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ENERGY TRANSITION PARTNERSHIP

Powering Prosperity and Enabling Sustainability in South East Asia

The Philippines Grid Diagnostic: Smart Grid Development

Terms of Reference | 03 May 2022

IKEA Foundation

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

AFD Agence Française de Développement

CIFF Children's Investment Fund Foundation

Department for Business, Energy & Industrial Strategy

Growald Family Fund

Environment and Climate Change Canada
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Table of Contents

1 BACKGROUND

I. Southeast Asian Energy Transition Partnership

1. The Southeast Asia Energy Transition Partnership (ETP) is a multi-stakeholder platform that aims to accelerate the energy transition in Southeast Asia and deliver the Paris Agreement targets on climate change by bringing together government donors, philanthropies and partner governments. ETP aims to empower its partner countries to transition towards an energy system that simultaneously ensures environmental sustainability, economic growth and energy security. To achieve this goal, ETP will mobilize and coordinate the necessary technical and financial resources to create an enabling environment for renewable energy, energy efficiency and sustainable infrastructure in the region.

2. ETP seeks to empower partner governments through joint action, improved coordination and dialogue, and synergies to accelerate energy transition and overcome structural barriers to renewable energy, energy efficiency, sustainable financing, and resilient infrastructure. ETP supports energy transition under four strategic outcome areas of:

    a. policy alignment with climate commitments;
    b. de-risking of finance for energy efficiency and renewable energy investments;
    c. developing smart grids; and
    d. building knowledge and awareness on energy transition.

3. ETP is focused on Indonesia, Vietnam, and the Philippines in mobilizing and harmonizing efforts, initiatives, and resources. ETP's work should contribute to improved coordination and streamlining of technical assistance to facilitate the drive towards energy transition in these countries. This shall include the high-level technical advisory support, technical grant-making, sustainable finance and investments in renewable energy, training, and capacity-building, and cross-sectoral and transboundary dialogues among key stakeholders in the public and private sector.

4. ETP is a member of the Energy Transition Council (ETC), a multi-stakeholder Council established as part of the UK's COP26 Presidency. The Energy Transition Council aims to make clean and sustainable power the most affordable and reliable option for countries to meet their power needs efficiently and accelerate their clean energy transition, while ensuring a just transition and improved energy access for all. The Rapid Response Facility (RRF) of the ETC is a demand-led international initiative launched by the COP 26 Presidency as part of the Energy Transition Council

that mobilises fast-acting support to emerging economies for their energy transitions. The RRF consists of a central unit (the 'hub') providing strategic, advisory and coordination support and a network of international institutional partners (the 'spokes'). ETP is also a *'spoke'* partner of the RRF and has responded to various requests from the Governments in Southeast Asia made through the RRF, including this request to support the development of Smart Grids.

II. Current Status of the Grid and Energy Storage Development

5. **EPIRA and WESM.** The passage of the Republic Act 9136, also known as the Electric Power Industry Reform Act (EPIRA) of 2001, transformed the Philippine power sector by creating a Wholesale Electricity Spot Market (WESM) with competitive bidding. Furthermore, this legislation unbundled the generation, transmission, distribution, and retailing activities in the power industry, with the aim to develop a reliable, affordable, and accessible electricity market in the country.

6. **Privatization of Utility Assets.** Together with the enactment of EPIRA, government power sector assets were privatized, including the national grid. The aim was to address inefficiencies and fiscal problems, however, investments made by private sectors were passed down to consumers.

7. **Concession Agreement with NGCP.** In 2008, the Philippines government entered into a concession agreement with National Grid Corporation of the Philippines (NGCP), a consortium of Philippines-owned Monte Oro Grid Resources Corp., State Grid Corporation of China, and Calaca High Power Corp. The consortium submitted the highest bid offer during an auction conducted by the Power Assets and Liabilities Management (PSALM) Corporation.

8. **NGCP Franchise.** The Philippines Congress approved a bicameral resolution granting a franchise to NGCP for 25 years to manage and operate transmission facilities in the country. The Philippines transmission company, TransCo, turned over the operations, maintenance, and management of the transmission system to NGCP, while the ownership, however, remained with the Philippine government through TransCo.

9. **NGCP Initial Public Offering.** The Concession Agreement safeguards the interests of the Government, and explicitly mandates ERC as the regulating body. The law that granted NGCP the franchise in 2008 mandated NGCP to make a public offering of at least 20% of its outstanding capital within 10 years of operation. The Initial Public Offering was issued in May 2021, with a valuation of around $1.5 billion. The planned grid upgrades and expansion indicated in the Transmission Development Plan (TDP) will be co-funded by this public fund-raising and also by loans from partner local banks.

10. **RE Act of 2008.** The Renewable Energy (RE) Act of 2008 affirmed the commitment of the Philippines government to accelerate the adoption and utilization of renewable energy, with the goal to effectively reduce harmful emissions and achieve economic development by accommodating higher RE penetration in the country's electricity mix. At the time of the enactment of the RE Act in 2008, the share of renewable energy in the mix of electricity generation and installed capacity were both at about one-third (~34%). However, the share of renewables in the current capacity mix has since been dwarfed by the continuous construction of large fossil-based power plants, particularly coal.

11. **National Renewable Energy Program (NREP) 2020-2040.** This program sets a target of 35% RE share in the power generation mix by 2030 and more than 50% by 2040. The NREP included programs and projects that reinforce existing legislation—namely the Renewable Energy Act of 2008 and the Biofuel Acts of 2006—such as the renewable portfolio standards (off-grid and on-grid), open and competitive selection process, green energy option program, productive use of RE, net metering, and development of 25 competitive RE zones

12. **Power Grid Vulnerability.** In 2020, the Philippines has an installed capacity of 26.3 gigawatts (GW) and a dependable capacity of 23.4 gigawatts (GW). Occasional brownouts, repair, and rehabilitation occur due to the ageing power plants embedded in the Luzon grid, and that accounted for two-thirds of the 126 existing power plants. Moreover, the country experiences an average of 20 typhoons annually, with more intense typhoons near the end of the year. These typhoons damage dilapidated power infrastructure and further cost the country an average of 0.5% of its GDP annually.

