



# Enhancing the Spot Market to Attract Investments to Renewables

## INCEPTION REPORT

8 May 2024

by

**Intelligent Energy Systems (IES), Economic Consulting Associates Ltd (ECA), & Nel Consulting Limited (NCL)**



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## Acronyms

<b>ACCC</b>	Australian Consumer Competition Council
<b>AE</b>	Independent Electricity Market Operation of Philippines
<b>AEMO</b>	Australian Energy Market Operator
<b>AER</b>	Australian Energy Regulator
<b>AESO</b>	Alberta Energy System Operator
<b>ANEM</b>	Australian National Electricity Market
<b>APC</b>	Administered Price Cap
<b>APP</b>	Administered Price Period
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>BAU</b>	Business As Usual
<b>CfD</b>	Contract for Difference
<b>CPT</b>	Cumulative Price Threshold
<b>DOE</b>	Department of Energy
<b>ECA</b>	Economic Consulting Associates Ltd.
<b>ECO</b>	Enforcement and Compliance Office – PEMC
<b>ERC</b>	Energy Regulatory Commission
<b>ETP</b>	Energy Transition Partnership
<b>FIT</b>	Feed-in Tariff
<b>GEAP</b>	Green Energy Auction Program (Philippines)
<b>GWAP</b>	Generator Weighted Average Price
<b>IES</b>	Intelligent Energy Systems
<b>IESO</b>	Ontario Independent Electricity System Operator
<b>ISO</b>	International Organisation for Standardization
<b>IT</b>	Information Technology
<b>LMP</b>	Locational Marginal Price
<b>LRMC</b>	Long-Run Marginal Cost
<b>MPC</b>	Market Price Cap
<b>MPF</b>	Market Price Floor
<b>NCL</b>	Nel Consulting Limited
<b>NDA</b>	Non-Disclosure Agreement
<b>NEMS</b>	National Electricity Market of Singapore
<b>NZEM</b>	New Zealand Electricity Market
<b>PEMC</b>	Philippines Electricity Market Corporation
<b>PJM</b>	Pennsylvania New Jersey Maryland
<b>RBMF</b>	Results Based Monitoring Framework
<b>RE</b>	Renewable Energy
<b>REC</b>	Renewable Energy Certificate
<b>RFP</b>	Request for Proposal
<b>RPS</b>	Renewable Portfolio Standards
<b>SDG</b>	Sustainable Development Goal
<b>SO</b>	Strategic Outcome



<b>SPC</b>	Secondary Price Cap
<b>SQL</b>	Structured Query Language
<b>SRMC</b>	Short-Run Marginal Cost
<b>TWG</b>	Technical Working group
<b>UNOPS</b>	United Nations Office for Project Services
<b>VBA</b>	Visual Basic for Application
<b>VRE</b>	Variable Renewable Energy
<b>WESM</b>	Philippines Wholesale Electricity Market



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# 1 Introduction

## 1.1 Project Background

Intelligent Energy Systems Pty Ltd (IES), Economic Consulting Associates Ltd (ECA), & Nel Consulting Limited (NCL) have been selected by UNOPS to carry out the project titled “Enhancing the Spot Market to Attract Investments to Renewables”. The project is implemented under the UNOPS Southeast Asia Energy Transition Partnership.

ETP has four strategic outcomes: (SO-1) policy alignment with climate commitments, (SO-2) de-risking investments on energy efficiency and renewable energy, (SO-3) extending smart grids, and (SO-4) knowledge and awareness building. The project is focused on contributing towards SO-2 and SO-4 to facilitate increasing participation of renewable energy resources in the Philippines Wholesale Electricity Spot Market (WESM) by reviewing price mitigation measures and methodologies and analysing the barriers and investment risks to RE deployment in the Philippines and energy self-sufficiency targets.

The expected long-term outcomes from this project are:

- Increase uptake of renewables in Philippines power system.
- Enhance understanding of opportunities for RE generators in the WESM to encourage greater level of investment in RE.
- Improve price mitigation measures to encourage investments into RE generation, increase market participation, and enhance market competition which lead to lower electricity tariffs.
- Strengthened capability of Philippine Electricity Market Corporation (PEMC) and Independent Electricity Market Operation of the Philippines (IEMOP) to monitor and analyse market and price trends, and update price mitigating measures in the future.

## 1.2 ETP Role in Supporting the Energy Sector Transition in the Philippines

The Southeast Asia Energy Transition Partnership (ETP) unites philanthropies and governments to collaborate with regional partners. ETP is in favour of the switch to contemporary energy systems that can guarantee environmental sustainability, energy security, and economic prosperity all at once. With a concentration on three key nations – Indonesia, the Philippines, and Vietnam – ETP operates in Southeast Asia to help accomplish the goals of the Paris Climate Agreement and the UN’s Sustainable Development Goals (SDGs). Four interconnected strategic engagement pillars that are well matched to overcome the obstacles to energy transition form the foundation of ETP’s approach. These include:

- Aligning policies with climate commitments,
- Reducing the risk associated with investments in renewable energy and energy efficiency,
- Expanding smart grids, and
- Expanding knowledge and awareness building.



### 1.3 Scope of Work

The project will address the market barriers to renewable energy investments by assessing and updating the methodologies for setting price-mitigating measures and recommending new cap values at balanced levels that will attract investments and at the same time protect consumers from high tariffs. The government has acknowledged that the current, outdated, and low-price caps discourage investments in peaking generators leading to heavy reliance on aging fossil-based plants. The project will also analyse the opportunities for more renewables in the spot market and the risks to RE investments.

### 1.4 Inception Report

This Inception Report has been prepared by the Consultant to provide the following contents:

- Project background and scope of work
- Consultant's approach for project implementation, which includes:
  - Appreciation of project objective and tasks,
  - Detailed approach for each deliverable,
  - Updated Work Plan,
  - Project team structure and management,
  - Risk identification and risk mitigation measures, and
  - Gender equality strategy.
- Communication and coordination strategy including:
  - Communication plan,
  - Donor coordination strategy, and
  - Results Based Monitoring Framework.

### 1.5 Structure of Inception Report

The inception report is structured as follows:

- Section 2 sets out an appreciation of the project objectives and tasks,
- Section 3 Detailed approach for each deliverable,
- Section 4 provides the Updated Work Plan,
- Section 5 Project team structure and management,
- Section 6 risk identification and risk mitigation measures,
- Section 7 is the proposed gender equality strategy for the project, and
- Section 9 is the proposed communication and coordination strategy.



## 2 Appreciation of Project Objective and Tasks

### 2.1 Project Objectives

The project objectives are:

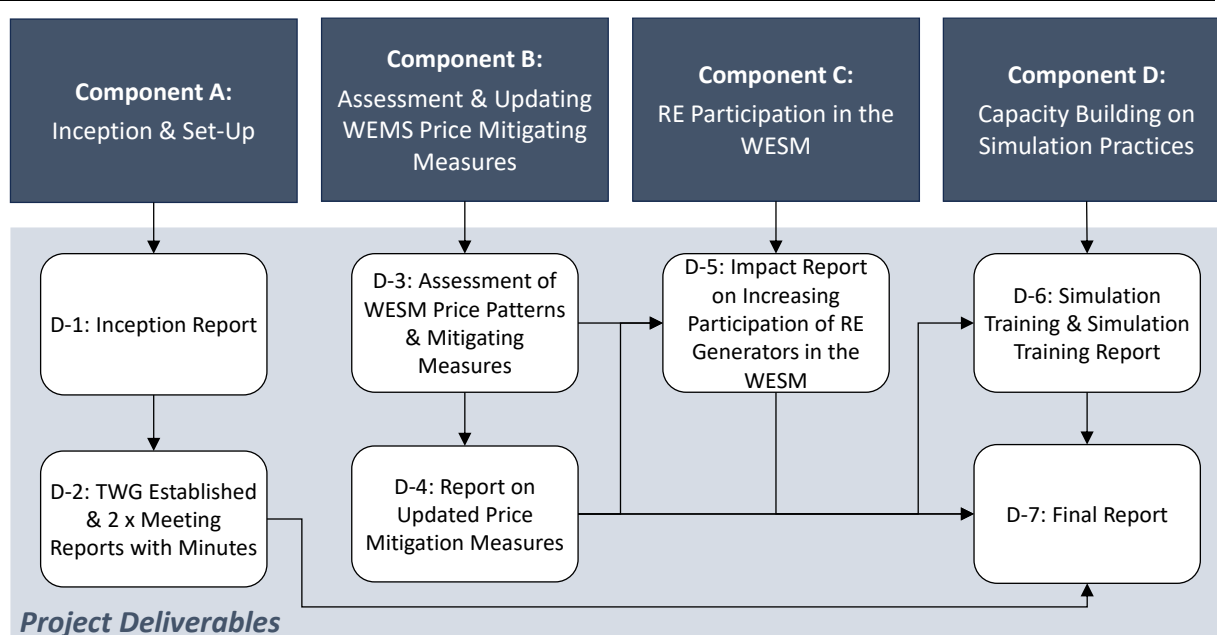
- Review WESM price mitigation measures and recommend methodologies for setting them,
- Understand how increasing RE will affect spot market trends, and
- Understand the barriers and risks to merchant RE generators.

### 2.2 Project components and deliverables/outputs

To achieve the intended outcomes and objectives, the project has been structured into four components: (1) Component A: Assessment of WESM Price Mitigating Measures, (2) Component B: Updating Price Mitigating Measures, (3) Component C: Analysis of RE Participation in the WESM, and (4) Component D: Capacity Building.

The components and key deliverables / outputs for each component are illustrated in the following Figure 1 and table:

**Figure 1 Components and Deliverables**



**Table 1 Description of Deliverables**

No.	Deliverable	Description
A D-1	Inception Report	Mobilisation of project team, development of the inception report. This will include the formulation of a project-specific communications plan.



No.		Deliverable	Description
	D-2	TWG Established & 2 x Meeting Reports	Consultant will operate as the secretariat of the TWG meetings throughout the project's execution with representation from ERC, PEMC, IEMOP and ETP.
B	D-3	Assessment of WESM Price Patterns & Mitigation Measures	Undertake an assessment of the WESM price patterns and price mitigation measures (price controls), considering increased RE generation in the Philippines WESM and with reference to international experience in market price cap settings given increased deployment of solar and wind in power markets.
	D-4	Report on Updated Price Mitigation Measures	Recommend appropriate price mitigating measures that will promote market efficiency and competition, and safeguard against excessively high or low prices, while encouraging investments in power generation.
C	D-5	Impact Report on Increasing Participation of RE Generators in WESM	A stand-alone publishable study on the impact of increasing participation of RE generators in the WESM including results of analysis of impact of RE policies and mechanisms – such as the RPS and GEAP, on uptake in RE in Philippines and fitness of WESM operations for their operation.
D	D-6	Simulation Training & Simulation Report	Execution of the training course, including the submission of training course materials – which will include the open-source model that is used (PROPHET). Also, the submission of a report that summarises the outcomes of the 3 x training courses.
	D-7	Final Report	A public-facing final report that summarises the Public Dissemination event and a report that covers the overall execution of the project. All other project materials will be handed over as part of the final report.



## 3 Detailed Approach for Each Deliverable

### 3.1 Approach for Deliverable 1: Inception Report

The inception phase has commenced with a kick-off meeting (2 April), and any additional meetings will be conducted to discuss issues critical to the implementation of the project. This includes adjusting the work plan presented in this proposal, given any change to the start-date, constraints, refinements to the scope of work and mutual agreements between the consultant and ETP.

As per the RFP, this inception report contains:

- Introduction and project background.
- Data requirements for the project and need for signing a Non-Disclosure Agreement (NDA) to protect the integrity of any confidential data / information that may be required for project implementation. This will be based on the data requirements that have been identified in this proposal as part of the methodologies for D-3, D-4, D-5, and D-6.
- Scope of work
- Methodology and Workplan, including approach, methodology and an updated project Gantt chart
- Detailed approach on how each deliverable will be satisfied and outlines / summaries of expected contents.
- Results of the audience mapping and analysis and communication/outreach plans,
- Identification of suitable media channels to be used for communicating the project and the rationale for choosing them.
- A donor / development partner coordination strategy.
- Project management inclusive of organisational chart detailing key personnel, their roles, and responsibilities, as well as their locations.
- Risks, mitigations, and assumptions.
- Monitoring and Evaluation Framework, presented in the form of the ETP Results Based Monitoring Framework (RBMF), and
- Communications plan.

### 3.2 Approach for Deliverable 2: Establish Technical Working group and Coordinate Meeting Reports

Deliverable 2 has two key objectives:

- **Objective 1:** Form a Spot Market Technical Working Group (TWG) with representatives from ERC, PEMC, IEMOP, and ETP, and
- **Objective 2:** Convene regularly throughout the project's execution including at least 2 x in-person mode.



**Approach for Objective 1 – Formation of TWG:** Within the context of Electricity Markets, establishing TWGs with a defined purpose has proven to be an effective way to investigate complex issues and form the basis of adapting the power market to changing circumstances, often through stakeholder engagement to ensure general buy-in to proposed solutions or approaches.

Within the context of adapting the WESM, which was designed around a traditional energy mix, to the challenge of accommodating increasing levels of RE in the generation mix that pose a challenge for market settings and procedures, it will be important to ensure that the TWG brings a mix of skills across a wide range of areas spanning technical, commercial, and legal / regulatory areas.

