal Memorandum shows that there are certain steps in the introduction of market features that will eventually end up with a fully functional EDM. The identified phases with associated and allowed market features can be summarize as:

Legal step 1 – Current situation without any change in legislation

Forwards with physical delivery, Exchange and/or OTC market

Legal step 2 – Issuance of administrative rules and regulations

Forwards and Futures with physical delivery, Exchange and/or OTC market

Legal step 3 – Changes in Congressional statutes

Forwards and Futures with physical delivery or cash only settlement, Exchange and/or OTC market

The steps are arranged in the degree of perceived difficulty to get the changes approved by the Legal institutions in the Philippines.

At the same time it will be important to avoid creating a situation where the market participants are introduced and pushed into a market that will change continuously and where participation would become troublesome due to continuously new contract types and market structures/requirements. We have therefore tried to structure a process that follows a natural evolution of the market where each phase can be seen as a stepping-stone towards the final goal.

Common features until fully functional EDM

To simplify the EDM implementation process it is suggested to develop a set of common market features that will be kept independent of the market type and developments through the first phases until we reach the final stage with cash-settled EDM. The list below contains the important market features to keep unchanged during the implementation processes of the EDM phases.

1. *Centralized clearing including collateral management* – this will be part of the market from day one and will give multiple positive effects and bring transparency to the Philippine market.
2. *Contract duration* – the contracts duration will be the same independent to the market type (OTC, Exchange, physical delivered or cash settled)
3. *Areas covered* – It is proposed to start with only one area (Luzon) and this area will be kept until the EDM is fully launched.
4. *Products* – the products tradable will stay the same with the supplement that the cash settled option would be introduced when the legal barriers are dealt with.
5. *Reference price* – This needs to stay firm over the course of the implementation. (For more information please see chapter 8.5 Reference Price Determination)

Project phases and implementation milestones

The final implementation project plan needs to incorporate all of the legal and technical aspects on establishing an EDM in the Philippines. Figure 24 presents the different phases and their respective milestones. Further details on each project phase is described below.

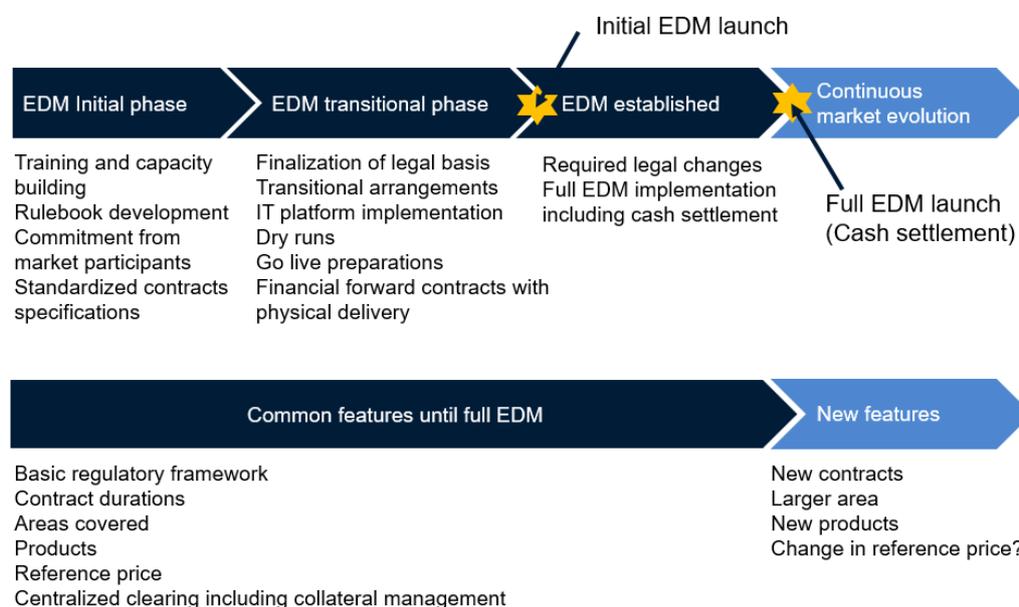


Figure 24. Summary of the EDM implementation project phases

10.1. EDM Initial phase

The trigger of this phase will be the EDM implementation project launch decision. The initial phase will be characterised by preparations and capacity building. During this phase an extensive training and capacity building program shall be launched to educate the market stakeholders, participants and regulatory institutions. All experience shows that this is one of the soft, but critical factors that determine the success of the market.