13. **Market issues in WESM.** Commercial operation of the Wholesale Electricity Spot Market started back in 2006 to ensure quality, reliable, secure, and cost-efficient electricity for Filipino consumers. However, the WESM still encounters several market issues including large capacities not offered in the market, high level of power plant outages, and transmission congestion problem which often contributed to high incindents of pricing errors, and high market prices.

14. **Weaknesses in the Luzon Grid.** The Malampaya natural gas field, which supplies 30% of electricity in the Luzon grid, is set to close by 2024 due to expiration of the concession contract and the forecast depletion of the field by 2028. This will further exacerbate the country's energy insecurity. With only 400 MW transfer capability of the High-Voltage Direct Current (HVDC) interconnection between the Visayas and Luzon grids, energy-rich Visayas is constrained to supply the Luzon grid, thereby exposing the country's largest grid to "yellow" and "red" alert warnings. On 26 March 2022, the Luzon grid was briefly placed under "yellow" alert after a combined 2,011 MW of generating facilities suffered forced outages. The System Operator, NGCP, reported an operating requirement of 9,998 MW while the available capacity on the grid was just

10,487 MW - leaving 489 MW of reserve capacity[1] . According to the Philippine Grid Code (PGC), contingency reserve should not be less than the largest synchronized generating unit connected to the grid, in this case the Sual Power Station with a nameplate capacity of 1200 MW. Below this threshold value, the grid will be placed on alert level, posing threat to the country's energy security[2].

15. **Context of the RE Act.** The RE Act exists within an energy law ecosystem together with the EPIRA Act of 2001, the Biofuels Act of 2006, and the Climate Change Act of 2009 (the latter provides the legal mandate for actions to address climate change). Despite these legal mandates to spur and support renewable energy investments in the country, there are a number of significant barriers to increased penetration of renewable energy into the Philippines electricity system:

    a. The continued reliance on coal. Coal has been given a skewed advantage over renewable energy under the current regulatory regime, which favours the lowest cost power supply option, and which does not account for the health and environmental costs or the risk associated with stranded coal assets alongside an overall declining case for coal power. While coal power plants are deemed to be secure investments that provide continuous revenue streams by availing of the automatic pass-through of the fuel costs to the consumers with little consideration of the future costs of coal power. While generating companies are well-versed in the construction and operation of these power plants, there should be a re-examination by the Energy Regulatory Commission of the pass-through costs for fossil power plants together with additional training and skills development

    b. Renewables are seen as high-risk investments. Renewable energy projects are considered risky given some existing concerns over variable renewable energy. Power companies rely on foreign contractors to gain sufficient experience in developing and operating newer, clean technologies. This along with the higher cost of capital in the Philippines, translates into higher costs for renewable energy projects in the country when compared to countries in Europe and the United States. Although renewables are entitled to receive a Feed-in-Tariff (FiT), project development risks are much higher for RE projects and installations are subject to caps. This translates into regulatory advantages for the development of coal power plants, for which developers are guaranteed returns on capital expenditure and operating expenses under power purchase agreements (PPAs) for 20-25 years while disregarding the long-term costs of pursuing coal power. Adequate regulatory framework can de-risk renewable energy and support the deployment of accelerated renewable energy in the Philippines.

[1] Luceno, M. (2022, March 27). Luzon grid placed on yellow alert after seven-plant outage. *Business World.* https://www.bworldonline.com/economy/2022/03/27/438388/luzon-grid-placed-on-yellow-alert-after-seven-plant-outage/

[2] Grid Management Committee (2016). Philippine Grid Code. *Energy Regulatory Commission.* https://policy.asiapacificenergy.org/sites/default/files/PGC2016Edition%28ResolutionNo22Seriesof2016%29.pdf

c. The intermittency of variable sources of RE is still an issue. The RE Act of 2008 explicitly targets development of indigenous renewable energy sources to achieve energy independence and mitigate GHG emissions. With the continuous falling cost of renewable technologies, particularly solar panels, and wind turbines, these RE technologies will dominate the electric power landscape in the future. However, the intermittency and variability of solar and wind power requires the presence of additional system reserves. Intermittency can also be addressed by enabling technologies such as energy storage systems, which can store electricity when demand is low and discharge electricity demand is high. Energy storage technologies are deemed expensive up-front, but with proper regulations and incentive mechanisms, they can be cost-effective in the long run.

d. The current grid infrastructure has a limited capacity to accommodate high-penetration levels of RE. Integration of variable renewable energy becomes difficult at high penetration rates. The proliferation of coal plants further complicates the operation of the grid as these types of plants cannot be turned on and off instantaneously to compensate for the intermittent renewable energy supply. In view of such factors, there is a need for more distributed and smart grid technologies to handle large scale renewable investments and to address calamitous outcomes caused by typhoons.

e. Mechanisms under the RE Law are neither maximised nor optimized. The RE Act of 2008 calls for Renewable Portfolio Standards (RPS), which mandate distribution utilities to augment their power supply with renewable energy sources and the Green Energy Option Program (GEOP), which provides competitive retail competition for green energy by end-users to demand clean energy and benefit from value-added tax exemption for renewable energy supply.

   Moreover, the RE Act of 2008 also implemented the net-metering scheme as the first non-fiscal incentive through the installation of solar PV panels of up to 100kW, wherein residential and commercial establishments, or the end-users become “prosumers” themselves – producing and consuming electricity at the same time. The end-users can generate savings on their electricity bills and protect themselves from volatile electricity prices.

   These mechanisms are slowly gaining momentum, especially with the expansion—beginning in February 2021—in Retail Competition and Open Access (RCOA) to end-users with an average monthly peak demand of at least 500kW for the preceding 12 months. However, provisions for the Renewable Energy Market that would facilitate trading in Renewable Energy Certificates (REC) and the Renewable Energy Trust Fund that would provide funds for

research and development, training and information dissemination are not fully maximised under the current regime.

III. Donor Assistance to the Energy Sector

16. **Mapping of Related Technical Assistance.** As of January 2021, per an ETP Donor Mapping Survey, more than ten development partners[3] were actively supporting the Government of the Philippines in the energy sector. Despite this, grid technology has received little donor support. Annex 2 provides an overview of ongoing technical assistance related to smart grids development and battery energy storage. On the whole, there is a lack of support to the Philippines in financial engineering to improve grid flexibility and extend smart grids.