The following are proposed as the key considerations in the TWG formation for this project:

- **Mission Statement:** TWG’s focus will be aligned with the objectives of the project which will be to study the prevailing price mitigation settings (market price cap, market price floor and secondary price cap) last set in the year 2015, given recent increases in RE in the WESM and the prospect of RE rising further in the future.
- **Required Expertise / Representation:** It will be important that the TWG brings people from diverse skillsets / experience backgrounds including technical, commercial, and regulatory expertise. This will necessarily require staff from ERC, PEMC, DOE and IEMOP that can cover: WESM Market Monitoring & Surveillance, WESM market operations, WESM legal and regulatory framework, and practical experience in market outcomes with a strong understanding of the implications for market participants and flow-on effects to consumers – since they ultimately face the financial outcomes of WESM operations and the settings of price control mechanisms. Measures will be taken to ensure at least 30% representation of females in the TWG.
  - The TWG may also require representation from market participations. This will be discussed and confirmed.
- **Leadership:** Formal assignment of a leader or chairperson to formulate meeting agendas and guide discussions on the issues.
- **Secretariat:** The consultant will operate in the capacity of the TWG’s secretariate which includes supporting functions of:
  - Circulating meeting agenda prior to meetings,
  - Take minutes including recording key decisions / agreements,
  - Record action items,
  - Follow up on actions items,
  - Preparation and circulation of any working documents, and
  - Manage changes to the members of the TWG in event that there are changes.



- **Mode of Operation:** Meeting frequency, communication mechanism (email group for example) and process for circulation of meeting agenda items (prior to meetings taking place) and circulating minutes or records of decisions that have been made. For in-person meetings, defining the logistics for this and for online meetings confirming the preferred tool for online meetings.
- **Non-Disclosure Agreement:** A mechanism for ensuring the integrity of any confidential data / information will be discussed as well.
- **Scope of Interactions:** The extent to which the TWG incorporates a wider group of stakeholders under certain situations: such as presenting wider findings from analysis / modelling or proposed changes to market price cap settings.

**Approach for Objective 2 – Convene Regularly:** It is proposed to have monthly meetings of the TWG or more frequently if a specific need arises during the project’s implementation. Further to this, our project work plan has been structured to have at least 3 in-person meetings of the TWG, one upon its creation, one following the analysis of price patterns in the WESM, and another focused on RE operation in the WESM and RE regulations in the Philippines. Note that six (6) field trips are planned in total for the project – so if additional in-person TWG meetings could be coordinated at the same time as the field trips, then this will be accommodated.

### 3.3 Approach for Deliverable 3: Assessment of WESM Price Patterns & Mitigation Measures

#### 3.3.1 Objectives & Sub-Tasks

**Objectives:** Deliverable 3’s objective is to undertake an assessment of WESM spot market price patterns and the operation of existing price mitigation measures, given increased RE participation in the WESM.

**Sub-Tasks for Deliverable 3:** Deliverable 3 has three main subtasks. Of these, we propose to conduct the international experience first as it provides a baseline against which to evaluate the performance of the Philippine WESM’s price control mechanisms.

- **Sub-Task 1:** Undertake International Review on Price Mitigation Measures in Wholesale Electricity Markets.
- **Sub-Task 2:** Assessment of WESM Price Trends & Price Mitigation Measures.
- **Sub-Task 3:** Review of WESM Market Price Mitigation Measures.

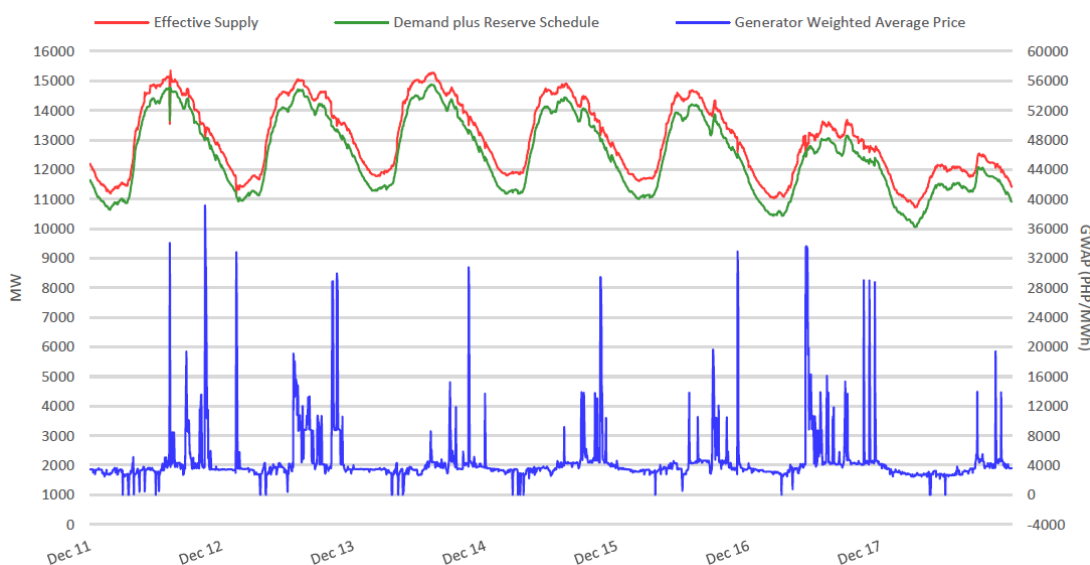
#### 3.3.2 Price Controls in Power Markets – Conceptual Overview:

Electricity spot market prices such as the WESM are notoriously volatile in the short-term as compared to other financial and commodity markets primarily because of limited options for



electricity to be stored and inelastic electricity demand. See for example Figure 2, WESM spot prices<sup>1</sup>:

**Figure 2 WESM Price Volatility Over 11-17 December 2023**



Pricing events can arise from a range of factors including (1) short-term supply and demand situation, (2) available generation plant and their characteristics (level of flexibility), (3) fuel prices and availability – including hydro storage levels, (4) characteristics of demand – flat and predictable vs. peaky and volatile, (5) industry structure – in particular the number of active sellers and buyers in the spot market, and (6) network capability and transmission constraints.

On one hand, in wholesale electricity markets that are designed as energy-only markets<sup>2</sup> such as the WESM or the Australian National Electricity Market (ANEM), high prices send a signal to prospective developers to build new generation and enter the power market, while on the other hand, high prices present risks to electricity purchasers and consumers. If there are sustained periods of high prices, or short periods of time with very high prices, then in the worst case, market participants may face extreme exposure to high prices threatening their financial viability.

Consequently, a suite of measures is deployed in wholesale markets – such as the Philippines, Australia, Singapore, New Zealand, and many others, that seek to find the right balance and trade-off between competing objectives: one is to ensure that spot prices will be high enough to create the incentive for investment and deliver a reliable power system, vs. imposing low caps or secondary price caps to limit exposure to volatile spot market prices.

A summary of measures in two power markets is set out in Table 2 to illustrate the suite of measures typically deployed in such markets and provides examples of the measures in the Philippines and Australia, markets that have many similarities in their design features:

<sup>1</sup> Source: IEMOP, “Weekly Market Watch” source: <https://www.wesm.ph/market-outcomes/market-watch>, 20 December 2023.

<sup>2</sup> Energy-only markets do not explicitly implement capacity markets / capacity payment mechanisms.



**Table 2 Comparison of Summary of Measures in two power markets, WESM (Philippines) and ANEM (Australia)**

<b>Price Mitigation Measure</b>	<b>Control / Incentive</b>	<b>WESM (Philippines)</b>	<b>ANEM (Australia)</b>
Competition Law	Limit market share to ensure multiple sellers (generators) and/or buyers (retailers). Incentivises the industry to have multiple buyers and sellers in competition.	EPIRA of 2001 or Republic Act 9136 imposes competition limits on generation companies not being allow to “singly or in combination, own, operate or control more than thirty percent (30%) of the installed capacity of a grid and/or twenty-five percent (25%) of the national installed generating capacity.”	Australian Consumer Competition Council (ACCC) governs competition policy in Australia and is required to investigate market structure and assess whether a market is giving rise to competitive outcomes or not. In situations where competition is assessed to be negatively impacted the ACCC may take measures such as breaking up dominant players or monopolies or imposing additional price controls on the industry.
Market Price Cap (MPC)	Caps the highest spot price that is allowed for a single dispatch period and typically is set to a level that will create an incentive for more capacity to enter the market.	Market Price Cap: 32,000 PhP/MWh (580 USD/MWh)	Market Price Cap: 15,500 AUD/MWh (10,543 USD/MWh)
Market Price Floor (MPF)	Represents the lowest price and set to a level that is usually negative to create an incentive to avoid over-generation.	Market Price Floor: -10,000 PhP/MWh (180 USD/MWh)	Market Price Floor: -1000 AUD/MWh (680 USD/MWh)



<b>Price Mitigation Measure</b>	<b>Control / Incentive</b>	<b>WESM (Philippines)</b>	<b>ANEM (Australia)</b>
Secondary Price Cap (SPC) Mechanism	Provides protection to consumers against sustained high prices.	Secondary Price Cap (SPC) Mechanism: If the rolling average of the generator weighted average prices (GWAP) for 3-days exceeds the price threshold (9000 PhP/MWh or 160 USD/MWh) then SPC is imposed as the cap. SPC is set to 6,245 PhP/MWh (110 USD/MWh)	Cumulative Price Threshold (CPT) / Administered Price Cap (APC) and Administered Price Periods (APPs): CPT: sum of market prices in a region exceeds 1,398,100 AUD (950,988 USD) in the previous 2016 trading intervals (rolling 7 days) under which case the APC of 500 AUD/MWh is applied (340 USD/MWh)
Bid Price Cap & Floor Prices	Provides an additional layer of price control ensuring that the market price caps / floors are enforced within the bids / offers of market participants.	Set in line with the Market Price Cap and Market Price Floor.	Set in line with the Market Price Cap and Market Price Floor.
Reserve price caps	Ensure that the cost of market-based ancillary services will be at levels	Expected to be set to the market price cap and market price floor, once the reserve market is operational.	Set to the energy market price cap, with market floor price set to 0.
Compliance Monitoring	Ensure market participants are operating in line with the market rules.	PEMC - Enforcement and Compliance Office (ECO) undertakes routine monitoring of market participants conformance to WESM Rules and Market Procedures – including must-offer rule compliance, and dispatch instruction compliance.	Australian Energy Regulatory (AER) is responsible for routinely undertaking assessments of market participant compliance, with assistance from the Market Operator, AEMO.



<b>Price Mitigation Measure</b>	<b>Control / Incentive</b>	<b>WESM (Philippines)</b>	<b>ANEM (Australia)</b>
Market Surveillance Monitoring	Routine monitoring of anti-competitive behaviour of market participants that would not be readily detectable via a compliance monitoring regime.	PEMC Market Surveillance Committee routinely monitors the WESM outcomes and reports against several defined market monitoring indices and other measures that are focused on detection of anti-competitive behaviour.	Australian Energy Regulator (AER) responsible for routinely monitoring Australian NEM for exercise of market power and anti-competitive market behaviour. AER may conduct detailed investigations into instances where anti-competitive behaviour has been identified.

For wholesale electricity markets to operate efficiently and effectively the suite of measures such as the above must all work together and in a way that is coordinated. Furthermore, as the underlying technology mix in such markets continues to evolve or as markets continue to change or be subject to new conditions such as rapid rises in commodity prices, then they need to be continuously reviewed and updated to ensure they continue to provide the right balance between: (1) reliability and investment, (2) ensuring financial risks of volatile prices reaming within, and (3) safeguarding against anti-competitive behaviour.

### 3.3.3 General Approach of Deliverable 3:

The overall approach that is proposed is as follows:

- **Step 1:** Data collection for the analysis of WESM outcomes that would be used in Step 3 and 4. (Note that the Data Request will be issued at the time of the inception report)
- **Step 2:** Undertake international review of market price mitigation measures – further details described below (Sub-Task 1).
- **Step 3:** Undertake assessment of WESM Price Trends given RE increases – further details described below (Sub-Task 2).
- **Step 4:** Undertake assessment of WESM Price Mitigation Measures which is also described in more detail below (Sub-Task 3).
- **Step 5:** Material will be packaged up and periodically reported to the TWG forum with focused sessions on international experience, outcomes of the WESM assessments on price outcomes and the WESM price patterns.



The results and findings of the analysis will be discussed with the TWG for feedback, comment, and review – see our work plan later in the report.

### 3.3.4 Data Requirements for D-3:

They key data requirements for Deliverable 3. From kick-off meeting: IES will coordinate with PEMC, IEMOP, ERC for data access. ERC and PEMC should raise any issues/concerns/limitations with IES accessing/provided with this data.

**Table 3 Data Requirements for D-3**

<b>Data Requirement</b>	<b>Comment</b>
Rules and other regulatory information	Documents and rules regarding the price cap implementation.  Note: IES has been provided with PIPPA's application on secondary price caps already.
Market Participants & Assets Owned / Traded	List of market participants over time, including ownership structure, and assets operated. This would include for RE plant, whether they entered as merchant players or on FITs. It is important to understand how this has changed over time in the period 2015-23.
Generation information	Includes location (node), rated capacities, all available technical parameters, such as losses to node, ramp rates, participation across the various services (energy and ancillary services), storage sizes for storage, anything else relevant that may have been included in generator registration
WESM Spot Prices and Market Outcomes (Supply, Demand, Dispatch, Bids/Offer, outage info)	Data on WESM outcomes is routinely published by IEMOP and IES captures it into a database that is routinely used for projects involving the Philippines. IES will use this data initially to carry out general screening but will request PEMC to provide snapshots of specific days or events that will be analysed in more detail.
Network information	Export and import limits across the major interconnectors between islands, and between regions. Historical outages, or significant re-ratings. Significant network constraints.
WESM Market Events and Outcomes	PEMC market monitoring and surveillance reports will be used to understand market events of interest – such as examples of market price caps, market price floors, and invocation of secondary price caps. These reports will be used in the first instance to understand: outage profiles, supply-demand gap analysis and WESM market competition levels over time.
Contract Market	Bilateral contract positions of market participants will assist in understanding market price outcomes and in particular the overall



Data Requirement	Comment
	level of bilateral contracting in the market and how it has changed over time.
Data on Reliability	NGCP's assessment reports on the level of reliability of the power system will be a useful input into assessments of whether there have been any major changes in the level of power system reliability over time in the WESM.
VRE operational information	Variable Renewable Energy (VRE) (solar and wind) generation profiles, information on the forecasts, and accuracy of the forecasts, and the extent to which VRE is curtailed in the WESM.
Other data	Any other relevant information, including Renewable Portfolio Standards, Renewable Energy Market and certificate prices, participation of GEAP technologies in the market

### 3.3.5 Sub-Task 1: International Experience on Price Mitigation Measures:

An international review will be carried out to canvas a variety of approaches to the general problem of market price mitigation measures.