During the same phase the rulebook will be developed. This process will make use of information from international experiences and how other jurisdictions has build up there regulatory structure. The rulebook foresees that the Legal phase 2 will be reached and it shall include rules for physical forward trading and, if needed, futures trading. This task will be divided between the development of the functional part of the rulebook as well as the required changes/additions/revisions of the regulatory framework that is required. As part of the development of the rulebook, the contract duration and type of the contracts that shall be traded will be developed and standardized.

Another important task under the initial phase is to try to secure a firm comitment from market participants and other stakeholders. One clear task during this phase is to establish the rules for market makers and assess if this could be purely voluntary or if some regulatory intervention is required.

Last, but not least, there is an important discusson that is required regading the ownership of the EDM and on who, in the Philippines, will take on the Clearing house responsibilities.

10.2.EDM Transitional phase

The transitional phase initiation trigger will essentially be the same as for the initial phase. The work on the rulebook and regulations as stipulated in phase one will seamlessly move into the Transitional phase.

During the transitional phase the legal workstream of changing the required regulation needs to be finalized. There might also be additional measures required to move participants into the new market to pool liquidity to the new market. As mentioned above, the initial trading is suggested to be conducted with financial forwards contracts with physical delivery on an organized (central) market place.

The IT infrastructure shall be procured and established at the EDM market operator.

Dry runs will be conducted to ensure that both the market operator and IT infrastructure are ready, but also as important is that the market participants are ready. The Go live date shall be scheduled and clearly distributed to the whole market well in advance so that all stakeholders are aware and can prepare. There will normally be “roadshows” where resource from the EDM market operator would meet potential market participants to discuss.

Under this transitional phase the clearing house will be establish and capitalized. Market participants will be registeted and memebership agreements signed. During this process also the collateral for each participant will need to be secured by the Clearing house.

At the end of the EDM transitional phase the market is ready for Go live with its initial offerings of products.

10.3.EDM Established phase

This phase is triggered by the go-live of the EDM based on centralized trading and clearing, standardized financial forwards with physical delivery and with a product specification as described in chapter 8.3.2.

Parallel to the trading operations, the EDM market operator shall proceed with the required legal changes for establishing the basis for introduction of the legal step 3 which shall open for cash-settled contracts and the possibility to add more advanced products to the list.

In addition, the EDM market operator shall during this phase also prepare the full EDM implementation making the required changes to systems and rulebook.

10.4.Continuous market evolution phase

The generic continuous market evolution phase is triggered by the full EDM launch with the option of cash settled financial forward contracts. It is expected that the market evolution will continue with further expansion of new types of products and contracts. An expansion of the EDM to cover also Visayas could be initiated when the market is ready for this. This will typically

be based on the evolution of the market in Luzon as well as the requirements from the market participants in Visayas.

When/if the market is expanded to new geographies, it will be important to review the calculation of the reference price; if there should be separate reference prices for the two main areas or if a combined reference price should be created.

As was discussed during the last consultation workshop, there is a question mark if the transitional phase is really required. As stated in the consultation workshop, one opinion is that with the introduction of rules for cash-settled futures by SEC as provided for in the SRC, this will cancel the current obstacle in article 2018 (as discussed in the Legal Memorandum). If there is consensus on this, it would be possible to move directly to Phase 3.

11. Philippine retail market

11.1. Effect of the EDM on the retail market

The retail market is the representation of the “market” where the end-users of electricity source their power. The retail market is usually separated from the wholesale market so that the end-consumers do not have to trade directly on the wholesale level; there is no direct involvement to the EDM either. However, the EDM can still have major effect on the retail level.