17. The ETP is currently funding two technical assistance projects to address various aspects of the smart grid ecosystem in the Philippines:

    a. Upgrading of Energy Regulations for the Energy Regulatory Commission (ERC). This consultancy will run from January 2022 until the 3rd quarter of the year. This response comprises technical assistance for ERC in the strategic context of the evolving role of power sector regulation, the regulator and the emerging objectives.

    b. Design and Implementation of Battery Energy Storage Market Mechanism for Philippine Electricity Market Corporation (PEMC). This technical assistance support started in January 2022 and will run until the 3rd quarter of the year. The consultancy provides technical assistance for PEMC in the strategic context of the evolving role of power sector regulation, the regulator and the emerging objectives; and with the aim to establish rules-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.

[3] ADB, AFD, Carbon Trust, ETP, EU, GIZ, IRENA, JICA, OECD-CEFIM, UK, USAID, World Bank, WRI

2 PROJECT DETAILS

IV. Rationale

18. The Philippine Grid Diagnostic Project (the Project) will address two key challenges facing the country as it upgrades its power grid to be smart grid compatible and be able to integrate an increasing share of variable renewable energy in the generation mix. The objective of the Project is to identify a "roadmap" for grid upgrades together with high priority modernization investments and develop prioritized technical packages for imminent investment to improve grid flexibility and extend smart grids.

19. Secondly, the Project will advise DOE on the resources required to achieve the Government's RE targets with respect to achieving the necessary grid flexibility and to remove any impediment currently posed by the transmission and distribution grid to RE integration. The Project will review impediments for the Government and the grid network to access finance, private and public, for required investment under the prioritised technical upgrade roadmap, review the current governance framework and identify any barriers and propose resolution of any such barriers, based on international experience and innovative concepts. The geographic scope of the study includes the Philippine main transmission and distribution grid, ranging from Luzon, Visayas, and Mindanao. The Project is a Government of the Philippine's request channelled to ETP through the RRF under ETC.

20. The rationale for such technical assistance stems from the fact that:

    a. **There is a lack of an investment roadmap to upgrade the grid**. Variable renewable energy can become a mainstream solution to meet the Paris Agreement targets. However, the Philippine grid lacks the technical capacity to accommodate high level penetration of these intermittent resources.

    b. **There are gaps and challenges in the grid governance structure.** There are gaps and challenges in the grid governance structure that are hampering planned grid modernization and upgrades, thus hindering the development of variable renewable energy. A review, analysis and proposal of solutions in order to address gaps in this structure is required.

V. Objectives

21. By developing a roadmap for investment upgrades, the Project will provide recommendations to the DOE in a form of 'an alternative view' to enable priority investments into the grids in Luzon, Visayas, and Mindanao to pave the way for

significant expansion in the share of RE in the total primary energy supply. The Project will support the national goal of modernising the Philippine power grid to ensure flexibility, security, and resiliency. The **objectives** for each of the two components are laid out below together with a cross-cutting component regarding communications to enable DOE and other Stakeholders' ownership the Project outcomes and outputs:

Component 1: Roadmap for Regulatory and Investment Upgrades.

22. This component covers the identification of necessary and prioritized investment upgrades for the Philippine power grids (Luzon, Visayas, and Mindanao) in order to modernize the grids and make them smart grid compatible, and able to accommodate increasing amounts of variable RE. The objective is to develop a single reference point (a "road map") and priority technical packages to ensure that relevant government agencies and key industry players share a common understanding of the investments, and regulatory frameworks that are needed in grid optimization, along with a and timeline for driving smart grid development in the Philippines

Component 2: Review of the Electricity Governance Structure.

23. This component entails a review of the current regulatory governance structure for the Luzon, Visayas, and Mindanao grids, with the aim to identify current challenges and bottlenecks, and short-and medium-term strategies that can be implemented to ensure that adequate amounts of maintenance and forward-looking investment are made to modernize and upgrade the grid infrastructure.

24. It is essential for the operation of a smart grid to ensure that the regulatory and governance structures support proper design and effective and efficient operation of the grid. At the same time, it is important that the regulatory and investment framework supports and incentivizes investment in the grid to ensure that the infrastructure is updated and supports real-time monitoring and operation.

25. At present, government and private sector investments (both planned and actual) into smart grid upgrades do not meet the needs laid out in the policy and regulatory vision. DOE, ERC, PEMC and key stakeholders acknowledge that the current governance situation results in ineffective implementation, and it is preventing the grid from attracting and absorbing investment for the necessary upgrades.

26. In order to address these challenges, this component is designed to provide DOE with a review (an "alternative point of view") of the governance structure and mechanisms for the Luzon, Visayas, and Mindanao grids.

27. The highlight of this component will be to investigate and identify the hindrances and gaps within the governance structure and the franchise agreement, despite its regulating authority and binding agreement, the causes and issues that surround the

context of grid upgrades and investments. This component will also provide alternatives and strategies that will be presented by the consultant to DOE and other stakeholders in an inter-departmental setting, with the aim to develop a consensus on short- and medium-term actions that DOE and ERC can take to overcome current inefficiencies and lack of investment into the Luzon, Visayas, and Mindanao grids.

28. In light of the above background, the objective of this component is to develop options and alternatives for changes in grid governance, as well as short-term strategies for overcoming challenges caused by the current grid governance, to enable grid upgrades and extension of smart grids and facilitate greater variable renewable energy into energy supply mix and, as a result, this is to help the country achieve its NDC and renewable energy targets.

Component 3: Communications and Information Dissemination

29. In view of the advisory nature of the Project and to ensure the information is correctly and sufficiently disseminated, work under this component involves a preparation of a communications strategy for the Project. Energy regulators and the Government, including DOE, have several communications and consultation processes that have been standardized to engage with the sector stakeholders. This communication strategy will be based on the information developed in the Project outputs, proposals and recommendations as well as a structured program of dialogue and exposure to alternative international experience with unbundled governance regimes and resolution of issues akin to those experienced in the Philippines.