An initial selection is as follows:

- Australian National Electricity Market (ANEM)
- New Zealand Electricity Market (NZEM)
- National Electricity Market of Singapore (NEMS)
- Pennsylvania New Jersey Maryland (PJM) – based on the US Standard Market Design, which effectively caps prices at 1000 USD/MWh, and
- Alberta Energy System Operator (AESO) – which caps prices at 1000 CAD/MWh, and
- Ontario Independent Electric System Operator (IESO) – which caps prices at 2000 CAD/MWh.

Our project team is flexible and can swap these proposed suggestions for other electricity markets if there is a desire to cover any specific jurisdictions / power markets. PEMC should confirm.

The analysis will set out the approach for the full suite of market price mitigation measures as described earlier, which would include: (1) price caps / floors, (2) administered pricing mechanisms, (3) competition laws and policies, (4) approach to compliance monitoring, and (5) approach to market monitoring and surveillance. Of particular focus will be the principles and philosophy behind setting market parameters as this is important to consider and reflect in the case of the Philippines WESM.

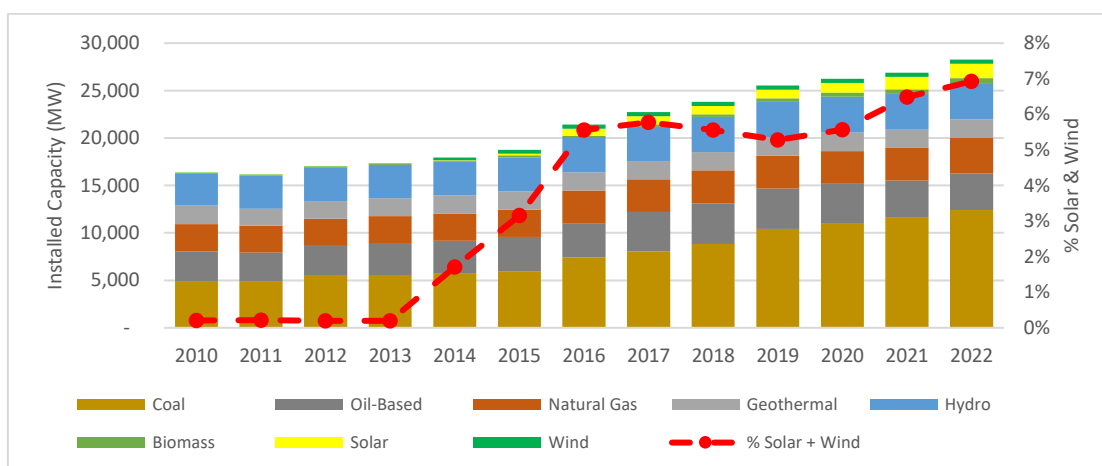
### 3.3.6 Sub-Task 2: Assessment of WESM Price Trends:

Since 2015, the level of installed capacity in solar and wind in the Philippines has grown and the WESM has had to support its operation, primarily by giving these resources must-run status in the power market which for a RE generator participating directly in the spot market means it



would operate as a price-taker. An illustration of the growth in the Philippines nationally is shown in Figure 3<sup>3</sup> where solar and wind capacity has largely remained at 6%-7% since 2016.

**Figure 3 Philippines Installed Capacity 2010-22 by Technology**



Observable impacts that solar and wind can have on wholesale electricity spot market price outcomes includes:

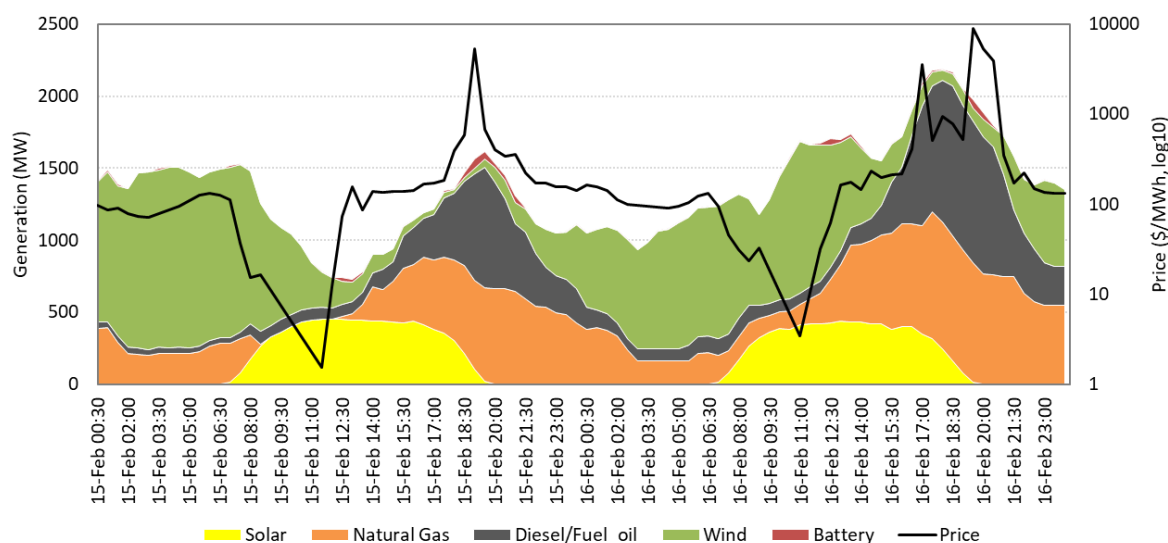
- Increased prevalence of negative prices,
- Increased downward pressure on prices during solar peak and wind peaks – which has a flow on effect to bidding behaviour of other generators to raise prices at other times, and
- Increased market price volatility.

Examples of this from the Australian National Electricity Market (South Australian region) are shown as shown in Figure 4 & Figure 5.

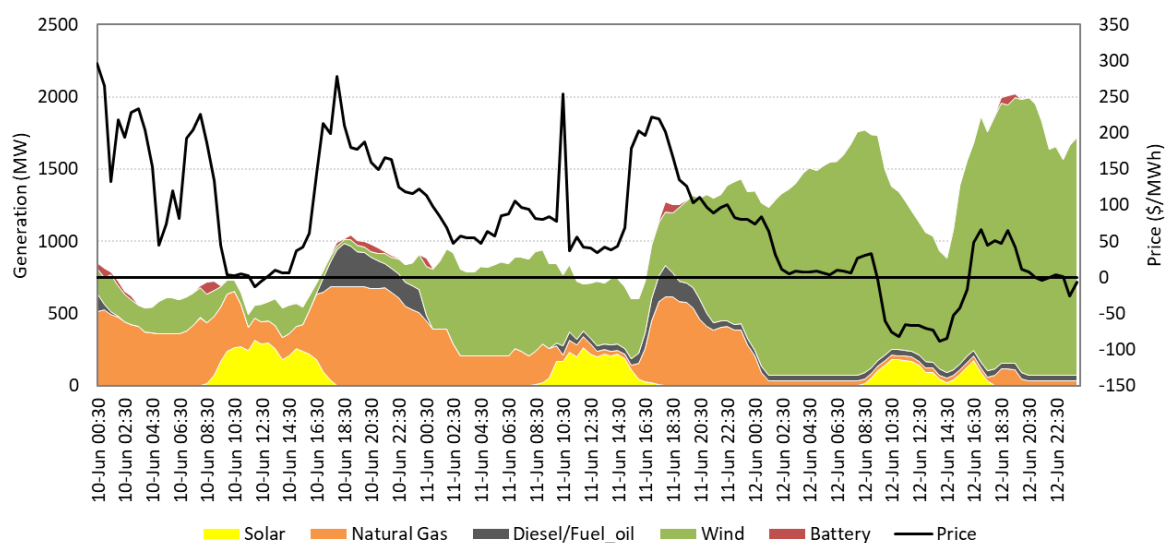
<sup>3</sup> Source: Department of Energy (DOE) Philippines Power Statistics.



**Figure 4 Low Spot Prices During Solar Peak in Dat & High Spot Prices in Evenings**



**Figure 5 Negative Prices During Period of High Wind Generation**



With this context in mind, the analysis proposed to be undertaken for Sub Task 2 is the following:

- Evaluation of GWAP price-distributions conditional on the level of wind and solar generation at the time over selected years from 2014-23 and consider how they have changed year by year and compared to periods of time when wind and solar generation is zero or low in comparable years.
- Assessment of the level of bilateral swap contracts in the WESM – the WESM’s bilateral contracts protect generators and customers for 80%-90% of traded volumes from spot price volatility – it is important to understand how this has varied over time.



- Determine benchmark prices for solar, wind, peaking plant, battery energy storage, and other technologies operating in the Philippines power sector to make informed analysis on revenues that each technology earns in the market and identify the proportion of revenue as a function of market price settings – for example, peaking plant derive much of their revenue from high spot market prices while baseload plant’s revenues are a mix.
- Determine dispatch-weighted spot market revenue for different technologies in the WESM to understand the spot market revenue adequacy / economic viability of by technology by whether they are FIT plant and RE merchant plant.
- Identification of periods of time when the market price cap, market price floor and secondary price cap have been in place and evaluation of the extent to which these settings and their invocation has impact revenue of solar and wind generation vs. other generation technologies.
- Undertake an assessment of renewable portfolio standard (RPS), green auctions and other policy impacts on RE uptake and operation in the WESM.

As noted earlier, IES will conduct a review / assessment of the existing data that is readily available first over the period 2014-23 with the purpose being to identify events or days / periods of interest – including the following:

- Situations where price caps and floors have been invoked,
- Situations where administered pricing has been invoked,
- Situations where there were high levels of solar and/or wind participating the market,
- Situations where the supply-demand gap was small,
- Situations of sustained high prices, sustained low / negative prices, and
- Other conditions of interest – based on a review of PEMC’s market monitoring and surveillance reports.

Having identified these events, we will subsequently submit a request to PEMC or IEMOP to obtain more detailed information on the days / events of interest. If additional meetings or interviews are required to supplement the data, then these will be arranged.

### **3.3.7 Sub-Task 3: Review of WESM Market Price Mitigation Measures:**

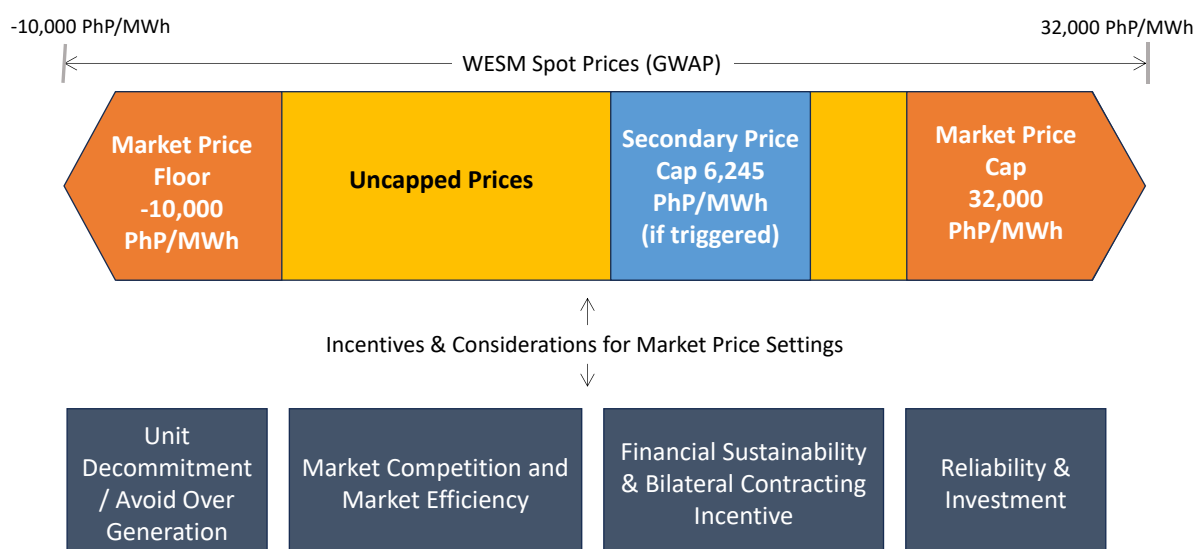
It is understood that that Market Price Cap (MPC), Market Price Floor (MPF) and Secondary Price Cap (SPC) have not been adjusted since 2015 and were based on operational costs, capital expenditures, and investment costs typical at time. They were set based on the costs of natural gas and oil-based power plants.

