



Philippines Grid Diagnostic: Regulatory Support for Smart Grid Development and the Ancillary Services Market

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Table of Contents

1 BACKGROUND	3
Southeast Asia Energy Transition Partnership (ETP)	3
Gaps and barriers in the regulatory support for smart grid development, energy storage systems, and ancillary market	4
2 Design of a Grid Diagnostic in the Philippines	0
Rationale	0
Objectives	1
Component 1: Roadmap for Regulatory and Investment Upgrades.	1
Component 2: An alternative point of view on Review of Regulatory Governance Structure.	1
Component 3: Ancillary Market Design.	2
Expected outputs and outcomes	3
Component 1: Roadmap for Regulatory and Investment Upgrades	4
Component 2: Alternative point of view on Regulatory Governance Structure	5
Component 3: Ancillary Market Design	5
Beneficiaries & Impact	7
3 ACTIVITIES, TIMELINES AND BUDGET	8
Implementation Mechanics and Main Activities	8
Component 1: Roadmap for Regulatory and Investment Upgrades.	8
Component 2: Alternative point of view on the Regulatory Governance Structure	9
Component 3: Ancillary Market Design	10
Assumptions	12
Project Management	13
Sustainability Measures	14
4 CONCLUSION	14
5 ANNEX – Results Framework	15

1 BACKGROUND

Southeast Asia Energy Transition Partnership (ETP)

1. **About ETP.** 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 Outcome Areas.** 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 Focus and Work.** 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. **ETC and the RRF,** 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 - moving away from coal and other fossil fuels - while ensuring a just transition and improved energy access for all. The Rapid Response Facility (RRF) 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 Regulatory and Investment Upgrades of Smart Grids and the Ancillary Market Services Design. Given the collaborative nature of the ETC and the RRF, where applicable the RRF response can also include further outreach to initiatives and partners for consultation such as GGI-OSOWOG, the Global Energy Alliance for People and Planet (GEAPP) and others.

Current regulations, gaps and barriers for smart grid development, energy storage systems, and the ancillary market

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 that were not borne by electricity consumers alone, but by the whole country.
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 Concession Agreement.** The Concession Agreement safeguards the interests of the Government, and explicitly mandates ERC as the regulating body under Section 3.02 of the agreement. In practice, however, NGCP has taken advantage of some weaknesses and gaps in the Concession Agreement to downplay grid improvements and expansion.
10. 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.

However, the Initial Public Offering (IPO) was not issued until 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 fundraising and also loans from partner local banks.

11. **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 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.
12. **National Renewable Energy Program (NREP), 2020-2040.** This program sets a target of 35% Renewable Energy (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
13. **Power Grid Vulnerability.** At present, the Philippines has an installed capacity of 25.5 gigawatts (GW) and a dependable capacity of 22.7 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.
14. **Weaknesses in 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. When the demand spikes at more than 11,500 MW, the grid, which has a capacity of only 11,700MW is overstretched, with just approximately 200 MW of reserve capacity. According to energy planners, any reserve capacity less than 1,000 MW (less than 10%)_on this system poses a threat to the country's energy security
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 must 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.
- 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 ancillary services and 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.
- d. *The current grid infrastructure has 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 factor, there is a need for more distributed and

smart grid technologies to handle large scale renewable investments and to address calamitous outcome caused by typhoons.

- e. 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.
 - f. Lack of market regulations for ancillary services and reserves. Ancillary services (AS) help grid operators to maintain the proper flow and direction of electricity, address imbalances between demand and supply, and help the system recover after a power event. Grid reserves are classes of reserves services to provide extra power or decongest demand when forecasted demand differs from actual demand due to a myriad of events. Although the Philippine Grid Code acknowledges the need for these services, effective competition and cost-recovery mechanisms are not yet established in the country. These services are currently procured and arranged directly from the independent power producers (IPPs) by the grid operator through bilateral contracts.
 - g. 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, which enables end-users to demand clean energy and benefit from value-added tax exemption for renewable energy supply. 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 monthly peak demand of 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.
16. **TA Request to ETC's Rapid Response Facility (RRF).** With challenges such as the above facing the Philippines power system, and as the country navigates the energy transition, the Government of the Philippines requested technical assistance under the Energy Transition Council's (ETC's) Rapid Response Facility (RRF). The Energy Transition Partnership (ETP) is funding two parallel consultancies to address various aspects of the smart grid ecosystem in the Philippines:
- a. Upgrading of Energy Regulations for 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. *The Consortium recruited for this work is led by the firm **Ricardo PLC**.*
 - b. Design and Implementation of Battery Energy Storage Market Mechanism for Philippine Electricity Market Corporation (PEMC). This technical assistance support will run from January 2022 until the 3rd quarter of the year. The consultancy will provide 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. The selected consultants will provide the following technical assistance to PEMC. *The Consortium recruited for this work is led by the firm **IES Consulting**.*