30. The Communications strategy includes provision of exposure of the DOE and other relevant stakeholders to pertinent international investment and governance experience to suggest pathways for the Philippines to reach its RE goals. In the effort to drive results-focus and issue-resolution, the Consultant will arrange for and participate in all the stakeholder activities and lead and support these events, providing for the background materials and post-event summaries and minutes and engage in all the sessions.

VI. Expected Outcomes and Outputs

31. ETP's strategy and results-based monitoring framework is focused on enabling the Philippines to achieve its NDC commitment of 75% reduction in GHG emissions by 2030. Upgrading current energy regulations through reforms in the existing policies and codes will attract overdue necessary upgrades to the grid system, facilitate entry of more REs and smart technologies and play a part in derisking the renewables sector.

32. The Government has requested for funding to enable increased flow of investment into smart grids and renewable energy in the Philippines' power sector through the

ETC RRF process. ETP has been selected for funding the project. The expected **outputs and outcomes** for each of the two components are laid out below:

Component 1: Roadmap for Regulatory and Investment Upgrades

33. The roadmap for regulatory and investment upgrades in the Philippine grid will build on existing analysis and work relevant to the identification and assessment of the priority investment roadmap. This will ensure that there is no duplication of work between consultants, as well as a common understanding about the necessary investments in grid upgrades and modernization

34. The outcome of this component will be the identification of medium- and long-term investment packages that will be needed in order to effectively upgrade and modernize the Luzon, Visayas, and Mindanao grids, including smart grid development at distribution level - structured in a staged road map, enabling DOE to pursue extension of the smart grid and grid flexibility compatible with the Government's goal for increased share of RE in the energy supply and the NDC targets.

Component 2: Review of the Electricity Governance Structure

35. The analysis of the regulatory governance structure of the Philippines grids will yield the following outputs and outcomes:

    a. Case studies and examples of effective grid governance in similar unbundled power systems internationally, with analysis of how policymakers and regulators dealt with governance challenges.

    b. Recommendations for short-, medium-, and long-term policy and regulatory steps that DOE and ERC can take to overcome current governance challenges that are hindering investment into adequate grid maintenance, as well as into the grid upgrades necessary to support higher shares of variable renewable energy generation in the future.

    c. The outcome of this work will be a fundamental issue analysis, recommendations with respect to the governance, legal, and regulatory adjustments that enable and attract both public and private sector investment in the necessary grid upgrades (including those upgrades that will be identified in Component 1 of this consultancy) including a summary of innovative financing mechanisms and tools

36. The expected outcome of this component will include development of a reliable, secure, stable and high-quality power supply in the country. This will involve enhancement in a governance (policy, regulatory, legal, and other aspects, as relevant) regime encompassing the Grid Owner, System Operators, and Market Operators to ensure the sustainability of the Project outcomes.

VII. Beneficiaries and Impact

37. The key beneficiaries of the Project are the officials, technical personnel and stakeholders of DOE and ERC. Key stakeholders include industry players, participants in the electricity market, and potential investors in the smart grid and energy storage system projects and businesses. Ultimately, all Philippines electricity users will benefit from a more efficient, cost-effective, and resilient power system. Other players in the power industry will also benefit from the Project, including private generator companies, civil society organizations, non-profit entities, local governments, and energy sector institutions, including power utilities and other market intermediaries. The recipient of the technical grant shall be DOE as the lead agency, which shall be tasked to support, oversee, and maintain the activities involving the design and implementation of the reserves market.

38. The Project will contribute to the national grid, RE investments and deployments, and energy efficiency targets of the Philippines, and to achievement of the country's commitments under the Paris Climate Agreement.

39. The Project will support smart grid expansion and improvement in grid flexibility in the Philippines to foster the energy system's capacity to attain the Government's goal to increase public and private investment flows into energy transition and renewable energy in each of its target countries. The project is expected to stimulate a measurable increase in public and private investment flows into smart grid and renewable energy in the Philippines. The Project will contribute to the Government's performance indicators identified in the PDP 2020-2040.

3 IMPLEMENTATION & TIMELINE

VIII. Implementation Arrangements and Main Activities

40. The Project will require active engagement by a spectrum of energy sector stakeholders in identifying problems and solutions to facilitate effective overview of the assignment. The Project is designed to be highly inclusive, and it will require coordination with, and involvement of, key officials and personnel from DOE, ERC and PEMC.

41. The Project will benefit from access and exposure to the Technical Working Group (TWG) of the DOE and ERC, which usually is organized monthly, and the frequency of these engagements may need to be increased to provide sufficient engagement and consultation opportunities to solidify the assignment's understanding. To ensure that the Project captures the benefits of, and is highly complementary to, it will also

engage with the ongoing external assistance provided to the sector particularly as identified in Annex 2.

Component 1: Roadmap for Regulatory and Investment Upgrades.

42. The consultant will carry out the following tasks under this component:

a. *Task 1.1. Review of current plans for grid expansion, modernization, and upgrades.* This task will involve a review of current plans for investment into expansion and modernization of the Luzon, Vizayas, and Mindanao grids. The aim of this review will be to identify gaps in investment, and areas where additional modernization and upgrades will be necessary in order to make the grids smart grid compatible, that is adequate and able to absorb and evacuate increasing amounts of variable RE and distributed energy generation. **Prepare a diagnostic report on the current status of grid rehabilitation and implementation progress, including existing smart grid initiatives being implemented by private distribution utilities, progress toward extending smart grids to prepare the network for increased variable renewable energy, and develop an analysis and recommendations on the issues stemming from the diagnostic.**

b. *Task 1.2. Define technical challenges and solutions.* In this task, the consultant will describe the technical, regulatory, and financial challenges that may impede the necessary upgrades and modernization investments in the grid. The consultant will carry out an in-depth analysis of the technical needs and institutional landscape concerning the Philippine grid investments, drawing on any relevant works on regulatory investment barriers defined from "Upgrading Energy Regulations for Energy Regulations Commission (ERC) of the Philippines", or from other related projects outlined in Table 1. This technical and political-regulatory analysis, which will include identification of specific grid upgrades and investments needed for the Luzon, Visayas, and Mindanao grids to make them smart grid compatible and adequate for the timely integration of variable renewable energy sources. **Prepare a compendium of priority rehabilitation and upgrade requirements required for extending smart grids and will be presented and discussed within a focused group.**

c. T*ask 1.3 Define institutional challenges and solutions*. The Consultant will review and identify any issues or barriers stemming from the institutional landscape concerning Philippine grid investments, drawing on any existing relevant work. This technical and political-regulatory analysis, which will include identification of specific upgrades and investments needed in order to upgrade the Luzon, Visayas, and Mindanao grids to make them smart grid compatible. Once the analyses have been carried out, the results will be presented and discussed in a focus group. **The Consultant will prepare a diagnostic report on the current**

status of institutional arrangements, embedded issues and recommendations for resolution, citing examples from international experience to progress grid rehabilitation and upgrade investments so as to achieve the RE targets of the Government.