However, since 2015, many things have changed, prompting the review. This sub-task is concerned with evaluating the existing price mitigation measures and undertake analysis on how they have impacted the WESM operation. The considerations that underly the values of MPC,



MPF and SPC are based on different considerations and hence influence different incentives of market participants. This is shown in a stylized manner in Figure 6:

**Figure 6 Relationship between Market Price Mitigation Settings & Incentives**



To evaluate the performance of the existing settings, several tests and evaluations will be carried out on the WESM including the following:

- Type of investment that has occurred, and assessment of revenue adequacy on the new investments,
- Level of reliability in the power system, including assessment of supply / demand at different times
- Assessment of market competition at different times and under different situations
- The methodology that has been used for setting the values of MPC, MPF, and SPC will be assessed, reviewed, and compared to lessons from international experience (Sub-Task 1)
- Comparison of prices when SPC is triggered against the prices that would have been in its absence, to assess the extent to which it has impacted market revenues of participants.
- Assessments of underlying cost structures for different generation technologies in the Philippines and how these have changed over the period 2015-23.
- Consideration of the generation mix that is likely to be deployed in the Philippines in the next 5 years.

The main tests and checks on the performance of the price mitigation measures are summarized in Table 4:



**Table 4 Tests/Checks on price mitigation measures**

<b>Price Mitigation Measure</b>	<b>Tests / Checks</b>
Market Price Cap (MPC)	<ul style="list-style-type: none"> <li>• Frequency of hitting the price cap over time and summary of types of events that led to its triggering.</li> <li>• Revenue adequacy of hypothetical peaking, storage, and other types of power station.</li> <li>• Level of investment and power system reliability in the market.</li> <li>• Estimate portion of revenue of generators based on situations where MPC has been invoked (by generation technology).</li> <li>• Recalculation of the market price cap based on current technology costs and likely technologies that would enter in Philippines WESM.</li> <li>• Estimate portion of retail electricity prices impacted by the MPC.</li> <li>• Assessment of market bidding behaviour before, during and after the occurrence of MPC events.</li> </ul>
Secondary Price Cap (SPC)	<ul style="list-style-type: none"> <li>• Frequency of invocation over time and summary of the types of events that led to its triggering.</li> <li>• Comparison against counterfactual where the SPC was not invoked on market participant revenues by plant type.</li> <li>• Estimate portion of revenue of generators impacted by SPC (by generation technology).</li> <li>• Comparison of SPC level against the short-run marginal costs of plant to assess whether it is too high or too low.</li> <li>• Estimate extent to which SPC has mitigated price risks to market customers (retailers) and estimate portion of retail electricity prices impact by the invocation of SPC.</li> <li>• Assessment of market bidding behaviour before, during and after the occurrence of SPC events – e.g. the portion of market participant bid quantities offered below / above SPC.</li> </ul>
Market Price Floor (MPF)	<ul style="list-style-type: none"> <li>• Frequency of invocation over time and summary of the types of events that led to its triggering.</li> <li>• Analysis of the extent to which MPF reflects the cost of shutting down thermal plant and/or trade-off between lost and gained revenue.</li> <li>• Estimate portion of retail electricity prices impact by the invocation of MPF.</li> <li>• Estimate portion of revenue in generators by technology type impacted by MPF.</li> </ul>



Price Mitigation Measure	Tests / Checks
	<ul style="list-style-type: none"> <li>Assessment of market bidding behaviour before, during and after the occurrence of MPF events – e.g. the portion of market participant bid quantities offered at less than 0 PHP/MWh.</li> </ul>

### 3.3.8 Report for Deliverable 3:

A report covering the findings across Sub-Tasks 1, 2 and 3 will be prepared and submitted. It will form the basis of TWG meeting discussions which is described in our work plan. Importantly, this report will set out identified impacts of the changing generation mix in the Philippines and will identify issues with the existing price mitigation mechanisms and include a discussion on considerations for the frequency of reviewing the price mitigation measures.

## 3.4 Approach for Deliverable 4: Updated Price Mitigation Measures

### 3.4.1 Objectives & Sub-Tasks

**Objectives:** Deliverable 4's objective is to recommend appropriate price mitigating measures that will promote market efficiency and competition, and safeguard against excessively high or low prices, while encouraging investments in power generation. Proposed changes to the mechanisms need to be supported by WESM market simulations.

**Approach:** The analysis required for Deliverable 4 will be supported by key findings from Deliverable 3. The proposed methodology will be as follows:

- Step 1: Define options for updated price mitigation measures.
- Step 2: WESM market simulation scenarios defined.
- Step 3: WESM simulations of scenarios with different options in place.
- Step 4: Consultations on the findings / results.
- Step 5: Formulation of final recommendations based on feedback and consultations.

### 3.4.2 Data Requirements:

The data collected under Deliverable 3 will service the purpose of this task.

### 3.4.3 Options for Alternative Price Mitigation Measures:

Options for price mitigation measures will be proposed and are expected to be well-informed by Deliverable 3's analysis. We propose to consider up to 5 options, along the following lines<sup>4</sup>:

- Option 1: Status Quo – no changes, against which performances of other options can be assessed.

<sup>4</sup> Subject to the findings of Deliverable 3.



- Options 2-3: Alternative parameterizations of MPC, MPF and SPC. Scenarios involving the resetting of values to levels that are in line with current technology / commodity prices and/or adjustments to the methodology for invoking the caps.
- Options 4-5: Alternative parameterizations of price mitigation measures. This may be informed by international experience. It may also be influenced by adjustments that would be more suited to modern technology mixes – e.g. as characterized by hybrid systems (variable renewable energy plant + energy storage) and energy storage in general. For example, market price caps that consider storage duration.

Prior to commencing market simulations, the options will be preliminarily evaluated against the criteria of: (1) promotion of market efficiency and competition, (2) safeguarding against excessively high or low prices, (3) alignment with the general WESM market design, (4) extent to which it will encourage investment in power generation, and (5) feasibility of implementation. This may lead to some options being revised or considered with lower priority than others.

From the kick-off meeting, a key consideration in analyzing the caps, is ensuring that there is a good balance between encouraging investments and fair tariffs.

#### 3.4.4 WESM Market Simulation Methodology:

When using power market simulations as the basis for making changes to the parameterisation of market price mitigation measures, care must be taken to: (1) isolate the key variables to ensure the modelling exercise performs an inferential function in the decision-making process, (2) reflects the most important market dynamics that are relevant, and (3) be suitably robust to ensure it will allow for the evaluation of the pros/cons of competing market design options. Often judgments are required to simplify elements of the electricity market design to simplify issues that are not relevant to the market design changes that are being “tested”.

The requirements from the RFP in relation to power market simulation:

- Formulation of key assumptions in assumptions spreadsheet – including demand, generation (and underlying costs), portfolio ownership structures (to reflect the competitive landscape of the WESM), contract levels, bids & offers and network topology.
- **Wholesale market simulation** – WESM operation – which would be based on bids / offers of generators, existing rules for management of RE generators, bidirectional offers from storage, and others – this would be done based on analysis of typical offers / structures and determining their reaction to changed market conditions – using freeware licenses of IES’s PROPHET power market simulator<sup>5</sup> (discussed further below), and
- **Retail market simulation** – which would primarily be concerned with estimating the impact of changed parameterizations of the market mitigation measures on the retail market, and retail prices that consumers face, to determine the impact on consumers of changes to the

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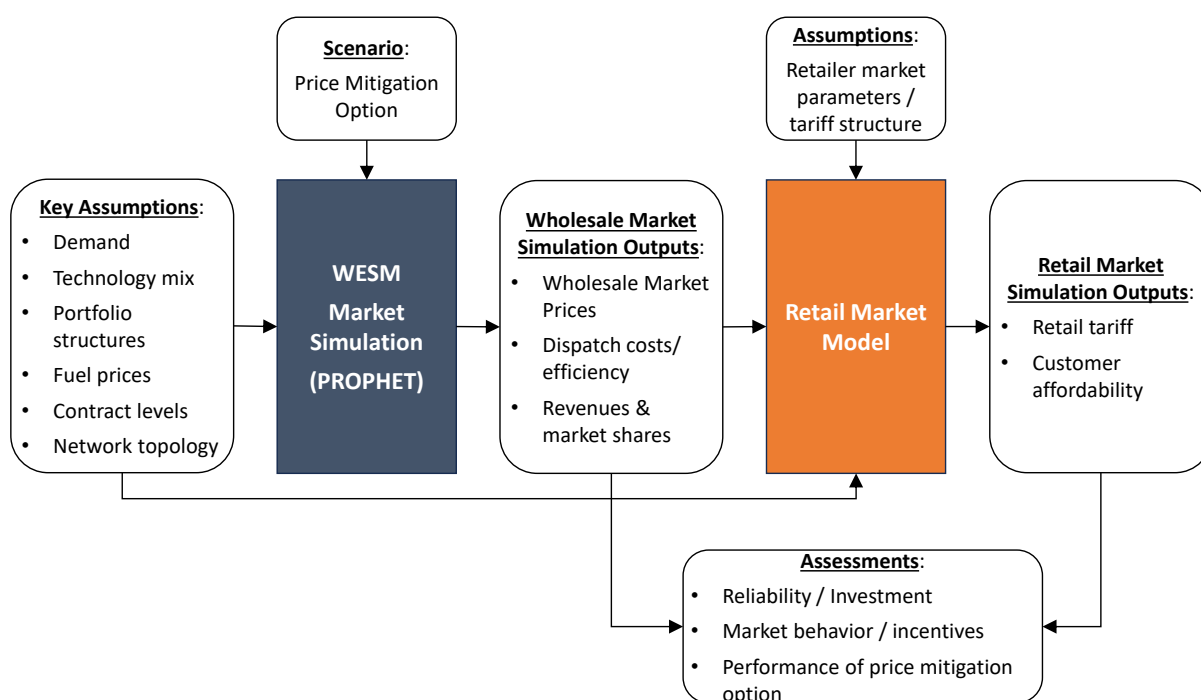
<sup>5</sup> Refer to website: <https://iesys.com/Prophet/Index>.



price mitigation measures. The analysis will need to also consider the varying levels of spot to contract purchases which will impact the retail rates.

A schematic of the general approach to simulation of the wholesale and retail markets of the Philippines is shown below in Figure 7.

**Figure 7 WESM Market Simulation Framework (using PROPHET freeware product)**



As mentioned, freeware licenses will be provided to ERC and PEMC of PROPHET which is a power market simulation product that IES has used to undertake a large number of power market simulation studies in including simulating the Philippines WESM.

The main features of the PROPHET model will include:

- Demand profiles,
- Generation technologies – including energy storage (pumped storage hydro and batteries),
- Transmission constraints,
- Minimum stable levels of thermal plant,
- Ramp rates,
- Outage / maintenance plans,
- A wide variety of modules to simulate market bidding behaviour – which is critical to reflect when changing market price mitigation measures as it will allow impact on market efficiency and competition to be assessed,
- Solar / wind resource generation profiles,
- Market ownership and control structure – trading portfolios,



- Bilateral contract levels and their impact on bidding behaviour,
- Short-run marginal prices of thermal technologies based on a fuel price scenario,
- Specification of the market price mitigation mechanism, for the given scenario, which in general will be incorporated in the market simulation model:
  - MPC, MPF and SPC values in PhP/MWh
  - Mechanism / methodology for imposing / triggering the price caps / floors,
  - (Where relevant) alternative formulations of price mitigation mechanisms, and
- Reflecting other constraints / rules as per the WESM rules.

From the kick-off meeting: IES will analyze how the reserve market can potentially be incorporated in the simulations. Simplified assumptions may need to be used.

The Wholesale Market model emulates the WESM based on using PROPHET power market simulation package.

PROPHET will simulate WESM spot price outcomes under different choices of price mitigation parameters / measures. Key outputs from the Wholesale Market model for each scenario are:

- Wholesale spot market prices (GWAP),
- Dispatch outcomes for generators,
- Generator revenues and total dispatch costs,
- Wholesale market shares, and
- Other indicators of market power and market efficiency.

These outputs can be used to compare the implications of one choice of market price settings against another and are indicators of market efficiency. A second assessment that will be made that is also critical is the incentive for new entrants and for power system reliability to be achieved. This is done by considering the spot market price outcomes and checking whether peaking plants or BESS technologies would earn adequate revenue in the WESM to enter the market.

In this way for each scenario of different choices of price mitigation measure, we can assess the following (against a BAU case):

- Market efficiency change (whether total spot market dispatch costs increase or decrease),
- Revenue adequacy of market participants, by technology,
- Changes in distribution of revenues between different technologies (solar, wind, BESS, hydro, coal, gas, etc.)
- Changes in distribution of revenues between different market participant trading portfolios
- Changes in the incentive for new entrants and hence power system reliability
- Impact on retail tariffs (and therefore impact on customer bills and affordability)



- Impact on incentive for market to deliver reliability (via investment incentive), and nature of investments that would result,
- Changes in wholesale electricity market price distributions, and
- Changes in incentives on market participants.

Collectively these assessments will enable informed decisions to be made between one set of price mitigation measures and another, thereby covering issues that are critical in the decision to change the price mitigation measures / parameters.

The findings, scenarios, key assumptions, and other information will be written up carefully in the report for D-4.

#### **3.4.5 PROPHET Freeware Licence Market Simulation Software Rationale:**

We interpret the requirement for an open-source solution to mean that ERC and PEMC will have access to the market simulation model database, and software beyond the conclusion of the project, without ongoing costs or fees. The IES product PROPHET was designed to simulate the operation of power markets such as Philippines WESM.

