UNOPS

ANNEX 3: Schedule of Requirements

TERMS OF REFERENCES

Upgrading Design and Implementation of Energy Battery Storage Market Mechanism of the Philippines Electricity Market Mechanism

I. Background and Introduction

1. The Philippines has submitted its second nationally determined contribution (NDC) to the UNFCCC, committing to 75% greenhouse gas GHG) reduction by 2030.[1] This constitutes, together with the 2019 moratorium of coal fired energy production a basis for decarbonizing the Philippine economy and energy sector, twin goals aimed at enabling a conversion of the Philippines into a low carbon economy. A significant responsibility for decarbonizing the economy falls onto the energy sector, with the balance being shared by other sectors, predominantly industry, forestry, and agriculture.

2. The Philippines energy sector is governed by the policy making Department of Energy (DOE) under its Philippine Energy Plan (PEP) 2018–2040[2] embodying the United Nations Sustainable Development Goal (SDG) of affordable and clean energy, the Renewable Energy Act, Energy Efficiency Act, and the policy on Resiliency of Energy System and Infrastructure, PEP outlines eight energy sector strategy directions to: (i) ensure energy security, (ii) expand energy access;
(iii) promote a low carbon future; (iv) strengthen partnership and collaboration between private sector and Government agencies on energy-related issues; (v) monitor and integrate sectoral roadmaps and action plans; (vi) advocate the passage of DOE's legislative agenda; (vii) strengthen consumer welfare and protection; and (viii) foster international relations and partnerships.

3. The Philippines is projected to rely heavily on imported fossil fuel, even after 25 years. Renewable energy (RE) provides some 10% of the total primary energy supply (TPES) mix, down from exceeding a quarter of the TPES, giving way to a dramatic increase of coal and gas. The RE Act of 2008 and its National Renewable Energy Program aim to triple RE supply from the 5,440 MW by 2030 and raise it to 20,000MW of capacity by 2040. Electricity generation bears the greatest responsibility for the Philippines growth in GHG emissions estimated at 4.5% from 75.9 million tons in 2010 to 230.2 million tons by 2035, ie. 6% per year and from coal-fired generation by 7.4% per year with domestic transport and industry sharing this responsibility among other sectors.

Philippine Electricity Market Mechanism

4. Section 30 of the EPIRA mandated the DOE to establish the Wholesale Electricity Spot Market (WESM) and the Philippine Electricity Market Corporation (PEMC) was established in 2003 to be the Autonomous Group Market Operator (AGMO) and at the same time will be the governing body for the WESM through the Philippine Electricity Market Board (PEM Board) which has

equitable representation from electric power industry participants. Since the transition to the Independent Market Operator pursuant to EPIRA in September 2018, PEMC revitalized its governance function focusing on (1) Market Assessment and Monitoring; (2) Enforcement and Compliance; and (3) Market Development and Enhancements. PEMC's role is to remain steadfast and proactive in its mission to ensure that there is power, efficiency, market, and competition in the energy industry through the effective and efficient governance of the WESM.

5. The Philippines displayed continued growth of RE capacities in the past decade. In 2010, the RE MW level stood at 5,304.25 MW (33.4%). The DOE already reported in 2020 a total installed capacity of 5,502 MW for commercial use and 210.87 MW for own use. The RE capacity figures are still expected to increase, noting the upcoming 44 RE project applications under the RE Act of 2008, with a total potential capacity of 1,478.9 MW.

6. With the noticeable uptick in RE capacities caused by the introduction of market-making mechanisms for RE such as the Feed-in-tariff Program and the Renewable Portfolio Standards, considerable level of battery/ energy storage capacities were also pipelined by major players of the power sector to complement the RE capacities in light of their variability. With the increasing penetration of variable RE (VRE), ESS is recognized as one of the technologies to manage the intermittency of the VRE-generating plants' output by ensuring system stability as well as ESS as one of the key elements in the Philippine Smart Grid Roadmap promulgated by DOE to guide ihe Electric Power Industry in the implementation of initiatives to modernize the power system.

7. The integration of renewable energy resources, characterized by their intermittent nature, particularly wind and solar, may, to a certain degree, depending on the amount of penetration into the grid, cause significant degradation of system performance brought about by the variability of their output An increase in variability requires a corresponding increase in ancillary service. The Battery Energy Storage System (BESS) is a new technology that can provide Frequency Control Ancillary Services (FCAS), particularly, Contingency Reserve (Primary Reserve) and Frequency Regulation (Secondary Reserve).

8. The DOE posted in its website 2020 statistics for the private sector-initiated power projects which include Battery Energy Storage Systems (BESS), which are phased to be online in the next ten (10) years with total capacities of 720 MW, 260 MW and 210 MW for Luzon, Visayas and Mindanao, respectively.

9. Taking into consideration this level of capacities for BESS, the DOE and the Energy Regulatory Commission (ERC) issued a number of policies to accommodate the participation of BESS in the power sector, as follows:

    a. DOE Circular No. DC2019-08-0012 that provided the Framework for Energy Storage System (ESS) in the Electric Power Industry;[3]
    b. ERC Resolution No. 09, Series Of 2015 which classified the battery energy storage system as a new source of frequency control ancillary services;[4] and
    c. The WESM Rules[6], which is the rulebook for the operations and governance of the wholesale market, also put in place the process and requirements for the registration and operations of BESS as a generator together with other players in the market.