d. *Task 1.4. Inter-agency Workshop to Share and Reflect on Findings.* The consultant will present the provisional findings and recommendations from its work in Task 1.1 and 1.2 in an inter-agency brainstorming workshop convened by DOE. Representatives should include relevant government agencies (DOE, ERC, PEMC, and TransCo), concessionaires (e.g. National Grid Corporation of the Philippines (NGCP), Distribution utilities and Electric Cooperatives, and key industry stakeholders (PEMC and IEMOP) to discuss and debate the **proposed roadmap**, identifying challenges and offering amendments and improvements.

e. *Task 1.5. Final report with a detailed road map for investment upgrades.* The consultant will develop a final **roadmap** in a detailed report that is refined based on input and consensus developed during the inter-agency workshop discussions. The detailed roadmap should identify a number of specific grid investment packages (at the pre-feasibility stage) that will be needed in order to modernize the grids and make them smart-grid compatible. The report should also contain specific support needed by distribution utilities and electric cooperatives. **The report and the roadmap will explore and recommend technical and market conditions, feasibility and pathways for the implementation of the recommendations and its financial impact to end-users. The "Final Report" prepared by the consultant will only be considered final upon review and approval of ETP and DOE.**

Component 2: Review of the Electricity Governance Structure

43. The consultant will carry out the following tasks under this component:

a. *Task 2.1. Review of current policy regulatory governance structure, mechanisms, and regulations in the Philippines.* To avoid duplication, this review be carried out at the concurrently with the review under Task 1.1; will draw largely on data collected from other pertinent projects included and outside of the Annex 2, as relevant, as well as from DOE and other stakeholders and be supplemented by additional research and interviews, as needed. The focus of the diagnostic will be on the policy, regulatory, legal, and governance structures and mechanisms pertaining to the Philippine's institutional and governance conditions related to management and operations of the grid. The consultant will comprehensively review and assess the transmission planning and investment policies, regulations, and investment accomplishments including the approval process of the TDP. It will assess opportunities and identify risks and solutions to ensure that the necessary investments to rehabilitation and upgrades to improve grid

flexibility for VRE integration be implemented. **The diagnostic report will contain a problem analysis and provide recommendations for resolution based international experience as well as identify legal and financial solutions.**

b. *Task 2.2. Review of grid governance structures and related regulations in similar unbundled power systems internationally.* In this task, the consultant will select at least three, but ideally all, international examples for case studies that serve as pertinent examples for the Philippines to learn from. The examples will be agreed upon with DOE in advance of carrying out the detailed analysis. In each case study, the review will provide the regulatory context, describe the governance structure, and describe challenges faced and solutions developed to attract the necessary investment for smart grid upgrades. The case study will include an analysis of how policymakers and regulators dealt with governance challenges, and how they ultimately resolved those challenges. The review will include recommendations for short-, medium-, and long-term policy and regulatory steps that DOE and ERC can take to overcome current governance challenges that are hindering investment into adequate grid maintenance, as well as into the grid upgrades necessary to support higher shares of variable renewable energy generation in the future. Peer-learning activities and dialogues with selected regional economies having similar unbundled power systems will also be pursued to share and discuss their experience – that contributed to their success and the lessons learned from their implementation. **The comparative analysis report will include a clear assessment of the choices selected in these energy regimes, the pros and cons of these choices, the variance from the Philippine case, and opportunities for learning and adaptation with respect to the Philippines situation.**

c. *Task 2.3. Inter-agency Workshops to Share and Reflect on Report Findings.* The consultant will coordinate with DOE to implement an inter-agency brainstorming workshops, where the consultant will share the findings and recommendations from its review and gains feedback and input from DOE, ERC, PEMC, NGCP, in order to develop a common view of the key issues faced, and on those recommended actions that may be able to effectively address the situation. **These discussions and proceedings will be recorded in workshop reports.**

d. *Task 2.4. Final report with recommendations on regulatory governance structure.* The consultant will prepare a comprehensive report accounting for all inputs from the problem analysis, possible solutions offered by the international experience, workshop dialogue and conclusions, and develop a final report, which will serve as a review and an “alternative viewpoint” and advise on the governance structure for DOE and ERC on the current and future regulatory governance structure for the three power grids. The expected outcome of this

work will be regulatory adjustments that increase confidence in grid operation and attract both public and private sector investment in the necessary grid upgrades (including those upgrades that will be identified in Component 1 of this consultancy. The "final report" prepared by the consultant will only be considered final upon review and approval of ETP and DOE.

Component 3: Communications and Workshops

44. The consultant will organize and lead various information dissemination and consultation sessions, which will take the form of meetings and workshops to ensure appropriate consultation processes are carried out and that there is a gradual integration of lessons and views from stakeholders. The consultant will be responsible for preparing a succinct powerpoint to deliver key findings to a range of stakeholders, to build ownership of the outputs to attain the intended outcomes.

45. The overall work to be undertaken by the grid diagnostics consultant is outlined in the indicative timeline below. Actual timelines may differ upon analysis from the consultant, with the below as a suggested guideline.