Table 1. Mapping of Technical Assistance Related to Regulatory Upgrades, Battery Energy Storage Systems, and Ancillary Services

Parameter	[THIS CONCEPT NOTE] Philippines Grid Diagnostic: Regulatory Support for Smart Grid Development and the Ancillary Services Market	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	Study on Ancillary Service Compliance to the Revised Philippine Grid Code and Harmonization of Department Circulars
<i>Funder (Consultant)</i>	ETP (TBD)	ETP (Ricardo PLC)	ETP (Nel Consulting)	USAID (RTI)	USAID	Government of the Philippines through Congress
<i>Beneficiary (ies)</i>	DOE (and ERC)	DOE (and ERC)	PEMC (and DOE)	ERC	ERC	ERC
<i>Brief Description</i>	Technical assistance to identify investment needs, resolution to governance issues, and design of an ancillary services market	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. Includes work on ancillary services.	[As reported by ERC] Drafting a regulatory framework to support a battery energy storage market mechanism.	A study on ancillary service compliance commissioned by ERC with budget approval by Congress
<i>Objectives</i>	<ul style="list-style-type: none"> • Component 1: Roadmap for Regulatory and Investment Upgrades. • Component 2: Review of the Electricity Grid Governance Structure. • Component 3: Ancillary Market Design. 	<ul style="list-style-type: none"> • Strategic review of ERC's regulatory framework and identify areas of improvement • Establish regulatory framework for entry of modern RE technologies aided by ancillary services • Review local regulations and sharing of international best practices for smart grid technologies 	<ul style="list-style-type: none"> • 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 to support BESS participation 	<ul style="list-style-type: none"> • Build-up ERC capacity to implement effective frameworks supporting the use of advance energy systems and • Support ERC in developing regulatory frameworks that promote energy resilience, reliability, smart technology and cybersecurity 	<ul style="list-style-type: none"> • Draft regulatory framework to support battery energy storage systems (BESS) 	<ul style="list-style-type: none"> • Study on compliance of ancillary services with the Philippine Grid Code and harmonization of other DOE circulars • Study on cost-recovery mechanism

Parameter	[THIS CONCEPT NOTE] Philippines Grid Diagnostic: Regulatory Support for Smart Grid Development and the Ancillary Services Market	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	Study on Ancillary Service Compliance to the Revised Philippine Grid Code and Harmonization of Department Circulars
<i>Remarks on relation to this Philippines Grid Diagnostic Review</i>	<ul style="list-style-type: none"> • NA 	<ul style="list-style-type: none"> • This is a holistic consultancy that will provide regulatory support DOE and ERC in the energy transition. The regulatory framework reviews will be relevant to Component 1 (investment road map) and Component 3 (ancillary services) of this Diagnostic Review. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • This consultancy will include support for the establishment of ancillary services in the reserve market. The work on ancillary services will be relevant to Component 3 (ancillary services) of this Diagnostic Review. 	This consultancy relates to the ETP-funded PEMC consultancy (Nel Consulting), but does not directly relate to the components in this Diagnostic Review.	<ul style="list-style-type: none"> • This consultancy will include work that is complementary to Component 3 (ancillary services) of the Grid Diagnostic Review.

17. **Mapping of Related Technical Assistance.** Table 1 provides an overview of ongoing consultancies related to smart grid regulations, battery energy storage markets, and ancillary services in the Philippines. It describes areas where the services described in this Concept Note on a Philippines Grid Diagnostic are complemented by other current and planned efforts by other donors.
18. **Scope of the Consultancy in this Concept Note.** The Philippines Grid Diagnostic consultancy described in this Concept Note will provide technical assistance that is focused on three main areas:
 - a. **Component 1: Roadmap for Regulatory and Investment Upgrades.** This component will involve a review of the need for, and barriers to, smart grid upgrades to facilitate increase amounts of variable RE into the Philippines grids.
 - b. **Component 2: Review of the Electricity Grid Governance Structure.** This component will involve a review of the governance structure of the grids and identification of issues that may be affecting the needed grid upgrades and development of a set of recommendations for DOE.
 - c. **Component 3: Ancillary Market Design.** This component will focus on the design and operation, as well as policy and regulatory governance, of ancillary services in the reserve market.