Since 2013 DOE has started to introduce Retail Competition and Open Access (RCOA) to promote retail competition to the power industry. The retail market has created an opportunity for electricity end-users with an average peak demand of at least 1MW to secure retail supply contracts from licensed Retail Electricity Suppliers (RES) or Local RES. PEMC, as the Central Registration Body, is determined cater to the needs of its expanding clientele with the entry on new contestable customers as the threshold level is further reduced to 750 kilowatts (kW). At this level and beyond, new entities or business function called Aggregators shall be allowed to supply electricity to end-users whose combined demand within a contiguous area is at least 750 kW. This development in the retail market is envisioned to herald more quality, security, and affordability in electricity trade and promote further transparency, dynamism and competition in the WESM.³⁸

Deregulated retail market and especially end-user electricity prices are either directly or indirectly exposed to the market forces. Since the suppliers in a competitive environment may price their services freely, this might expose customers to volatile prices. Therefore, it is end-customers benefit of having a liquid, transparent and well-functioning Derivatives Market available for their Supplier or Distributor to source their power. When free supplier switching is allowed and there exists active competition among the Suppliers, the end-customers can choose the company who offers them “the best” prices. For instance with an EDM in place a supplier is able to provide stable or fixed prices as he can hedge these from the EDM. The stable prices may then be secured by efficiently utilising the EDM to cover from the market risks.

It is also obvious that this will increase liquidity in the overall market, it will more transparency to the retail market and it will align prices in the overall Philippine power sector.

One clear advantage that Philippines has compared to many other markets going through a deregulation process like this, is that the prices between the captive and contestable markets are very close to each other and an introduction of retail competition would not harm the end-consumers – maybe the effect could be better for them.

As retail opening has not been part of the scope of this study, we have not been able to examine this in detail, but there are clear signs that this, combined with an EDM, could be a very good combination, not at least for the end-consumers in the Philippine market.

³⁸ http://www.wesm.ph/inner.php/the_market/retail

11.2. Distribution/suppliers incentives regulation for participation in the EDM

For a successful EDM, liquidity is one of the key drivers. Thus, when considering Philippines electricity sector, it is important to be able to include the Distribution Utilities and suppliers to the EDM as they represent the retail sector. Currently, the Distribution Utilities have a possibility to pass most of the power purchase costs on the end-consumers but on the other hand are not allowed keep any profits. This creates a situation for Distribution Utilities where they have low incentives to join the Electricity Derivatives Market.

What we still believe is that the primary road of incentivising DUs to participate in EDM is to trust on the RCOA to increase competition in the retail market services. Since the threshold level for supplier switching has been reduced, it is foreseen that more companies will be interested to offer these services and further increase the competition among the Suppliers and Distribution Utilities. The RCOA is also a stepwise introduction where new levels will be opened for competition. Practically, increased competition means that the Suppliers and Distribution Utilities may not be able to anymore push the power procurement costs to the customers since there might be competitors offering lower prices for the same services. This progress may then drive the Suppliers and Distribution Utilities voluntary to the EDM for hedging purposes to keep the power purchase prices in fixed and reasonable level at all times.

However, as in any market reform, it might be that the RCOA does not create enough competition and eventually won't reach the preferred goal. In this case, other measures need to be considered to bring DUs and Suppliers to the EDM. The second way to do this basically requires regulatory intervention. One possibility to incentivise the DUs to participate in EDM is to allow them to collect some revenues generated from their business. In this model, the Energy regulatory commission needs to impose revenue regulation for the DUs where they are legally entitled for annually allowed revenues. This allowed revenue should give them a reasonable return on their services. The revenue regulation model will then aim to encourage the DUs to try to gain profits by effectively utilising different market segments, including the EDM.

There are examples, especially from Europe, where distribution companies have an incentive-based regulation.

12. Potential risks and mitigation measures while implementing the EDM

In this chapter the potential implementation risks identified are listed together with mitigation measures. It will be wise to do a full risk assessment on the future project implementation plan when this is established but in table below the most generic and common risks are presented.