Task	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
Component 1: Roadmap for Regulatory and Investment Upgrades								
Task 1.1: Review of current grid regulations, codes, circulars								
Task 1.2: Define technical challenges and solutions								
Task 1.3. Define institutional challenges and solutions								
Task 1.3.1: Focus Group Discussion								
Task 1.4: Workshop to Share and Reflect on Findings.								
Task 1.5: Final report with a detailed roadmap								
Component 2: Second Opinion on the Regulatory Governance Structure								
Task 2.1: Review of current regulatory governance structure								
Task 2.2: Review of grid governance structures and related regulations in similar unbundled power systems internationally.								
Task 2.3: Inter-agency workshop to share and report on findings								
Task 2.4: Final report with recommendations on regulatory governance								
Component 3: Deliverables and Communication Plan								
Task 3.1: Report Dissemination and Workshops								

IX. Deliverables and Timeline

Table 1 provides the specific deliverables and timelines with the payment references

Deliverable Milestones	Corresponding Tasks	Indicative Timeline	Percentage Payment
Inception Report. Inception plan includes a work plan in the form of an updated Gantt chart for the entire assignment,	All tasks under components 1-3	2 weeks after contract signature	15% of LS component of

covering all aspects of the work, in the context of the inception report. The inception report will include the evaluation and monitoring framework with baseline and target data, in alignment with ETP's Results-based Framework. The consultant will discuss the inception report in a kickoff workshop(s), involving stakeholders of the initiative.			the contract amount
Submission of Midterm Report **Report with analysis, assumptions, challenges, reflections and executive summary on listed Tasks, which are to be attached as Annex.**	Task 1.1 Task 1.2 Task 1.3 Task 2.1 Task 2.2	16 weeks after contract signature	35% of LS component of the contract amount
Workshop Report **A summary of activity from the workshops, including submissions of powerpoint slides, attendance lists and a report detailing the findings, dialogues and conclusions.**	Task 1.4 Task 2.3	20 weeks after contract start date	10% of LS component of the contract amount plus reimbursable as per costs
Submission of the First Draft Report.	Task 1.5 Task 2.4	24 weeks after contract start date	20% of LS component of the contract amount
Acceptance of Final Reports	Task 1.5 Task 2.4	28 weeks after contract start date	20% of LS component of the contract amount
Workshops and stakeholder engagement	Component 3	8 weeks after Final Report acceptance date	Will be paid at-cost

The timeline reflected above is an indicative timeline for consultants to submit the deliverables. Time for ETP / UNOPS to review the submission and provide feedback to the consultant should be considered.

X. Assumptions

46. This Project assumes that DOE, ERC, and PEMC, TransCo, and NGCP will cooperate to ensure its effective implementation and coordinate and support the Project activities.

47. The Project assumes that the ongoing technical assistance (working with ERC and PEMC) will cooperate and share data; that this work will be performed in parallel with the support: and fundamentally, that this Grid Diagnostics Project will be informed by the work done under progress and leverage and build on existing work.

48. The consultant will possess competent knowledge on the energy transition issues, energy system governance in various legal regimes, technical competence on power systems planning and operations particularly those similar to the case of the Philippines, as well as the regulatory conditions and standards in the Philippines.

49. The ERC and DOE will ensure that all data and documents will be available for the consultant and will remain reasonably available to support the Project.

50. The Project will work under the overall guidance of ETP Steering Committee, its Secretariat and Advisory Committee, the DOE, ERC, and the Government of the Philippines. The consultant will coordinate with Government agencies to arrange for a focus group consultation and inter-agency review process to provide guidance for the outputs of the Project and advise on its directions and focus to ensure comprehensive coverage of the energy sector responsibility and contributions with respect to the NDC goals.

XI. Project Management

51. This Consultancy on Diagnostic and Roadmap for Smart Grid Development is envisioned to run for 10 months, unless otherwise agreed.

52. The Diagnostic and Roadmap for Smart Grid Development will be financially managed and administered by the ETP Secretariat in Bangkok, Thailand.

XII. Sustainability Measures

53. ETP values sustainability and advocates for better gender equality. With this consideration, we include the following as one of the sustainability measures:

54. The bidder shall provide a response that demonstrates its commitments to support gender equality and women's empowerment throughout its operations."

XIII. Qualification and Experience of the Service Provider

59. The consultant's project team should demonstrate the capacity to execute the works and should include all essential roles filled with personnel with relevant experience. CV's of the personnel proposed should be used to verify this information. The lead individual should have the following qualifications :

Education

- Master's Degree in Energy, Engineering, Economics, Climate Change, Social Sciences, Political Sciences, Development or related field is required.

Work Experience

- A minimum of 15 years of relevant experience in similar role, with minimum 5 years of leadership experience
- Professional experience in grid technology, digitalization, grid flexibility and integration issues, technical, governance, economics, financial, and packaging of grid investment requirements.
- Professional experience in energy system modelling and forecasting
- Previous successful involvement with, and good knowledge of, donor, government, private sector and civil society is desired
- Knowledge of the energy sector modelling and forecasting, energy transition, political, economic and social situation in the Philippines is desired
- Computer literacy in Microsoft packages (MS Word, MS Excel, MS Access, MS Power Point) is required
- Bidders should propose a team that has the required skills, knowledge, and experience to provide the service within the timeframe outlined in this Terms of Reference. While ETP does not prescribe the composition of the team, the below list might be used as a reference on the expertise that the proposed team needs to have:

    a) Electrical Engineering
    b) Renewable Energy and Energy Transition
    c) Energy Economics and Finance
    d) Energy sector institutions, planning and governance

- The bidder should also assign a Contract Manager who would liaise on the non-technical part of the contract implementation, including coordination, liaising with key counterparts, liaising with UNOPS on submission of invoices and payment-related documents.

5 Evaluation Criteria

- Eligibility and Formal Criteria
  a) The criteria contained in the table below will be evaluated on a Pass/Fail basis and checked during the Preliminary Examination of the proposals.

Criteria	Documents to establish compliance with the criteria
1. Offeror is eligible as defined in Instructions to Offerors, Article 4 In case of JV, all JV members should fulfill this requirement	• Form A: Joint Venture Partner Information Form, all documents as required in the Form, in the event that the Proposal is submitted by a Joint Venture. • Form B: Proposal Submission Form
2. Completeness of the Proposal. All required Questionnaires (if any), and Returnable Bidding Forms and other documentation requested under the Document Checklist section have been provided and are complete	• All documentation as requested under Instructions to Offerors Article 10, Documents Comprising the Proposals
3. Offeror accepts UNOPS General Conditions of Contract as specified in Section IV	• Form B: Proposal Submission Form

- Qualification Criteria
  a) The criteria contained in the table below will be evaluated on Pass/Fail basis and checked during Qualification Evaluation of the proposals.