2 Design of a Grid Diagnostic in the Philippines

Rationale

19. The Philippine Grid Diagnostic will address three key challenges facing the country as it upgrades its power grid to be smart grid compatible and be able to integrate increasing share of VREs in the generation mix. This well-targeted independent consultancy will provide a “roadmap” on where and how grid upgrade and modernization investments can be prioritized; a review (“alternative point of view”) of the governance structure for the Luzon, Visayas, and Mindanao grids, and the design and implementation of an ancillary services market.
20. The rationale for such consultancy stems from the fact that:
 - a. **There is a lack of investment roadmap to upgrade the grid.** VREs are becoming a mainstream part of the solution to meet with 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.** Although the law that grants NGCP a franchise and the Concession Agreement safeguards the interest of the Government, there are gaps and challenges in the grid governance structure that are hampering planned grid modernization and upgrades.

- c. **There is a need to design an Ancillary Services Market.** Ancillary services are essential element for a reliable and resilient power system, but in the case of the Philippines, these services are currently procured under bilateral contracts. To ensure that incentives are aligned and that there is market competition, there is the need for the design of a proper market mechanism for the ancillary Services.

Objectives

21. By developing a road map for investment upgrades, an alternative point of view on power sector governance structure, and the design of an effective ancillary market, this Philippines Grid Diagnostic project will support the national goal of modernizing the Philippine power grid to ensure flexibility, security, and resiliency. Table 1 provides an overview of the consultancy described in this Concept Note Philippines Grid Diagnostic, along with a comparison to related external consultancy work that may have direct or indirect implications on this Philippines Grid Diagnostic.
22. The **objectives** for each of the three components are laid out below:

Component 1: Roadmap for Regulatory and Investment Upgrades.

23. This component covers the identification of necessary 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”), 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.

24. 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.
25. It is essential for the operation of a smart grid to ensure that the regulatory and governance structures support the 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.
26. The background to this objective involves understanding the concession agreement. When NGCP was granted the grid franchise in 2009, under a concession agreement as sole operator and manager of the grid, they assumed this responsibility from TransCo and PSALM. It is the responsibility of NGCP, as concessionaire, to design, develop, finance,

construct and complete all new projects at its own cost and expense after taking account of the Transmission Development Plan.

27. The concession agreement covers only the terms and conditions between TransCo and PSALM (government entities) and NGCP (as concessionaire). Apparently, a gap exists in the concession agreement about the explicit role of ERC as the regulator in contract execution and implementation. This gap has been used by NGCP to defer necessary grid improvements. Even though ERC has the regulatory authority to impose direction and penalties for the concessionaire's inaction, the implementing rules and regulations to such determination are not elaborated in the concession agreement. As a result, ERC is unable to enforce the performance parameters of the concession agreement.
28. 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.
29. 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.
30. 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 surrounds 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.
31. 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: Ancillary Market Design

32. This component will focus on the design and operation, as well as policy and regulatory governance, of ancillary services in the reserve market. The aim of the component will be to diagnose and recommend policy and regulatory frameworks for both DOE and ERC and to develop their capacities to effectively govern and regulate providers of ancillary services.

33. This component will include consultations with major stakeholders in the grid system, such as DOE and ERC, and other stakeholders identified by DOE, and outline their roles and functions with respect to the ancillary service markets.