Risks	Mitigation
Political/Regulatory/Legal risk <ul style="list-style-type: none"> • Potential changes to law and rules • Timeline for changes 	The best mitigation tool for this will be to analysis the needed changes to get an overview and ensure nothing is left out. It needs to be determined who should be the primary authority to approach. This task is part of the EDM study with its legal memorandum report.
Participation / Liquidity	Capacity building will be important, as this will increase the participants understanding and interest in the EDM. Market makers shall be established from day one to ensure opportunities to trade in the market. Incentives as: low fees etc. It's important to ensure that the EDM design is develop with focus on the market participants and their needs. ,
Decision on ownership of the EDM	Part of the EDM study discussion but needs to be decided by involved parties. This needs to be decided early in the process as the ownership will affect the overall design and implementation of the EDM.
Regulatory uncertainties	Establish SEC as the main regulatory body for the EDM, SEC will then act as the focal point for the market development and evolution.
Infrastructure and IT risk	To minimize risk and cost it is highly suggested to procure an existing and well-tested trading system infrastructure. The procurement process could potentially take time and shall be initiated as soon as the ownership has been determined.
Keep the reference price firm at all times	Rigid rules and design of the reference price will ensure a firm price. It will be important to ensure that the supervising authority has an understanding of the effect of potential regulatory intervention in the EDM reference price. Need for capacity building of the suggested regulator (SEC).

<p>Market abuse and dominance issues</p>	<p>A well trained and equipped market surveillance team shall be established and operative from day one. This team needs to have an extensive data access to monitor all aspects of the tradin in the EDM and to some exten in the WESM. A close cooperation will the WESM market monitoring team is vital.</p>
<p>How to manage the cost of transmission for EDM contracts</p>	<p>Need to create a methodology for how to calculate, how to charge and how reimburse.</p> <p>The second option is to move directly to phase 3 with only cash-settled financial contracts.</p>

Table 13. Potential risks and mitigation measures

13. Short and long-term effect on the existing Real-Time Energy Market

The effect of the EDM will be influenced by the interest of the market participants and the resulting volumes traded in the market. If there is a quick and steady increase in the volumes the effects will of course be larger than if the EDM only attracts some few trades with small volumes. The WESM spot prices will continue to be volatile and at times there are risk of high prices.

If we imagine a good start of the EDM with a healthy liquidity growth the first few years of operation the overall effects from the EDM could be listed as:

- A platform for an efficient and secure risk management and hedging,
- Increased transparency in the market, both in the perspective of investors but also in the area of market abuse and illegal behaviour.

With regards to the existing Real-Time Energy Market (WESM) the effects will be different based on if the EDM is physical delivered or cash settled.

If the forward contracts will be with physical delivery, the volumes from trading in the EDM will be settled separately (like bilateral contracts) and the small share of spot volume that is settled through the spot market, today around 8%³⁹ will continue. Hopefully some of the bilateral physical volume will move from the bilateral market into the organized forwards market (the EDM). For the WESM there would not be any difference seen from market view, as this volume will just pass the WESM as part of the gross pool design.

However, when the forward market will be cash-settled, these contracts would be settled financially and then the participants would source the actual physical electricity from WESM. This would then increase the volumes traded in WESM. The price risk of the spot price is then hedge in the EDM and the contracts are settled day by day over the contract period on the reference price produced by WESM.

Depending on how the WESM and the EDM solves the nominations of the physical forwards contracts, this can have impact on the centralized scheduling operations as the physical forwards needs to be distributed to affected nodes.

The overall market monitoring of both the long-term market and the spot market will be improved, as there will be organized markets in both timeframes. A close relationship between the WESM and the EDMs market surveillance units are vital to ensure an effective information flow.

In the long-term the retail and the end-consumers will potentially notice that the prices will evolve to become more stable from the DU that are using the EDM. Industries and other direct connected consumers would see the opportunity to hedge in a flexible way using the EDM, getting a more predictable cash flow for the energy consumption when using the EDM.

³⁹ WESM 10th Anniversary SPECIAL report, 2006 2016_Igniting_Transformation_Special_10th_Anniversary_Edition

14. Capacity building programs

The Introduction of a Philippines EDM will create a need for training and capacity building among both the new EDM Market organization(s) and shareholders including participants. Throughout the entire implementation phase, as well as expansion phase, of the EDM there will be a need for training activities and thus also a need for coordination of personnel attending the different training activities.