10. Rationale: Recognizing the flexibility of ESS technologies, and their eventual significant capacity share in the market, power industry players owning ESS may eventually acquire considerable opportunities to affect the prices and outcomes in the spot market that may disadvantage other market players. Hence, the benefits reaped from the introduction of RE in the spot market, including reduced market prices may be reversed.

11. The coordinated operations by the ESS within the electricity market needs to be complemented by an

effective governance framework in order to optimize the facilities' capabilities, while maximizing the near-zero costs of clean generation technologies participating in the market. Other jurisdictions such as the State of Texas in the United States were mindful of this and considered affecting some of these measures, among others as part of market governance:

- Imposing tighter compliance standards for the planned injection/ withdrawal of energy of the battery versus the real-time injection/ withdrawal, and
- Limiting the charging during low supply margin or emergency situations so that the supply level will be manageable and price spikes in the electricity market will be minimized.

II. The Purpose of the Project

12. **Purpose of the Project:** The Project will provide technical assistance for PEMC in the strategic context of the evolving role of power sector regulation, the regulator and the emerging objectives; as well as to establish a rule-based market operations in which battery energy storage can be extended to enable and to maintain a course for development of low-carbon electricity systems.

13. The Project will also provide technical assistance and capacity building to PEMC, in the establishment of a framework for the coordinated operations and governance of BESS and other ESS in the power grid for these facilities to reinforce the reliability and security of the grid where RE generators also participate. The selected applicant will provide advice and recommendations on this framework and identify mandates specific to PEMC in the performance of its governance mandate for BESS and other ESS participating in the electricity market.

III. Scope and Objectives of the Project

14. **The overall goal** of the Project is to ensure that PEMC holistically support energy transition and transition to low carbon energy systems and the Government's NDC. More specifically, the Project has the following specific objective:

a. Provision of policy and technical assistance in the development of measures/ mechanisms necessary to adequately govern the participation of BESS and other ESS in the WESM. The technical support will broaden and strengthen PEMC's governance functions to emerging technologies participating in the electricity market which include battery and ESS as part of the country's energy transition program. Likewise, it will determine the completeness of market policies with respect to BESS and other ESS, and recommend possible enhancements to the market design and protocols, as applicable. Specific results of the project are defined in Para. 15.

IV. Outcomes, Objectives and Milestones

15. **Outcomes and Outputs for Policy and Technical Assistance to PEMC:** Upon completion of the policy and technical assistance to PEMC, the Project will achieve the following outcome and outputs:

Outcome: Competitive conditions for the battery storage services in the wholesale electricity spot market, de-risking investments of the existing and new developers of renewable energy to finance renewable energy investments; and

Output 1: Conformance standards applicable to BESS and other ESS; and inception planning and preparation of the reports.

- **Activities within this Output include:** Conduct of workshops on international experience on the governance of ESS with PEMC-TWG as attendees and conduct of consultation meetings with relevant PEMC units, DOE, ERC and other relevant stakeholders (battery owners, RE developers, Grid Operator)

Output 2: Introduction of protocols for BESS and other ESS for their scheduling and dispatch in the energy-only and eventually in the co-optimized market for energy and reserves;

- Activities within this Output include: The preparation of the general design document for the governance of BESS and other ESS in the WESM:
- Identification of provisions of WESM Rules and Related Manuals that require amendments to incorporate the rules specific to the governance of the participation of ESS, and other needed enhancements under the WESM;
- Determination of market mitigating measures (i. e. market triggers and conformance standards) applicable to the participation of ESS in the WESM; and
- Identification of software functional specifications that include core functions to automate the market mitigating measures;

Output 3: Achievement of satisfactory compliance rating by the market participants who operate BESS and other ESS, determined by PEMC's Enforcement and Compliance Office; and

Output 4: Increased levels of competitiveness in the spot market in terms of BESS and Other ESS ownership.

- Activities within Outputs 3 and 4 include: Submission of finalized draft changes to relevant provisions in the WESM Rules and related Manuals; Conduct of public consultations regarding the proposed governance framework and market mitigating measures where the presence of advisors shall be required; Submission of software functional design and specifications; and Submission of final report (both public and complete versions) containing the final design of the governance framework and the market mitigating measures, and the proposed WESM Rules Changes taking into consideration the comments received from the public consultations and inputs from relevant stakeholders. A briefing on the final report and recommendations will be made by the advisors with PEMC-TWG, DOE and the ERC in attendance.

VI. Implementation Methodology

16. The Project will be implemented by making use of all existing information in the country, and particularly capitalizing on the existing knowledge of the policy, regulatory, legal, financial and energy sector standards and conditions prevailing in the Philippines. The methodology comprises a close contact and liaison with the staff of PEMC at all levels, identification of capacity building and transfer of technology, in design and implementation of the regulations, and development of a deep understanding of the technical and implementation challenges. The implementation methodology also assures legally and otherwise required consultations, stakeholder coordination and processes to ensure full capacity for compliance by the entitles. The implementation methodology will strengthen PEMC's leadership and technical capacity in all areas under the Project.