34. Specifically, the Project will achieve the following objectives:

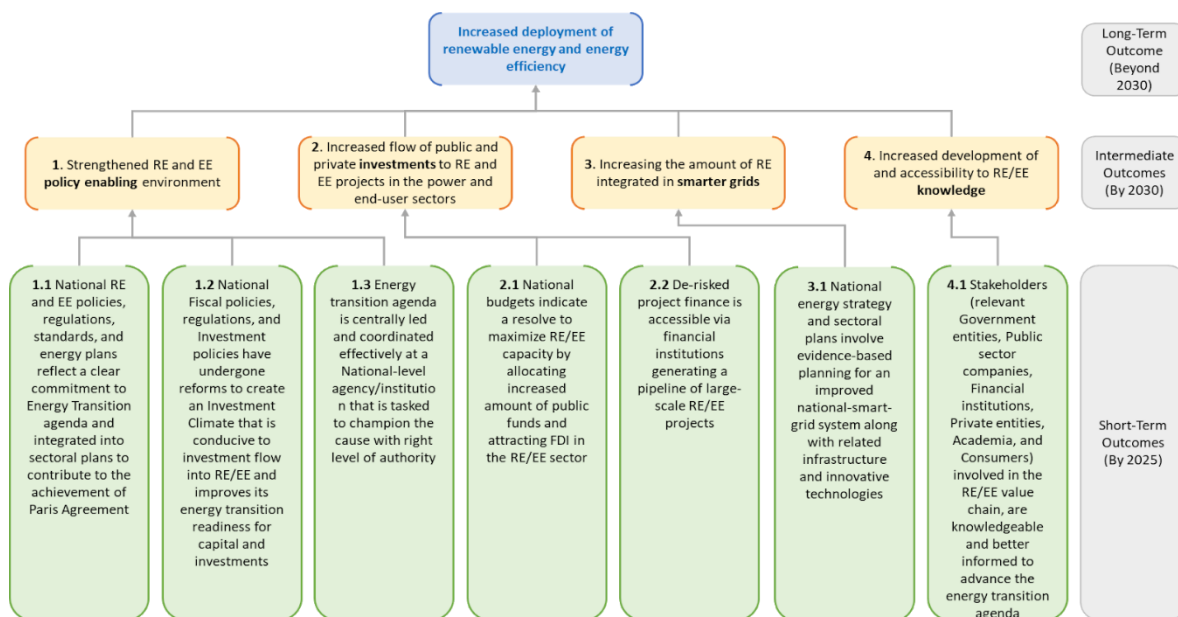
- a. Conduct a stocktaking of the existing regulatory policies related to the power reserve market, a gap analysis of current technical guidelines on ancillary services, and recommend enhanced policy measures to incentivize the entry of ancillary services in the reserve market;
- b. build the capacity of DOE and ERC to simulate market activity, using data analytics that can be deployed in the determination of the appropriate pricing signals, to stimulate the reserve market; and
- c. strengthen and institutionalize coordination and policy actions between DOE and ERC to increase the ancillary services in the reserves market.

Expected Outputs and Outcomes

35. ETP's strategy and results-based monitoring framework is focused on enabling the Philippines to achieve its Nationally Determined Contribution (NDC) commitment of 75% reduction in GHG emissions. 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.

36. With this Concept Note for a Philippines Grid Diagnostic, ETP seeks to increase the flow of investment into smart grids and renewable energy in the Philippines power sector. Broadly speaking, the success of this project will be measured based on the following performance metrics (also, see Figure 1):

- a. Strengthened RE and EE policies. The project will contribute to clearer, more effective policies and regulations related to smart grids, and it will therefore support the scale-up of EE and RE integration into the power grids.
- b. Increased flow of public support. The clear road map for smart grids, including battery energy storage systems and ancillary services will stimulate greater investment both locally and internationally into the grid as well as investment into BESS and Ancillary Services technologies.
- c. Increased amount of RE penetration. The increased investments will in the long run lead to greater amounts of RE integrated into smarter grids. This will also translate to increased RE capacity in the current mix.
- d. Increased development and adoption new clean technologies. The project will identify gaps and opportunities for capacity-building for DOE in the areas of policy frameworks, for ERC in the area of regulatory development, and for other market actors, and equipment and service providers in knowledge about how to set up, operate, and supply smart grid technologies and services.



**Figure 1. ETP's Strategy & Results-based Monitoring Framework:
Reducing GHG Emissions and Achieve the SDGs in Southeast Asia - 2021-2025**

37. The expected **outputs and outcomes** for each of the three components are laid out below:

Component 1: Roadmap for Regulatory and Investment Upgrades

38. The roadmap for regulatory and investment upgrades in the Philippine grid will build on the work on regulation (which impacts investment) done by DOE for the ETP-funded consultant Ricardo PLC (see Table 1). 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

39. 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, to ensure that they are smart grid compatible and will support increased amounts of variable RE that will be required to meet the NDC targets of the Philippines government.