The experience from similar kind of new market establishments is that during the implementation phase the personnel of the new organizations such as the EDM Market Operator and CCP (if separate entity) and other shareholders who needs the training are occupied with many other tasks. Therefore, the capacity building plan needs to be efficient and agile to reach all the persons involved. The Training will have main objective to train a sufficient number of persons in new EDM organization(s) to a degree that makes them skilled to operate the EDM markets and Clearing functions. Similarly, the market participants need to have sufficient amount of key personal trained to be able to actively participate in the EDM.

This high-level plan for the capacity building activities for the EDM should be developed and based on the objective to ensure that both the market and the market participants will be able to operate successfully once the new systems and procedures have been implemented. Two options for the high-level plan are proposed, dependent on the size of the EDM organization(s).

The most efficient capacity building plan heavily depends on the size of the future EDM organization, including both Market Operation and the Clearing and Settlement operation. First option suitable for larger organization is wrapped around so called trainer-to-trainer model where the knowledge transfer will take place in two phases:

- During the first phase, mostly external expert resources will be the source for knowledge and experience.
- During the second phase, dedicated EDM organization(s) staff will partly take over as source and – by this – will be trained in passing on knowledge and expertise to other personnel and participants.

In the first option, the core training group shall function as an intermediary between the Trainer and the Trainees. During the implementation process of new markets and organizations, there will normally be only a limited number of employees from new EDM organization(s) having the opportunity to attend the training as a whole. There must therefore be an appointed EDM personnel group responsible for 'internal training' (meaning training of the internal staff by the core training group) in order to ensure the success of the training. The core training group is assumed to be responsible for this task within the new EDM organization. Organizing the capacity building programme this way will be time and cost efficient for the EDM organization(s) when they can eventually take the responsibility of the training themselves. The first option for capacity building programme is illustrated in Figure 25.

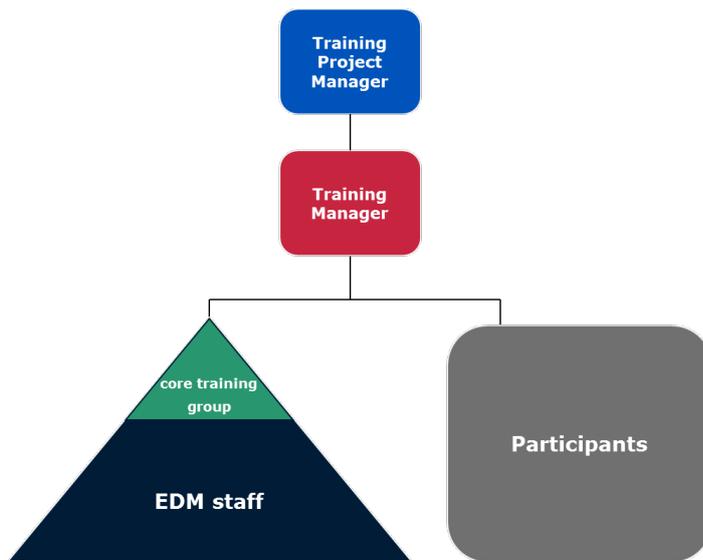


Figure 25. Option 1 for capacity building phase 1.