Criteria	Documents to establish compliance with the criteria
1. The company should have a minimum of 5 years of experience in delivering similar projects in the past with a track-record of success. In case of JV, the experience will be calculated as an accumulation of the experience of each of the JV members.	• Certification of incorporation of the Offeror • Form F: Performance Statement Form
2. Offeror must provide a minimum of two (2) customer references from which similar services have been successfully provided, within any of the last 5 years	• Form F: Performance Statement Form

- Technical Criteria
  a) Technical evaluation will be carried out to bids that pass the eligibility, formal and the qualification criteria, with requirements as follows:
  b) The maximum number of points that a bidder may obtain for the Technical proposal is 80. To be technically compliant, Bidders must obtain a minimum of 56 points
  Minimum pass score: 70% of maximum 80 points = 56 points

Technical proposal points allocation

Section number/description		**Points Obtainable**
1.	Offeror's qualification, capacity and expertise	25
2.	Proposed Methodology, Approach and Implementation Plan	35
3.	Key Personnel proposed and Sustainability Criteria	20
Total Technical Proposal Points		80

Section 1

Section 1: Offeror's qualification, capacity and expertise		**Points**	**Sub-points**
1.1	Brief description of the organization, including the year and country of incorporation, and types of activities undertaken, including relevance of specialised knowledge and experience on similar engagements done in the past. Bidders partnering up with a Filipino entity to provide for the strategic consultation; as well as the communications expertise is considered a valuable asset. (Max 4 pages written text plus 1 Matrix)	20	
	1. Experience in projects of comparable size, type, complexity and technical specialty		10

	2. Experience in providing similar services in the region, especially the Philippines		5
	3. Understanding of local context, and partnering up with a Filipino entity to provide for the strategic consultation; as well as the communications expertise		5
1.2	General organizational capability which is likely to affect implementation: management structure, and project management controls. (Max 4 pages written text)	5	
	1. Management structure, management controls, and extent to which any part would be subcontracted		3
	2. Financial Capacity/financial stability: Bidder should have minimum annual turnover of 150,000 USD in any of the past 2 years Liquidity / quick ratio should be minimum 1, in any of the past 2 years . In case of a joint venture, annual turnover is calculated based on the total annual turnover of the JV members. In case of a joint-venture, at least one of the JV members should have 1 liquidity/quick ratio in any of the past 2 years.		2
Total points for section		**25**	

Section 2

Section 2: Proposed Methodology, Approach and Implementation Plan		Points	Sub-points
2.1	Description of the Offeror's approach and methodology for meeting or exceeding the requirements of the Terms of Reference	20	
	1. Description of the offeror's approach to identification of necessary investment upgrades for the Philippine power grids (Luzon, Visayas, and Mindanao)		7
	2. Description of the offeror's approach to review of the current regulatory governance structure for the Luzon, Visayas, and Mindanao grids, including identifying current challenges, short-and medium-term strategies that can be implemented to upgrade the grid infrastructure		7
	3. Description of offeror's plan to get buy-in from the relevant actors involved		6
2.2	Quality Assurance Plan	10	
	A plan outlining how the bidder intends to ensure oversight and quality assurance throughout the assignment. Quality Assurance plan should include discussion on risk-assessment and its mitigation plan		10
2.3	Implementation Timeline	5	
	Bidder submits a detailed implementation timeline which includes detailed activities to be undertaken during this assignment, and is completed with gantt chart		5

Total points for section	**35**	

Section 3

Section 3: Key personnel proposed and Sustainability Criteria		**Points**	**sub-points**
3.1	Qualifications of key personnel proposed	17	
	1. Project lead		9
	2. Qualification of other proposed team members		8
3.2	The bidder shall provide a response that demonstrates its commitment to support gender equality through its operations	3	
Total points for section		**20**	

- **Financial Criteria: 20 points**
  a) The financial part of those proposals that are found to be technically compliant will be evaluated as follows.
  b) The maximum number of points that a bidder may obtain for the Financial Proposal is 20. The maximum number of points will be allocated to the lowest evaluated price bid. All other prices will receive points in reverse proportion according to the following formula:
  c) Points for the Financial Proposal of a bid being evaluated =

$$\frac{[\text{Maximum number of points for the Financial Proposal}] \times \{\text{Lowest price}\}}{[\text{Price of proposal being evaluated}]}$$

- Financial proposals will be evaluated following completion of the technical evaluation. The bidder with the lowest evaluated cost will be awarded (20) points. Financial proposals from other bidders will receive prorated points based on the relationship of the bidder's prices to that of the lowest evaluated cost.

- **Formula for computing points: Example**

Points = (A/B) Financial Points
Bidder A's price is the lowest at $20.00. Bidder A receives 20 points
Bidder B's price is $40.00. Bidder B receives ($20.00/$40.00) X 20 points = 10 points

- The total score obtained in both Technical and Financial proposals will be the final score for the proposal, with 80% allocated to the Technical proposal and 20% to the Financial proposal. The proposal obtaining the overall highest score will be considered as the winning proposal. This proposal will be considered to be the most responsive to the needs of UNOPS in terms of value for money.

- The selection of the preferred bidder will be based on a cumulative analysis, analysing all relevant costs, risks and benefits of each proposal throughout the whole life cycle of the services and in the context of the project as a whole. The lowest priced proposal will not necessarily be accepted.