Key rationale for its proposed use on this project is:

- (1) Ability to model the supply / demand by zones or on a nodal basis as per the WESM market – Luzon, Visayas and Mindanao,
- (2) Emulate the behaviour of market participants bidding in an energy-only power market to maximise revenue / profit – refer to comments on bidding behaviour below for more on the modules,
- (3) Capability to run hourly simulations for every trading period of the day,
- (4) Capability of computing the full settlement outcomes and report on profitability of generators and their portfolios,
- (5) Implement different options for market rules and price mitigation measures / logic – e.g. different price caps / floors and have the bidding behaviour in the market adjust accordingly,
- (6) It has extensive error-checking and validation of input data which traps errors before time is wasted on running simulations – this is very important to ensuring that the product is robust and reliable, and
- (7) We have a predefined set of reports and charts to present all simulation results that are automatically included.

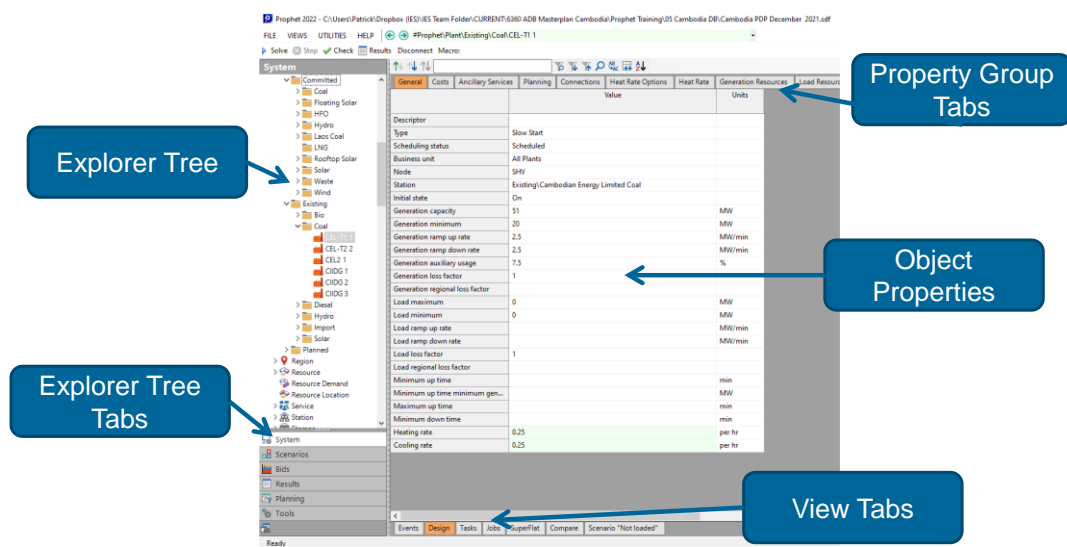
If the source code is required, then IES can provide this on an exclusive basis to ERC and PEMC. However, in our view, it is not necessary because the overriding purpose is for ERC and PEMC to have a power market simulator that can be used indefinitely into the future as an output of this project. Furthermore, the software itself is flexible, will be set up with a full Philippines WESM database that can be updated over time and used on an ongoing basis into the future by PEMC (and ERC) without requiring access to the source code.



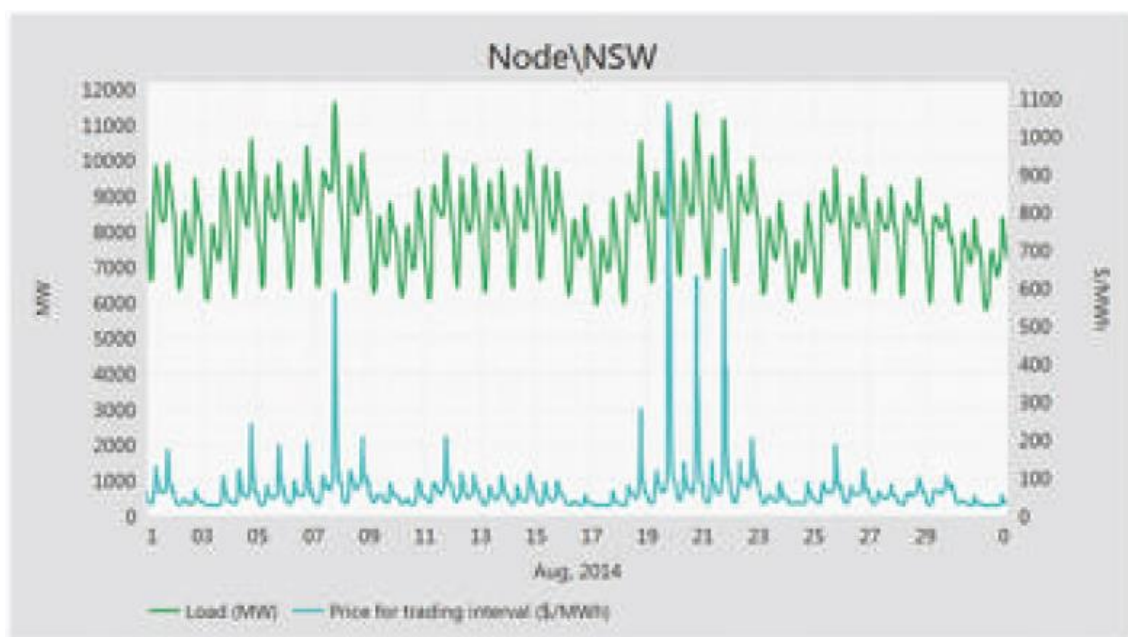
Further to this, PROPHET comes with an extensive set of user manuals, worked examples, case studies, and standardised training course material and other documentation that we can provide to ERC and PEMC as part of the project during the training planned courses.

The following illustrations show firstly the user interface for PROPHET – essentially, objects such as power stations, portfolios, load centres etc. are built and simulation scenarios constructed by including various objects that define the market and market clearing logic. The second illustration shows an example of PROPHET’s output – an example of simulated prices and demand.

**Figure 8 PROPHEt - Example of User Interface**



**Figure 9 PROPHEt - Example of Price Simulation Results View**



### 3.4.6 PROPHET Bidding Behaviour Modules:

Bid (offer) data and information is an important component of the project scope and is also a major component to PROPHET simulations. PROPHET has various bidding modules based on user requirements and the bidding approach can be different for individual or groups of plants – i.e. market participant’s trading portfolios.

Bid behaviour simulation modules are described below:

- **Bid Set and Bidstack.** Manually defined bids are created in the form of bid sets and bidstacks that can be arranged into repeated patterns. This module takes in fixed values for quantity and price pairs analogous to bid inputs from generators in the WESM.
- **Bid Constructor and Allocator.** Creates bids with bid prices and quantities calculated from user-defined formulas. The formulas can incorporate built-in constants that adjust the bids according to the situation in the market – for example, offering more capacity at prices as a function of the market price cap.
- **Rebid to Cover Contracts.** Adjusts bids in line with bilateral contracts which are important in the Philippines WESM and based on a portfolio’s overall bilateral contract position in the market.
- **Bid Loader.** Imports bid data from an external database or file during a simulation run. This would be useful for running historical bids and running counterfactual analysis.
- **Pumping Bids.** Creates bids for storage plants (including BESS) based on charge / discharge capacities and roundtrip efficiency.
- **Bid Builder.** Constructs bids to simulate a realistic bidding pattern in the market by conforming to a supply curve.
- **Short-Run Marginal Cost (SRMC) Bidding.** Bids plant into the market to cover their short run marginal costs – i.e. to recover their variable costs of operation.
- **Long-Run Marginal Cost (LRMC) Bidding.** Bids plant into the market to cover their long run marginal costs.
- **Shadow Bidding.** Models bidding behaviour where plant bid up to the nearest rival.
- **Ancillary Service Bids.** Places bids into the market for the ancillary services provided by plant.

### 3.4.7 Simulation Method:

Because the power market modelling is concerned with making informed decisions on the decision to adjust the price mitigation measures, it is important to set up a range of scenarios that show the full implications of changing the market parameters and ensure it delivers satisfactory outcomes over a range of conditions. Furthermore, it needs to be shown that any changes deliver improved outcomes beyond the status quo (business as usual) hence a baseline scenario needs to be set up. The general approach that we propose to use is to run



counterfactual modelling of the WESM for the period 2020-23 and run some “what-if” scenarios of future years such as 2025 and 2030, where the implications of higher penetration of solar / wind could be examined, or decommissioning / retirement of some coal plants.

Initial proposal for the scenarios is as follows – but will be discussed with TWG and others during the project prior to execution:

- Baseline for period 2020-23 and sample future years (2025 and 2030) with existing price mitigation measures in place, expected technology mix etc.
- 3-4 scenarios of alternative parameterisations of the existing price mitigation measures – simulating years 2020-23, 2025, and 2030
- 1-2 scenarios of different price mitigation measure logic – simulating years 2020-23, 2025, and 2030
- Years 2025 and 2030 will then be examined for a scenario with high solar, wind and BESS generation and less coal generation in the market to stress-test.

The baseline scenario will be compared to actual market outcomes and enables the model and assumptions to be checked and validated.

#### **3.4.8 Data Requirements:**

The main data requirements for the market simulations will be:

- Historical bids / offers for sample periods over the period 2020-23,
- Key transmission congestion points / constraints – typically generation group limits / constraints,
- Historical demand,
- Historical outages / generator availabilities,
- Wind and solar generation profiles,
- Historical Locational Marginal Prices (LMPs) and GWAPs,
- Kalayaan pumping load profiles, and
- List of registered market participants and their power stations month by month.

#### **3.4.9 In-Person Focus Group Discussions with TWG:**

The findings associated with Deliverable 4 are key to the project, and the RFP calls for 2 x in-person focus group discussions on the findings – one with the government representatives and another with market participants each to gather input, suggestions, and feedback. This has been factored into our work plan.

Measures will be taken to ensure at least 30% females are represented in the focus group discussions.



#### 3.4.10 Report for Deliverable 4:

A report covering the Recommendations on an appropriate price mitigation measure for the Philippines WESM, supported by the modelling and analysis that will be undertaken will be prepared. It will reflect the feedback from consultations and will clearly set out the proposed values for the MPC, MPF and SPC, or an alternative formulation, if that is deemed to be appropriate following consultations. As part of the report for Deliverable 4, the methodology, assumptions, and findings of the analysis for each scenario must be documented in the policy brief.

### 3.5 Approach for Deliverable 5: Assess Increasing Participation of RE Generators in WESM

#### 3.5.1 Objectives & Approach

**Objectives:** The objective of Deliverable 5 is to prepare a public report and accompanying brief that explains the barriers to renewable energy participating on a merchant basis in the WESM, and how the work under the preceding deliverables helps overcome these

**Approach:** The proposed steps for Deliverable 5 are:

- Step 1: Collect data on the performance of existing RE support mechanisms,
- Step 2: Understand investors' perceptions of key barriers to merchant RE plants,
- Step 3: Assess the extent to which the price-cap reforms identified previously address these barriers,
- Step 4: Identify additional mechanisms, from international experience, that could further support merchant RE plants in the WESM, and
- Step 5: Formulation of findings, policy brief, and publishable report.

#### 3.5.2 Data requirements:

The report will be largely based on information collected under preceding activities. Additional data will include information on the operation of the RE portfolio standard (RPS), the RE certificate (REC) market, and the Green Energy Auction Program (GEAP).

#### 3.5.3 Methodology:

It is expected that Deliverable 5 will build upon findings under Deliverable 3 but will take a more holistic view of the Philippines RE sector and policy / regulatory framework.

The report will also provide a broader overview of the potential for RE deployment in the Philippines, the barriers created by the WESM, and measures to overcome these, including the reforms to pricing limits identified above. To support this, it is proposed to conduct interviews of active investors in RE in the Philippines and of some existing generators operating in the market to understand the risks that could be present and use this as the basis for improving



policies and WESM or in other areas of RE policy to improve the joint functioning of RE policies and operation of the WESM.

Key elements of the report will include:

- Analysis of the interaction of existing mechanisms, such as the RPS, REC market, green energy option policy, and the GEAP, with the WESM. Particular attention will be paid to the extent to which these mechanisms mitigate price risk in the WESM and any limitations on technologies and quantities of RE capacity that can be developed under them.
- Analysis of the opportunities, barriers, and risks for RE merchant plants in the WESM, with a focus on addressing the perception that investors and financial institutions perceive the spot market as a high-risk to off-taker.
- Assessment of the extent to which adjusting price caps and other price mitigating measures would encourage investor confidence in the spot market as a viable market for renewables. This will draw on the findings from the previous analysis.
- High-level proposals on additional measures that could be adopted to further promote the development of merchant RE plants in the WESM, drawing on international experience. For example, the use in Great Britain of contracts for differences (CfDs) with a government-backed company to provide price stability for RE plants.

#### 3.5.4 Focus Group Discussion:

We proposed in our work plan to discuss the findings of Deliverable 5 with TWG in-person as it is quite important to the project's overall outcomes. This would also be coordinated with a preliminary session on market simulation basics. This is discussed further in the work plan.

#### 3.5.5 Report for Deliverable 5:

A stand-alone publishable report that assesses the impact of increasing participation of RE generators in the WESM will be provided as the final output of Deliverable 5. It will be copyedited with a layout that will support easy reading and be accompanied by a summary policy brief using infographics and other visual aids to convey information in a reader-friendly manner.

### 3.6 Approach for Deliverable 6: Simulation Training & Simulation Report

#### 3.6.1 Objectives & Approach

**Objectives:** The objective of Deliverable 6 is to enhance PEMC's and IEMOP's capacity in the analysis of market prices, assessment of market efficiency, price volatility, price drivers, and electricity market simulations. This is to be addressed via 3 x training sessions.

**Approach** The proposed approach for Deliverable 6 is:

- Step 1: Formulate training course agenda topics, and ensure alignment with TWG's input,



- Step 2: Conduct training course 1 which we propose to cover an introduction to the key concepts, principles, and preliminary introduction to market simulation training and market analysis.
- Step 3: Conduct training courses 2 & 3 which will progressively introduce more advanced topics including hands-on training in the market simulation software.
- Step 4: Reporting on training course.