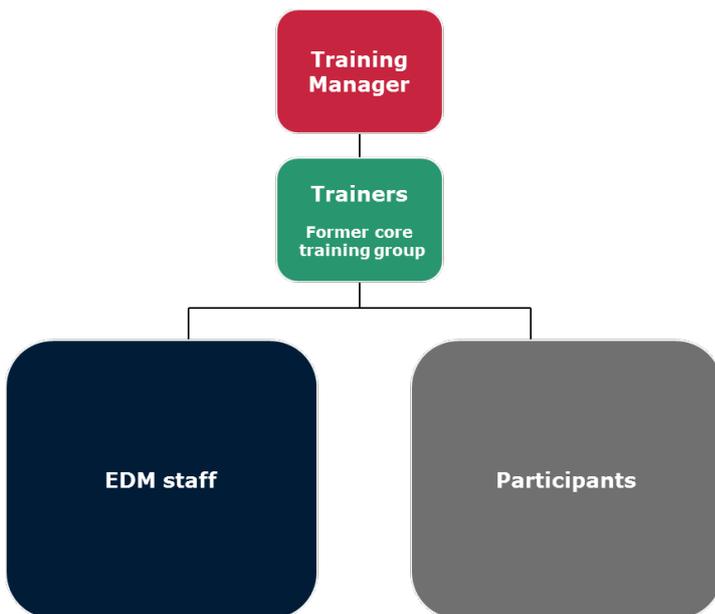


Figure 26. Option 1 for capacity building phase 2.

The second option for possible capacity building method is more suitable if it is projected that the EDM organization(s) will remain relative lean and with small amount of personnel. In this case, it is more efficient to organize the training directly through workshops from matter expert Consultants to the EDM organization personnel, shareholders and market participants. Since this capacity building model expects the audience to be relatively small the training penetration will be expected to be efficient through seminars and workshops in which all relevant people can participate. In additional, with relatively moderate audience the time management is also still possible in order to reach all relevant persons needing the capacity building. The capacity building method option 2 is illustrated in Figure 27.

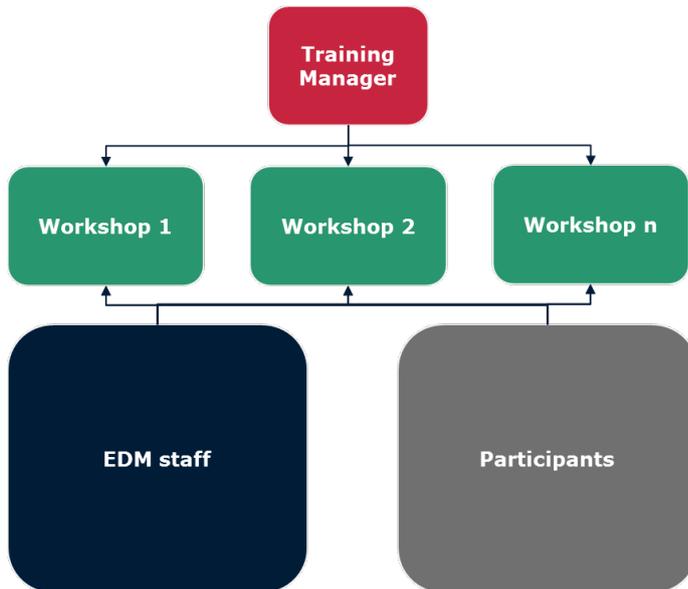


Figure 27. Option 2 for capacity building through workshops.

The generic requirement for capacity building is illustrated in Figure 26.

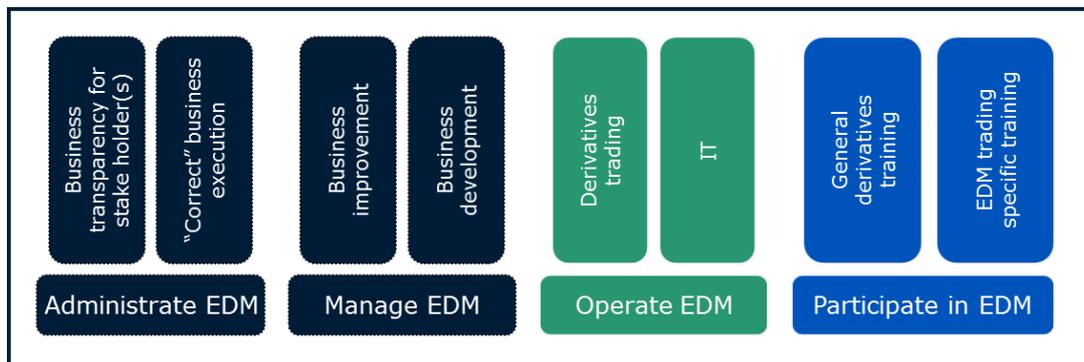


Figure 28. Proposed high-level training subject content.