ANNEX 1 – Results Framework

ETP Results	Project Output(s)	Indicator	Target	Data Source and Means of Verification
Impact: Summary based on RBMF indicators				
Long-Term Outcome: Summary based on RBMF indicators				
Intermediate Outcome 1. Strengthened RE and EE policy enabling environment				
Short-Term Outcome 1.1 National RE and EE policies, regulations, standards, and energy plans reflect a clear commitment to Energy Transition agenda and integrated into sectoral plans to contribute to the achievement of Paris Agreement	Roadmap for Regulatory and Investment Upgrades	Identification of gaps in investment, and areas where additional modernization and upgrades will be necessary in order to make the grids smart grid compatible, Identification of technical, regulatory, and financial challenges that impede the necessary upgrades and modernization investments in the grid. Identification of issues and barriers stemming from the institutional landscape concerning Philippine grid investments	Structured roadmap with medium- and long-term investment packages that will be needed in order to effectively upgrade and modernise grids	DOE assessment
Short-Term Outcome 1.3 Energy transition agenda is centrally led and coordinated effectively at a National-level agency/institution that is tasked to champion the cause with right level of authority	Strategic overview of grid governance structure	Assessment of current policy regulatory governance structure, mechanisms, and regulations in the Philippines. Review of grid governance structures and related regulations in similar unbundled power systems internationally.	Fundamental issue analysis, recommendations with respect to the governance, legal, and regulatory adjustments that enable and attract both public and private sector investment in the necessary grid upgrades	ETP assessment
Intermediate Outcome 2. Increased flow of public and private investments to RE and EE projects in the power and end-user sectors				
Intermediate Outcome 3. Increasing the amount of RE integrated in smarter grids				
Intermediate Outcome 4. Increased development of and accessibility to RE/EE knowledge				
Short-Term Outcome 4.1 National energy strategy and sectoral plans involve evidence-based planning for an improved national-smart-grid system along with related infrastructure and innovative technologies	Developed capacity for DOE and ERC and key industry players with smart grid development and grid regulatory governance	Seminars and Workshops between the Consultant, DOE, ERC, and other key stakeholders Rules and Guidelines drafting consultation	Necessary frequency of workshops, seminars, and consultations between the TWG, the consultant, and other key stakeholders to substantiate project objectives	Implementation reports by ERC

Annex 2. Mapping of Technical Assistance Related to Smart Grids Upgrades and Development

Parameter	[THIS SCOPE OF WORK] Philippines Grid Diagnostic for Smart Grid Development	Upgrading of Energy Regulations	Design and Implementation of Battery Energy Storage Mechanism	Increase Deployment of Advance Energy Sources and Systems under Energy Secure Philippines	Technical Assistance on Battery Energy Storage Mechanism	Fresh Look at Ancillary Services Provision in the Energy Sector	Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines
Beneficiary (ies)	DOE (and ERC)	DOE (and ERC)	PEMC (and DOE)	ERC	ERC	ERC	DOE
Brief Description	Technical assistance to identify investment needs, resolution to governance issues in smart grids development.	Technical assistance for transitioning to low-carbon energy systems by upgrading the energy regulations	Technical assistance for rule-based operations of battery energy storage systems (BESS)	Support DOE's plans from 2017-2040, to ensure energy security, expand energy access, promote a low-carbon future.	[As reported by ERC] Drafting a regulatory framework to support a battery energy storage market mechanism.	Technical Assistance to determine appropriate ancillary services service levels, improved procurement approaches, price benchmarking, and appropriate cost recovery mechanisms.	Proactive transmission planning approach that supports investment in transmission expansion and upgrades for large-scale RE development.
Objectives	• Component 1: Roadmap for Regulatory and Investment Upgrades. • Component 2: Review of the Electricity Grid Governance Structure.	• Strategic review of ERC's regulatory framework and identify areas of improvement • Review local regulations and sharing of international best practices for smart grid technologies	• Produce conformance standards applicable to BESS planning and operations • Introduce protocols for BESS for their scheduling and dispatch in the energy and reserve market • Identify provisions of WESM Rules that require amendments	• Build-up ERC capacity to implement effective frameworks supporting the use of advanced energy systems and • Support ERC in developing regulatory frameworks that promote energy resilience, reliability, smart technology and cybersecurity	• Draft regulatory framework to support battery energy storage systems (BESS)	• Determine the categories and levels of ancillary services appropriate for Philippine grids; • Determine the optimal procurement mechanism and mix of contracted and traded AS to ensure affordable and sufficient ancillary services;	• CREZ process identifies economic RE resources and leverages economies-of-scale development for wind and solar while creating new opportunities for

Parameter	[THIS SCOPE OF WORK] Philippines Grid Diagnostic for Smart Grid Development	Upgrading of Energy Regulations	Design and Implementation of Battery Energy Storage Mechanism	Increase Deployment of Advance Energy Sources and Systems under Energy Secure Philippines	Technical Assistance on Battery Energy Storage Mechanism	Fresh Look at Ancillary Services Provision in the Energy Sector	Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines
			to support BESS participation			• Benchmark Philippine AS procurement practices, pricing and costs against international standards and cost of service; • Recommend ancillary services cost recovery mechanism options; • Recommend System Operator incentive structure improvements that can align affordability, efficiency, security, and reliability;	other types of RE due to increased transmission access.
Remarks on relation to this Philippines Grid Diagnostic Review	• NA	• This is a holistic consultancy that will provide regulatory support to DOE and ERC in the energy transition. The regulatory framework reviews will be relevant to Component 1	• This consultancy will provide comprehensive support for establishment of BESS in the Philippine energy landscape. This consultancy does not directly relate to the components in this Diagnostic Review.	• This consultancy will include support for the regulatory frameworks that promote energy resilience, reliability, smart technology and cybersecurity which will not directly relate to the components in this Diagnostic Review.	This consultancy relates to the ETP-funded PEMC consultancy , but does not directly relate to the components in this Diagnostic Review.	This consultancy does not directly relate to the components in this Diagnostic Review.	This work shares common objective to accommodate high RE investments and grid developments but does not relate directly to the smart grid component in

Parameter	[THIS SCOPE OF WORK] Philippines Grid Diagnostic for Smart Grid Development	Upgrading of Energy Regulations	Design and Implementation of Battery Energy Storage Mechanism	Increase Deployment of Advance Energy Sources and Systems under Energy Secure Philippines	Technical Assistance on Battery Energy Storage Mechanism	Fresh Look at Ancillary Services Provision in the Energy Sector	Grid Planning and Competitive Renewable Energy Zones (CREZ) in the Philippines
		(investment road map)					this Diagnostic review.