### 3.6.2 Data Requirements:

Information collected ahead of Deliverable 3 execution will be used.

From kick-off meeting: IES will provide indicative PC system requirements to be able to run the PROPHET model. The training should accommodate the range of participants' experience with market simulations. ERC has experience in this area whereas we should assume PEMC has no experience at all.

### 3.6.3 Training Course Agenda / Topics:

A training course agenda will be developed with input from the TWG to ensure it covers relevant and practical topics for training course participants. Topics will include amongst others the following:

- Analysis methodologies for wholesale electricity spot markets,
- Monitoring and evaluation of bidding behavior,
- Role of price mitigation measures,
- Role of competition policy,
- Measures of market efficiency and evaluating the performance of markets,
- Statical methods for determining relationships between price drivers and market price outcomes,
- International examples and case studies for price mitigation measures / methodologies,
- International examples and experience in the treatment of RE generators in power markets like the Philippines WESM,
- Operations research and market pricing mechanisms as per market dispatch engines,
- The basics of power market simulations,
- Worked examples and training in open-source market dispatch and pricing simulator tool,
- Simulation of market participant behavior,
- Relationship between spot market contract levels and bidding behavior, and spot prices,
- Other topics relevant to the project, and market price simulations, and
- Implications for compliance monitoring and market surveillance.

A participant invitation list will be formulated and agreed with TWG. Measures will be taken to ensure that at least 30% of the attendees are female.



### 3.6.4 Price Simulation Training:

As per the Work Plan (section 4) we propose to carry out 3 x Training Sessions in-person with 2 instructors in the room for 30 participants. This will be done in a practical, hands-on manner with workbook exercises, worked examples, and real-life case studies. The goal will be to maximize participation and ensure that the training course attendees are engaged in meaningful tasks that are closely linked to the content of the project and the issues it presents to PEMC, IEMOP and ERC. All 30 participants will be provided with a version of the PROPHET and a Philippines WESM market database that they can run on their laptops during the training course.

It is understood that the same group of 30 participants will be trained, and our approach will start with introductory material first to ensure a solid foundation and move onto more advanced topics over the three training courses, which will be based on hands-on power market simulation modeling in PROPHET.

**Table 5 Details of the Training Course**

<b>Training Course</b>	<b>Field Trip</b>	<b>General Content</b>	<b>Tools</b>
1	F-4 [In week 7/Oct/24 ]	<p><b><u>Introduction to market price simulation</u></b></p> <ul style="list-style-type: none"> <li>• Generator cost structures</li> <li>• Market structures – physical network &amp; market rules</li> <li>• Market price clearing mechanisms including linear programming &amp; constraints.</li> <li>• Market price mitigation measures</li> <li>• Portfolios and competition</li> <li>• Treatment of RE in power markets</li> <li>• Bilateral contracting</li> <li>• Other concepts</li> </ul>	Simple spreadsheet-based examples and exercises to work through the concepts and issues relevant to market simulation.
2	F-5 [In week 11/Nov/24]	<p><b><u>Market Simulation Modeling 1:</u></b></p> <ul style="list-style-type: none"> <li>• Market price simulation software overview</li> <li>• Inputs and outputs for market simulations</li> <li>• Simulating bidding behavior and different ways of achieving this in the power market simulator</li> <li>• Setting up assumptions and inputs</li> <li>• Explanation of model and its components / features</li> <li>• Database, assumptions, and inputs</li> <li>• Examples of running the model</li> <li>• Worked examples to show how different bidding strategies impact market outcomes.</li> </ul>	Market Price Simulation Software Solution for D-4 (PROPHET)



Training Course	Field Trip	General Content	Tools
		<ul style="list-style-type: none"> <li>Market price mitigation settings and their impact.</li> </ul>	
3		<p><b>Market Simulation Modeling 2:</b></p> <ul style="list-style-type: none"> <li>Carrying out more detailed examples</li> <li>Undertaking numerous exercises, case studies and worked examples for the participants.</li> <li>Workshopping different topics, scenarios, applications, and conditions.</li> <li>Building new scenarios</li> <li>Ensuring that everything is handed over on the power market simulation software.</li> <li>Recapping the entire course content to revisit some of the most important ideas and concepts</li> </ul>	Market Price Simulation Software Solution for D-4 (PROPHET)

Post training course evaluation – a simple, online training course evaluation form will be issued to participants, to collect information non the level of satisfaction of participants in the training course. The results will be summarized in the training course delivery report.

### 3.6.5 Report for Deliverable 6:

A report to summarize the outcomes from the training sessions will be prepared and submitted. The report will include a list of the participants (attendance sheets), training course materials – including the open-source price simulation model, participant exercises and solutions, and results of online post training course evaluation form.

## 3.7 Approach for Deliverable 7: Final Report & Dissemination of Project Findings

**Objectives:** Public dissemination of the results and findings of the project. Includes the submission of a Final Report, and a report on the public dissemination event.

### 3.7.1 Presentation of Findings and Recommendations:

A presentation on the results and outputs of the project will be carried out for relevant stakeholders. As described in our work plan we will organize a public dissemination event for 45-50 participants.

From the kick-off meeting: Financial institutions will be invited in the dissemination workshop and other relevant activities. Financial institutions should be consulted to understand their risk perceptions on the market.

### 3.7.2 Reports and Finalisation of Deliverables and Materials:

We understand from the RFP that a report documenting the dissemination event is to be submitted. Furthermore, a Final Report will be provided which will include A summary of the



project, activities conducted, highlights of outputs, the project's potential impact on energy transition, recommendations on follow-up activities, and lessons learned in conducting the project. At this stage we will submit a final set of all deliverables, training course materials and open-source model to ETP, PEMC, IEMOP and ERC.

### 3.7.3 Report for Deliverable 7:

A report on the dissemination event will be submitted, along with a Final Report that is described above. All key project deliverables and models will be turned over as well.

- The communications plan is to as a minimum include:
  - 5 x social media posts (liaising with ETP).
  - 1 x press release for each public workshop / event.
  - 1 x feature article / blog post on project to be uploaded to ETP's website.
  - 2 x maximum 1-hour online presentations of project progress and highlights to ETP secretariat and/or ETP funders

It is understood in relation to the communication plan that our firm will be responsible for preparing the material and identification of a suitable strategy while ETP's will be ultimately responsible for coordinating the publishing of content – e.g. on the ETP website or to social media channels.



## 4 Updated Work Plan

The overall work plan / Gantt Chart is illustrated in Figure 10. A start date of 8 April 2024 has been assumed.

It has been structured into the following areas:

- **Project Management (PM)**: Sets out the main activities for project management including preparation of monthly reports in the standard template format.
- **Component A**: Sets out the project activities for the completion of inception phase and formation of the Technical Working Group (TWG).
- **Component B**: Activities required for the assessment and updating of the WESM price mitigation measures components of work.
- **Component C**: Shows the tasks related to work underpinning the assessment of renewable energy participation in the WESM.
- **Component D**: Sets out the activities associated with undertaking capacity building on simulation practices.
- **Fieldwork (F)**: Sets out the timing for planned field work of international consultants in the Philippines.
- **Deliverables (D)**: Shows the weeks where deliverables are planned to be submitted – consistent with the requirements of the RFP.

In general terms we see sequential execution of the project components, in line with the timetable that is defined in the RFP. All activities, field trips and deliverables have been numbered.

Further discussion of the features of the proposed work plan are set out in the sub-sections that follow.

### 4.1 Kick-Off Meeting

A kick-off meeting was arranged to facilitate introductions and to review the project methodology, work plan, and strategy for project implementation. Discussion also included the risk management and risk-mitigation strategy building. We view that it is extremely important in the early stages of the project to align on in project implementation arrangements, objectives and priorities of the projects, expectations for each project deliverable, and to understand any previous work and identify any areas of the project where the consultant needs to be careful to ensure the project's success. Furthermore, any constraints or limits in implementation should be identified as well as agreeing on approaches to engagement with the project's stakeholders. Kick-off meeting findings, discussions and agreements has been used as an input into this inception report.

Other key items from the kick-off meeting:



- Identification of focal person from each organisational: PEMC (to be confirmed), ERC (Engr. Tonette Badillo), ETP (Fritzie), IES (Stuart Thorncraft).
- PEMC to identify/think about members of the working group.
- Set up a meeting to prepare for the first team mission for the TWG meeting. Stuart Thorncraft to suggest a time/date to have a call on this.

## 4.2 Inception Phase & Report (D-1)

This inception report documents an updated methodology, work plan and other elements of our proposed methodology to ensure alignment with ETP's expectations from the kick-off meeting. See Section 2.2.1 for more details.

## 4.3 Monthly Progress Report

During the inception phase the approach for the monthly progress reports will be discussed and setting up a group email list for the recipients of the updates. The modality of providing regular project updates can be agreed – with one option simply being an email update which details what has been achieved, what is planned as the next step, and any roadblocks or issues that are preventing progress. The preferred option is for regular bi-monthly calls (to be set-up between ETP and the team).

As per the RFP document, the monthly progress reports will include a concise narrative of the activities completed and the next steps. It is understood that the monthly progress reports will serve as the monitoring report and is an internal report between the consultant and the UNOPS/ETP team members.

The monthly reports will include the follow and any other items specifically requested and mutually agreed between IES and the UNOPS/ETP team:

- Updated Gantt Chart
- On a quarterly basis, this report should include an update on results achieved as per the Results Based Monitoring Framework (RBMF) and provided template. Where applicable, must be gender disaggregated.
- Slide deck that summarizes the findings, status, and project next steps.
- Risks and mitigations.
- Lessons learned.
- Minutes of meetings, if relevant.
- Minutes of Interviews and Consultations if relevant.

The final progress report will include a summary of the project, activities conducted, highlights of outputs, the project's potential impact on energy transition, recommendations on follow-up activities and lessons learned from the conduct / execution of the project.

ETP will provide IES with the spreadsheet-based template for the monthly progress report.



#### 4.4 Overall Schedule of Deliverables

The table below sets out the deliverables defined in the RFP document, and sets out, based on our work schedule (shown above) of the expected timing in terms of “week-beginning”.

**Table 6 Deliverables**

No.	Name	Week-Beginning
D-1	Inception Report	29-Apr-24
D-2	TWG & 2 x TWG Minutes	10-Jun-24
D-3	WESM Price Patterns & Mitigation Measures	8-Jul-24
D-4	Report on Updated Price Mitigation Measures	28-Oct-24
D-5	Study on Impact of Increasing Participation on Generators in WESM	16-Dec-24
D-6	Price Simulation Training Report	20-Jan-25
D-7	Final Report / Report Dissemination Report	10-Feb-25

#### 4.5 Field Work

We have provisioned for seven (7) field trips to Philippines (Manila) to support the project at critical stages of its implementation. Tentative dates for field work are set out in the table that follows. These are subject to being updated during the kick-off meeting and inception phase of the project but reflect our best estimates at the time of proposal preparation. Note that the trips will mostly be coordinated with the TWG meetings so that they could be done in person.

The table below summarises the planned field trips – each proposed to be 1 working week in duration.

**Table 7 Field Work Details**

No.	Name	Comments	Week-Beginning
F-1	TWG #1 Meeting (Set up / Project Scope & Objectives)	<ul style="list-style-type: none"> <li>Face to face attendance of the first TWG meeting with up to 15 x participants.</li> <li>Discuss data requirements and other matters related to project scope and execution.</li> <li>International consultants: ST</li> </ul>	13-May-24
F-2	TWG #2: Analysis of Price Patterns Discussion	<ul style="list-style-type: none"> <li>In person discussion with TWG on price pattern results, findings and implications with up to 15 x participants.</li> <li>International consultants: ST</li> </ul>	15-Jul-24
F-3	Price-Mitigation Measures Sessions	<ul style="list-style-type: none"> <li>In person discussions and consultation on proposed price-mitigation measures and their impact on WESM behaviour / market operation.</li> </ul>	23-Sep-24



No.	Name	Comments	Week-Beginning
		<ul style="list-style-type: none"> <li>Conduct 2 x consultation sessions on findings.</li> <li>International consultants: ST</li> </ul>	
F-4	Training Workshop #1 (Introduction) & RE Policy Brief	<ul style="list-style-type: none"> <li>Provide updates on mitigation measures and RE generation policy brief to the TWG.</li> <li>Undertake introductory level training on market price simulations for group of 30 x participants.</li> <li>International consultants: WD, ST</li> </ul>	11-Nov-24
F-5	Training Workshop #2 & #3 (Advanced)	<ul style="list-style-type: none"> <li>Undertake training courses on power market simulation modelling at more advanced level for group of 30 x participants.</li> <li>International consultants: ST, JA</li> </ul>	13-Jan-25
F-6	Final Presentation	<ul style="list-style-type: none"> <li>Final recommendations presented to group of 45-50 x participants.</li> <li>International consultants: ST</li> </ul>	3-Feb-25

*Initials: ST = Stuart Thorncraft, WD = William Derbyshire, JA = Jennifer Abedin*

#### 4.6 In Person Workshops

Several in-person workshops have been identified in the RFP. These have all been provisioned for in the work plan and addressed via the field work described in the previous section. To demonstrate how we have accounted for the required workshops we present a list of the RFP Requirements for in-person workshops in Table 8 (see below). This table shows the deliverable that has given rise to the in-person workshop, the field trip that the in-person workshop would be executed on and the type and nature of the workshop that we propose to incorporate into our work plan.