The overall scope of the training should cover following aspects:

1. Ensure that the markets are performing according to both the stakeholders as well as PEMC expectations.
2. To manage the required changes to the business framework of the markets, 'sell' the new changes and implement them in a way that ensures that the goals for any change are met.
3. Inform all required stakeholders, including potential market participants, of the required changes.
4. Prepare new EDM organization(s) staff for operation of the EDM and to fully understand the business framework for the market to assist market participants in their participation.
5. Train the market operators on how to effectively administer the systems and deal with 1st and 2nd line support issues.

6. Prepare EDM organization(s) staff and market participants for participation in the Philippines EDM – technical training and preparation.
7. Prepare market participants for participation in the EDM– technical training and preparation.
8. Assist the market participants on how to best utilise the markets.

The training and capacity building content will be designed based on the identified knowledge gaps and needs. It is recommended to do a survey within the staff foreseen to take over key roles in EDM organization(s) as well as among the key shareholders to identify these caps. However, the high-level training plan for the EDM organization(s) should consist of four parts, namely:

1. Administrate EDM
2. Manage EDM
3. Operate EDM
4. Participate in EDM

The first two training subjects are for the back-office operations of the EDM organization(s). The main objective is to train the EDM personnel how to interact and coordinate the new entities and evolve the business. Part of these training is to think how to progress with the proposed stepwise implementation of the Philippines EDM. The third capacity building subject is crucial for the operation of the EDM. The objective is to train the new EDM personnel how to run the markets day-to-day and how to use, operate and maintain the IT platforms for the markets. The fourth capacity building subject is targeted for the stakeholder and participants of the EDM. The objective in these modules is to provide the market participant's sufficient knowledge and expertise in both theory background in derivatives trading and Philippines EDM specific trading. Basically, it would be recommended to require participants to first attend in the theory training to gain required background knowledge before moving into the Philippines EDM specific trading. The EDM specific trading should give the participants inter alia detailed knowledge on the available products, how to use them, how the settlement of the market works and how to IT platforms should be used.

15. Summary and next steps

The concluding discussion for the EDM study will be provided in this section wherein the main points suggested will be summarized and the need for decisions for further progress of the EDM in the Philippines will be emphasized. As raised in both the technical and legal reports, and in the consultation workshops, the required legal changes for enabling the EDM is of high importance. There are two alternative routes to go depending on if the legal implementation aims for an interim period (with physical delivered contracts) or if the implementation project shall go directly for cash settled contracts. The technical report suggests that cash settled contracts without an interim physical contracts period would be preferred as this would imply less additional work.

SEC is, by the EDM study, designated as the appropriate supervision and regulation authority over the EDM. There is a need for inter - supervisory bodies agreements on information sharing, escalation and investigation processes and responsibilities to create an efficient regulatory framework. The EDM Market Advisory Board that will be involved in the development of the EDM and can be the “voice” from the market participants can be introduced. A Market surveillance team shall be established from day one to monitor and detect possible breaches, report illegal behaviours and ensure a fair and efficient market.

Financial forward contract targeting the fundamental players is suggested, either as physical delivered contracts or as cash settled. Underlying reference price is suggested to be a Volume weighted average price (VWAP) for all nodes. Current regulation allows changing WESM prices retrospectively. This cannot be the case for the EDM reference price as this price needs to be firm. We therefore suggest that the VWAP used for EDM be calculated based on the final prices from WESM on D [+1] and that this is declared firm at this stage.

Prioritized decisions to be made:

- Should the EDM have an interim step with physical contracts or should the EDM be cash settled from the start?
- Ownership of the EDM needs to be decided on.
- Outsource the clearinghouse business or have everything under the same organization?
- Reference price methodology?

Identified next steps:

- Initiate the legal change process described in the Legal Memorandum
- SEC regulation framework development initiation
- EDM rulebook development
- Training and capacity building planning and implementation for all relevant stakeholders
- Standardization of contracts including contract durations, areas covered, products
- Preparation for IT infrastructure procurement process