It should be noted that for the assessment of the impacts of RE generation in the WESM, we propose a TWG meeting on this subject in addition to two earlier meetings on other subjects. This will ensure good engagement of the TWG throughout the project.

#### 4.7 Training Workshops

As described in Section 3.6, Table 5, we propose three training workshops on the topic of power market simulations which will incrementally build up knowledge of power market simulations starting from an introductory level and advancing through to hands-on training using the PROPHET market simulator.





**Table 8 In-Person Workshop Approach**

No.	Workshop or Meeting	RFP Requirement(s)	In Person Workshop / Meeting	Field Trips	Number of Workshops /Meetings	Workshop / Meeting Type	Proposed Duration	Comment
D-2	TWG established and meeting reports with minutes of the meetings	At least two in-person TWG meetings 9 with around 15 participants per meeting.	In-person meeting	F-1 F-2	2	15-Person Meeting	3 hours	
D-4	Report on Updated Price Mitigating Measures	The consultant is expected to conduct two (2) in-person focus group discussions, one with the government representatives and another with market participants each to gather input, suggestions and feedback. The costs associated with the venue and meals will be reimbursable.	Focus Group Discussion	F-3	2	30-Person Focus Group Discussion	1/2 day	
D-5	Publishable Study on the Impact of Increasing Participation of RE Generators in the WESM	At least two in-person TWG meetings 9 with around 15 participants per meeting (specified under D-2).	In-person meeting	F-4	1	15-Person Meeting	3 hours	We have added this as an additional TWG meeting



No.	Workshop or Meeting	RFP Requirement(s)	In Person Workshop / Meeting	Field Trips	Number of Workshops /Meetings	Workshop / Meeting Type	Proposed Duration	Comment
D-6	Price Simulation Training Report	Bidders should consider conducting three (3) workshops for 30 participants	Training Workshop	F-4 F-5	3	30-Person Workshop	1 day (per course)	Training course 1 on F-4, and Training courses 2 & 3 on F-5.
D-7	Final Workshop	The consultants will organize one dissemination event for 45-50 participants	Workshop	F-6	1	45-Person Workshop	1/2 day	



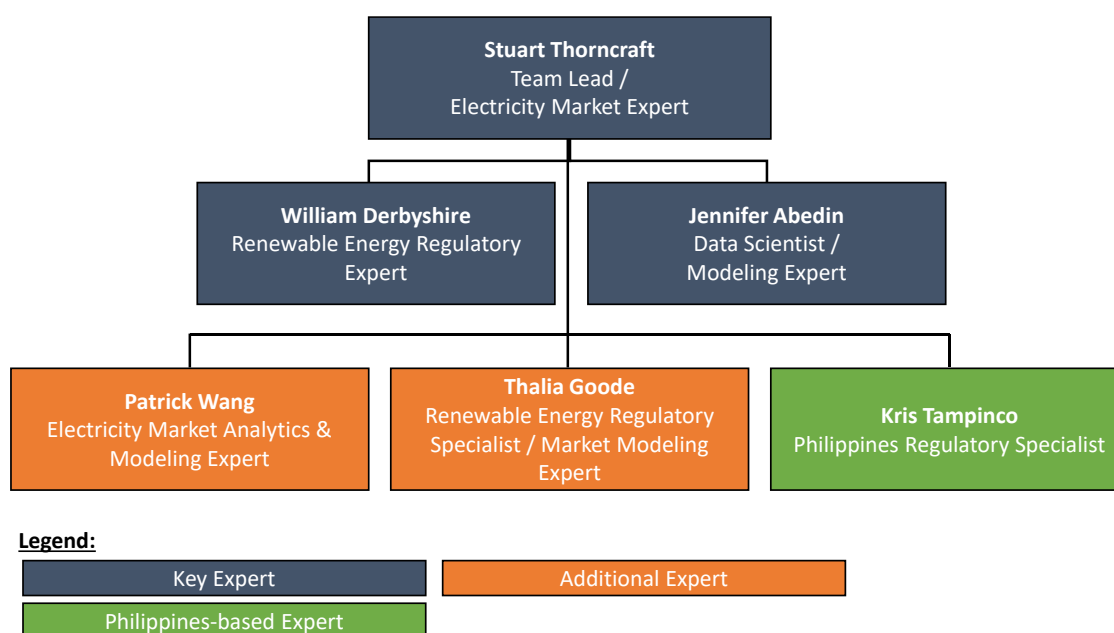
## 5 Project Team Structure and Management

### 5.1 Project Team Structure

Successful implementation of the project requires expertise in electricity market regulatory frameworks, design, implementation, and operation. The project team needs a mix of skills spanning power system operations, economics, finance, electricity market simulation, bidding behaviour and incentives, legal and regulatory frameworks for market regulation, relationship between power system reliability and effective market operation and an understanding of variable renewable energy (VRE) and its operation in power markets. Our JV of IES and ECA provides experts who bring substantial power market experience across these areas. Furthermore, IES provide staff who have had a long working relationship with PEMC and IEMOP staff across numerous engagements since the year 2006, when the WESM first commenced its operation. Finally, we have added a Philippines regulatory specialist to the project team who is based in Manila and will support the project team in matters pertaining to the Philippines power industry’s legal and regulatory framework.

The following is the proposed team structure for this project:

**Figure 11 Project Team Structure**



We have complemented the three formal roles defined in the RFP with two additional international experts: Patrick Wang (IES) and Thalia Goode (ECA) who are both power market modelling specialists with substantial experience in simulating Australia’s national electricity market using PLEXOS which is similar in many ways to the Philippines WESM. Patrick also brings power market modelling of the Philippines WESM. Furthermore, Kris Tampinco is based in



Manila, Philippines and will support the project team in regulatory and legal issues pertaining to the Philippines WESM and renewable energy regulations / policies.

As noted in section 7 the gender ratio of our proposed team is 50% male to female ratio.

The following table summarizes the project team’s role assignments, and their home office locations:

**Table 9 Qualifications of key personnel**

No.	Name	Location	Role
1	Stuart Thorncraft	Sydney, Australia	Team Lead / Electricity Market Expert
2	William Derbyshire	Bangkok, Thailand	Renewable Energy Regulatory Expert
3	Jennifer Abedin	Sydney, Australia	Data Scientist / Modeling Expert
4	Kris Tampinco	Manila, Philippines	Philippines Regulatory Specialist
5	Patrick Wang	Sydney, Australia	Electricity Market Analytics & Modeling Expert
6	Thalia Goode	London, United Kingdom	Renewable Energy Regulatory Specialist

## 5.2 Brief Profiles of Project Team Members

### 5.2.1 Stuart Thorncraft – Team Lead / Electricity Market Expert

Stuart is a Managing Consultant at IES who undertakes projects that involve the provision of advice and consulting services to governments, regulators, energy companies and financial institutions on the energy markets of Australia, Philippines, Vietnam, Singapore, South Korea, Thailand, Malaysia, Cambodia, and others in Southeast Asia. He has over 20 years of experience in advising on power system operations and electricity markets, including over 17 years’ experience in the Philippines power sector with a particular focus on the Wholesale Electricity Spot Market (WESM). He has been the Team Leader of numerous projects involving PEMC and IEMOP – including auditing of the WESM market systems, advising on WESM Rules and Procedures, and project’s focused on dispatch and price simulating the operation of the WESM. Other areas that Stuart undertakes consulting engagements on includes regional and national transmission planning studies, undertaking asset valuations and/or economic cost-benefit analyses to support project financing, performing technical assessments of renewable energy integration projects and energy storage projects, and advising on decarbonisation of power industries to support country-wide energy transition strategies. He has worked extensively in most of the countries of ASEAN over the last 15 years.

### 5.2.2 William Derbyshire – Renewable Energy Regulatory Expert

William is a Bangkok-based Director at ECA with over 25 years of experience in energy economics and power sector policy, the last 20 of which have been focused on the Asian region. William is



currently leading the preparation of a road map for ASEAN cooperation in carbon pricing, the analysis of coal phaseout pathways in Indonesia, in support to the delivery of net-zero commitments, the assessment of carbon pricing for the power sector in Malaysia and the Philippines, and recommendations on power sector reform in Sri Lanka. Recent assignments also include preparation of a hydropower development strategy based around regional trade for the Lower Mekong Basin countries (Cambodia, Lao PDR, Thailand, and Viet Nam), drafting a vision paper for reforming Indonesia's power sector, and managing economic and financial appraisal of power sector investments in Viet Nam. William has worked in all ASEAN member states except for Brunei and is very familiar with the policies, governance and regulation of their power sectors.

### 5.2.3 Jennifer Abedin – Data Scientist / Modeling Expert

Jennifer has a degree in Electrical Engineering and work experience in energy retail contract brokering. This includes analysing electricity prices with the goal of minimising costs to the consumer. She brings a comprehensive understanding of Australia's energy market via her work in the industry with clients including Australian Energy Market Operator (AEMO), distribution network companies, electricity retailers, and generation companies. As IES, Jennifer that have levered her technical modelling skills including power system network modelling, power market simulations using PLEXOS, least cost power system planning, energy storage systems modelling, wind and solar modelling to support new projects. Jennifer also brings experience from her work across several Southeast Asian countries including Vietnam, Myanmar, Cambodia, and Laos – having worked on projects to establish the business case for pumped storage hydro projects, solar farms, and wind farms.

### 5.2.4 Kris Tampinco – Philippines Regulatory Specialist

Kris Tampinco has over 20 years of experience in the power industry. For over 15 years, she has been actively undertaking projects for Regulators and Policy makers in different jurisdictions with specific focus on the tariff determination process and development of regulations for generation, transmission, and distribution entities both in developing and developed countries. Kris is working closely with the Energy Regulatory Commission (ERC) of the Philippines in the implementation of performance-based regulation of power utilities in different sectors of the electricity supply chain assisting the ERC with tariff setting and rules development; assisted the New Zealand Commerce Commission in their tariff determination process for electricity and gas industries under default price quality regulation; working closely with the Energy Regulation Board (ERB) of Zambia in their formulation of incentive-based regulation for the different sectors and the determination of cost-reflective tariffs in renewable energy mini-grids; assisting with the development and strengthening of the National Energy Authority of Papua New Guinea including the development of regulations; and worked with the National Energy and Utilities Regulatory Commission of Ukraine in setting best practices for conducting audits of utilities. Most projects that Kris has undertaken for Regulators in developing countries involved representing the



Regulator during public consultations and public hearings. Moreover, the projects included a significant component of capacity building whether through on-the-job training or developing and conducting customized workshops not only for the Regulator, but also for key stakeholders. Being based in Manila, Philippines, Kris has extensive experience in undertaking projects across Asia. In the Philippine electric power industry, apart from her extensive work with the ERC since 2008, she has worked with all other key stakeholders, from the Department of Energy down to consumer groups. She has provided consultancy service in the areas of tariff modeling, financial assessment, regulatory strategy, and training to regulated utilities including the largest distribution utility in the and the sole operator of the Philippines' transmission system. She has also provided services to generation companies and investors through the financial, regulatory and market assessment of projects particularly in their acquisition of either Greenfield or Brownfield generation or distribution assets. Moreover, Kris has undertaken due diligences of renewable energy projects in off-grid areas in the Philippines. In the Vietnam electric power industry, she was a member of the team who developed the market rules for the Competitive Generation Market, funded by the World Bank for the Electricity Regulatory Authority of Vietnam. At the onset of the opening of Myanmar's economy, Kris has advised investors in their participation in the privatization of power generation and distribution utilities, helping resolve the issue on power shortage and to implement non-technical and technical loss reduction programs that are comprehensive, economic, and sustainable, to improve the quality of service and increase the utility's revenue and profits. Kris is an Industrial Engineer and holds a Master of Science degree in Management Engineering, graduating cum laude.

#### 5.2.5 Patrick Wang – Electricity Market Analytics & Modelling Expert

Patrick has diverse experience in electricity and gas markets, physical trading of power & gas, electricity contracts trading, financial modelling, strategy, and portfolio integration. He maintains an in-depth understanding of transmission constraints, contract market dynamics, well-versed on fundamental drivers and real-time portfolio bidding and behaviours. Patrick provides analytical and modelling support to IES Advisory Services, including portfolio optimisation, portfolio due-diligence, development of energy procurement strategies, electricity market modelling, linear programming and IT skills in Excel, VBA, SQL, and database design. He has worked as an economic and financial analyst to support contracting and PPA analysis for wind and solar projects in Australia and in Asia. He has previously held positions at McLennan Magasanik Associates, Babcock & Brown Power, KPMG Advisory and Barclays Capital.

#### 5.2.6 Thalia Goode – Renewable Energy Regulatory Specialist / Power Market Modelling Expert

Thalia joined ECA in 2023 and has developed PLEXOS models for Seychelles, Kenya, the Western Balkans, and Oman. She has experience in developing national integrated resource plans for Seychelles and Zanzibar. In her previous role at Hydro Tasmania, Australia she focused on developing medium- and long-term price forecast models of the Australian energy market using



PLEXOS modelling software. Her role also included providing analysis to inform investment decisions, liaising with the state government, and developing the business strategy. Prior to this, Thalia worked as a mechanical engineer at Hydro Tasmania.



## 6 Risk Management

### 6.1 Quality Assurance plan

To ensure the successful implementation of this project we will build in measures to ensure quality control, quality assurance, risk identification and risk mitigations. These are critical for the implementation of projects with clear milestones, deadlines and in the case of this project, where the consultant needs to engage with multiple stakeholders: PEMC, IEMOP, ERC and UNOPS/ETP.

Features of our standard approach to quality control and quality assurance are:

- During the kick-off meeting, a preliminary discussion with key project stakeholders to understand the key contacts with the entities, preferences in terms of communication (email, telephone, etc.) and to review the work program to ensure we elicit their feedback prior to its execution.
- During the kick-off meeting, an assessment of project risks will be made – particularly with reference to the implementation schedule, timing of deliverables and priorities of clients, and where necessary additional measures built into the project plan to actively monitor and mitigate identified risks – we discuss an initial assessment of project risks and mitigation measures for this project below.
- Another upfront assessment for consideration in the kick-off meeting and inception phase will include identification of any sensitive or controversial topics.
- All key deliverables (reports, presentations, models, analysis spreadsheets) and their content will be reviewed internally before delivery to the client. Furthermore, version numbers and dates will be retained in all reports / spreadsheets including noting significant changes or reflecting important agreements or assumptions that have been made.
- Regular internal checks on progress implementation will be made, where barriers or progress has become impeded measures to rectify will be taken - IES has numerous back-office staff who can be utilised as well if there is a need to speed up some areas of the project.
- During the project, we provide updates on project progress with a frequency that is suitable for the project and the client's needs.
- Other quality assurance measures that will be adopted will include data verification, version control, documentation revision processes, peer review procedures and keeping audit trails of any critical decisions or assumptions.
- Measures will also be taken to ensure the project team members all have uniform conduct during the engagement – in particular, IES has a code of ethics and a gender mainstreaming code of conduct that will be communicated to all project team members ahead of engagement.



- Furthermore, protocols for communication with clients and stakeholders will be established – in particular, our standard approach is to run all client interactions through the Project Lead (Stuart Thorncraft on this project) and will run all official communications and exchanges with stakeholders via a designated contact at UNOPS / ETP.
- Our project team members are also familiar with ISO 9001 quality assurance procedures and generally seek to impose such discipline on the completion of projects.

## 6.2 Risk Identification and Risk Mitigation Measures

Table 10 sets out a preliminary risk identification and risk mitigation plan for this project – it would be developed further in consultation with ETP during project kick-off meeting and inception phase. The consequences of risks are identified, and a proposed mitigation measure is set out. Our work plan has been structured to finalize the risk identification, consequence and to build in mitigation measures – which may take the form of the approach to project management and/or to monitoring. This would be built into the inception report for the project.

**Table 10 Preliminary risk identification and mitigation plan**

No.	Risk	Consequences	Mitigation
1	Numerous stakeholders with representatives from a variety of stakeholders (PEMC, IEMOP, ERC) and ETP	Perception of favouring some stakeholder’s views over others for decisions made during TWG sessions or recommendations in the project, which could diminish credibility of findings and analyses conducted.	Project management to include transparent and well-defined consultation processes on project findings and deliverables, involving all stakeholders (possibly with representation of market participants) – including clear statements of assumptions. This can be addressed by ensuring the TWG has clear and well-defined mission statement which includes informing the TWG members of their responsibilities as member of the group.  E.g., the TWG Chairperson is responsible for the final comments to be adopted, where those will be agreed during a TWG meeting or email circulation
2	Miscommunication between project team members and clients or between project team, ETP and Philippines stakeholders	Misalignment of project direction, raising sensitive issues unnecessarily, or reduction in credibility of results / findings of study	Strict reporting guidelines established at the beginning of the project (in the inception phase) between project team members, ETP and project stakeholders.



No.	Risk	Consequences	Mitigation
	(PEMC, IEMOP, ERC)		
3	Required data is not available can't be provided because it is regarded to be confidential or sensitive	Compromises analysis, modelling and conclusions drawn from such analysis. This could lead to a lack of acceptance of the results or a need to rework analysis until it is accepted by stakeholders.	Several measures will be adopted: (1) use of Non-Disclosure Agreement (NDA) for data, (2) identification of gaps / incomplete data sets, (3) compilation of all key assumptions and circulation to stakeholders to ensure agreement prior to running any modelling / analysis, and (4) strong focus at project commencement on data collection and verification
4	Delays on sign-off by all relevant stakeholders on project reports	Project delays, and progressing with findings that stakeholders may not agree with	Measures can include provision of default assumptions that will be carried forward, timely circulation of reports, use of presentations / workshops to maximise understanding and imposing deadlines for feedback
5	Modelling results based on incorrect assumptions or leading to findings that are not in line with expectations of Philippines stakeholders (PEMC, IEMOP, ERC)	Acceptance of study findings will be compromised, or findings will in general not be endorsed, compromising project completion and progress. Could lead to poor decisions or recommendations being made.	Any modelling will ensure that assumptions are clearly stated and communicated to all stakeholders. Prior to the issuance of any modelling or analysis, the project team will internally review and "stress-test" the findings ahead of issuance to ETP where additional "sense checks" can be done ahead of more widely issuing the findings. Ensuring stakeholder buy-in to modelling assumptions is critical.
6	Disruption to project completion due to factors beyond the project teams' control – such as pandemics, natural disasters, military action, wars etc.	Ability to complete project in timely manner compromised, with delays in feedback, critical consultation sessions and other delays to progressing the project.	Continuous project meetings to monitor the situation, use of online meetings, adapting our project plan around any significant project disruptions – e.g., key meetings delayed or postponed, or inability to carry out stakeholder consultations.
8	Changing circumstances in the power sector – for example, new policies, new planning	Results and findings become outdated before project ends, or findings / recommendations needing to be	Careful, continuous monitoring of changes to policies, legal frameworks and / or market conditions – e.g., economic outlooks, demand forecasts and/or policies.



<b>No.</b>	<b>Risk</b>	<b>Consequences</b>	<b>Mitigation</b>
	objectives, new outlooks for supply (such as projects being cancelled, or new projects being committed to) or changes to outlook in demand.	adjusted in response to late changes – these in turn lead to delays, reworking modelling / findings / analyses which compromises ability to complete the project in a timely manner	



## 7 Gender Equality Strategy

During the implementation of this Project we propose to take the following measures:

- **In conducting consultation activities:** Gender stakeholders' consultation will be carried out with participation of women and men in the policymaking process to ensure that their voices are heard, and their priorities are reflected in policies, roadmap, and projects. We target the proportion of consultations involving female counterparts to be at least 30%. Furthermore, in situations where third parties are required to provide services to the project team (such as booking venues for workshops and procuring professional translation services), equal treatment will be provided between males or females.
- **In the management of our organizations:** Mobilize woman for promoting women involve in this assignment and achieving gender equality are core commitments of the IES and ECA JV. We take measures to ensure that women have the same benefits in this assignment as men – including daily rates, time for breaks and no discrimination against religion, age, or sexual orientation. There are activities in which participation by women is expected to be predominant; those areas include project accounting, administration, translation, workshop preparations etc. During project decision-making all team members input will be equally valued, from the Team Lead to project experts to our clients. Measures will also be taken to ensure the project team members all have uniform conduct during the engagement – in particular, both IES and ECA have codes of ethics and a gender mainstreaming codes of conduct that will be communicated to all project team members ahead of engagement.
- **During the workshops:** Measures will be taken to ensure gender equality in terms of the invitation list, ensuring that woman will have access to the workshop, will be entitled to the same opportunities, benefits, and resources during the workshop. Furthermore, workshops will be well equipped with equipment to ensure communication and knowledge transfer is fair and equal to all parties attending.
- **Positions of Experts within Project Team:** Equal pay and benefits for comparable roles with similar responsibilities has been ensured in the proposal. Both IES and ECA offer equal opportunities for promotions and career progression to both males and females internally.
- **Beneficiaries for Project Deliverables:** Measures will be taken to ensure that there is equal treatment of females and males in the implementation of deliverables to ensure that both females and males will gain equal benefits from the deliverables produced in the project. It is important that the projects deliverables and recommendations be disseminated to audiences represented both by females and males, and any subsequent training programs or implementation initiatives feature both groups at comparable ratios.



## 8 Communication & Coordination Strategy

### 8.1 Communication Plan

#### 8.1.1 Summary of Requirements

As stated in the project TOR, the communication plan should as a minimum include:

- Five (5) social media posts (in liaison with ETP),
- One (1) press release for each public workshop / event in at least 1 newspaper (to be cleared with PEMC and other beneficiaries,
- One (1) feature article / blog post on the project to be uploaded in ETP's website.
- Two (2) online presentations of project progress and highlights to the ETP secretariat and / or ETP funders, duration up to one hour each.

#### 8.1.2 Audience Mapping

Compared to functions and tasks, we have identified relevant stakeholders, the key beneficiaries of this project are as follows.

- *Philippine Electricity Market Corporation (PEMC)* serves as the autonomous group market operator and governing body of WESM.
- *Independent Electricity Market operator in the Philippines (IEMOP)* as the independent market operator of the WESM functions as the primary platform for wholesale electricity trading by managing new entrant registration, obtaining electricity bids and offers, demand forecasting, computing real-time market prices and dispatch schedules of participants, monitoring the day-to-day market trading, and managing billing, settlement, and collections, among other functions.
- *Energy Regulatory Commission (ERC)* is the primary regulatory body of electric industry of the Philippines. It enables the approval of investments for transmission infrastructure upgrades while also ensuring market fairness.

#### 8.1.3 Proposed Media Channels for Stakeholders Outreach

In identifying suitable media channels to be used for communicating the project to the stakeholders and wider public we have considered the following factors:

- Effectiveness in project communication.
- Professionalism and accountability of the media outlet.
- Appropriateness of the communication method for Philippines audiences' specifics, including the level of prevalence and the acceptance by the stakeholders for the chosen communication method.

On that basis, certain communication methods can be used to convey the project information to the public. Such media channels include:



- **LinkedIn:** Ensuring the professionalism and accountability of the published project information, while capable of reaching a sizable professional audience. The following addresses can be deployed:
  - UNOPS official LinkedIn page (in liaison with ETP)
  - Southeast Asia Energy Transition Partnership (ETP) official LinkedIn page (in liaison with ETP)
- **Newspapers:** To be cleared with PEMC and other beneficiaries.

In general, the specifics of the media channels to be used will be decided by PEMC and other beneficiaries.

#### 8.1.4 Proposed Methodology

The proposed methodology is that IES will prepare the text or summary of the project’s activity as required following completion of a given deliverable and will update it with any feedback. UNOPS will then be able to use their social media channels to post the content.

## 8.2 Donor Coordination Strategy

It is understood that the key donors working in the Philippines energy sector, other than UNOPS ETP, include: (1) World Bank, (2) Asian Development Bank, and (3) USAID. Based on recently released terms of references from World Bank and ADB, they are not engaged in work that overlaps with the specific content of this project. However, it is understood that USAID has been undertaking some work looking into issues around the performance of the WESM and on improvement to power market monitoring and surveillance.

It is recommended that during the first visit an effort be made to understand the USAID’s work and to ensure that work on this project is coordinated with work on their project.

## 8.3 Results-based Monitoring Framework

The RBMF tracks the contribution of the project to ETP’s Strategic Outcomes by tracking reporting against outputs and metrics on a quarterly basis. The results of the project will be monitored through the following RBMF outline as in Table 11. The Consultant will prepare and submit the quarterly project updates via the RBMF online spreadsheet that is managed by UNOPS’ consultant.

**Table 11 Results Based Monitoring Framework (RBMF) Outline (from RFP)**

RBMF Element	Description
Impacts	<ul style="list-style-type: none"> <li>• GHG emissions avoided or reduced – fossil fuel replaced by renewable energy.</li> <li>• Share of renewable in the total final energy supply (TPES) increased.</li> <li>• Increasing the share of the renewable energy mix to 35% by 2030 and at least 50% by 2040</li> </ul>
Outcomes	<ul style="list-style-type: none"> <li>• Strategic Outcome 2: De-risking renewable energy investments</li> <li>• Strategic Outcome 4: Knowledge and awareness building</li> </ul>



RBMF Element	Description	
Outputs	<ul style="list-style-type: none"> <li>Output 2.2: De-risked project finance is accessible via financial institutions generating a pipeline of large-scale renewable energy projects.</li> <li>Output 4.1: Stakeholders (relevant Government entities, public sector companies, financial institutions, private entities, academia, and consumers) involved in the RE/EE value chain, are knowledgeable and better informed to advance the energy transition agenda.</li> </ul>	
Indicators & Targets	Indicators	Targets
	Indicator 2.2-01: No. of new and existing, national, and international, financing options / instruments de-risked and opened for private and blended financing	Two (2) Instruments: <ul style="list-style-type: none"> <li>New methodology for setting price mitigating measures</li> <li>Revised regulation with new price caps that encourage investments into renewables, enhance market competition and lead to lower tariffs</li> </ul>
	Indicator 4.1-01: No. of studies, research, new evidence gathered and published, for raising awareness, improving knowledge base, driving decisions, and dissemination	One (1) study of the opportunities, barriers, and risks of RE merchant plants in the WESM
Indicator 4.1-02: No. of trainings, knowledge sharing events, and/or awareness workshops organized at national and regional levels building institutional capacity and knowledge networks	One (1) set of training sessions on electricity price simulations	
Activities	<ul style="list-style-type: none"> <li>Assessment of historical spot market prices, analysing trends and their impact on renewable energy participants.</li> <li>Analyse the impact of current price mitigating measures including offer price caps and floors, as well as secondary price caps to the market and on attracting investments in new renewable energy plants</li> <li>Review of international experience and best practices in setting price mitigation measures</li> <li>Update the methodology for setting price mitigating measures and determine new offer price caps and floors, and secondary price caps</li> <li>Prepare a standalone publishable report on the opportunities of renewable energy in the spot market, including risks and barriers</li> <li>Training for PEMC and IEMOP on price simulations and analysis</li> <li>Price simulations or modelling and analyses</li> <li>Consultations with relevant government agencies and market participants</li> </ul>	