Component 2: Review of the Electricity Governance Structure

40. 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 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) including a summary of innovative financing mechanisms and tools

Component 3: Ancillary Market Design

- 41. This component will build on the results of the Congressionally funded technical assistance on ancillary service compliance on the Philippine Grid Code, regulatory policies, department circulars (see Table 1). This component will focus on institutionalization of the proposed improvements in the management and operation of the national grid by establishing responsive planning, scheduling and suitable technologies.
- 42. It is essential to enhance the grid reserve markets and upgrade the grid system via reforms in the governance regulatory systems. This will create space for the entry of more RE generators and the distributed generation that they provide. Relevant aspects of ancillary market design that will be covered in this component include policies to facilitate the reserve market, simulation models, and inter-departmental coordination.
- 43. This component will have the following outputs:
 - a. establishment of an overall reserve market design to design an effective cost-recovery mechanism that incentivize ancillary services providers as well as mitigating measures to co-optimize renewable energy into the grid and the adoption of battery energy storage system;
 - b. establishment of parameters and indices for the increase/decrease services for reserve categories, including the ancillary services provider's readiness/conformance criteria per reserve categories;
 - c. creation of a framework for conversion of ancillary service modalities in firm-only contracts by incorporating provisions for incentives and penalties;
 - d. provision of testing guidelines and technical specifications for the participation of Distributed Generation (DG) and VRE;
 - e. enhancement of third-party testing accreditation guidelines for ancillary services; and
 - f. formulation of a Competitive Selection Process (CSP) for the Procurement of

Contracted ancillary services.

44. The component will also include capacity-building of DOE and ERC on simulation modelling frameworks (e.g., data analytics and software tools), and will include the following outputs:
- a. identification of rules on the offer floor and ceiling price for reserves;
 - b. definition of variables for the presence of scarcity pricing;
 - c. creation of indices for economic cost recovery and causer pay mechanisms; and
 - d. guidelines for a remuneration methodology for the system operator and ancillary services providers.
45. The component will also support the strengthened coordination of institutional policy actions between the DOE and ERC to stimulate the reserve market and strengthen the support services for providers of ancillary services:
- e. propose circulars and guidelines for inter-departmental cooperation and harmonization in the oversight of ancillary services;
 - f. provision of spaces for dialogues and fora to exchange ideas and thresh common issues; and
 - g. establishment of mechanisms for information transfer and data sharing between the two agencies.
46. The expected outcomes of this component will include development of a reliable, secure, stable and a high-quality power supply in the country. This will involve enhancement in a regulatory regime encompassing the Grid Owner, System Operators, and Market Operators to ensure the sustainability of the Project outcomes. The Project will promote an incentive mechanism for the investment in reliable and affordable ancillary services, which will eliminate yellow and red alerts by 100% to meet the operational supply-demand balance. In addition, a 50% additional capacity will be achieved from the ancillary reserves during peak demand. As a result, the Project aims at achieving an annual growth rate of VRE into the national grid of 4.5% to realize the target of 35% renewable energy share in the total energy mix by 2030.
47. Similarly, the component will enhance the capacity of DOE and ERC to effectively implement the ancillary services requirements, particularly in terms of mandatory testing of third-party ancillary services capability, setting the optimized pricing for the procurement of ancillary services, and promotion of the reserve market. With a steady supply of electricity, the component will support the current trajectory of the country's economic growth, and thus, enable higher incomes, productivity, and better quality of life. And foremost, greater RE in the grid supported by ancillary reserves will contribute to the NDC commitment of 75% by 2030.

Beneficiaries & Impact

48. 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.
49. The project will contribute to the national grid and renewable portfolio standards of the Philippines, and to achievement of the country's commitments under the Paris Climate Agreement.
50. The regulatory support for smart grid and energy storage systems in the Philippines mirrors ETP'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.
51. The role of the country's national grid system and its associated policy and regulatory framework is crucial to put this into reality. Hence, the impact of this Project will be monitored and evaluated based on the following performance indicators:
- annual average growth rate of renewable energy by 4.5% from 2023 to 2030;
 - the share of RE in the total final energy consumption at 30% on or before 2025 and 35% on or before 2030;
 - a 50% increase in available energy capacity to the grid with the presence of ancillary services during peak demand;
 - a 50% increase in per capita investment in sustainable financing for DG and VRE compared to carbon-based investment;
 - a 100% reduction of power outages, such as red alert and yellow alert announcements, from 2023 to 2025; and
 - a minimum of 25% buffer between installed capacity and available power capacity into the grid.

3 ACTIVITIES, TIMELINES AND BUDGET

Implementation Mechanics and Main Activities

52. The project will require active engagement by a spectrum of energy actors in identifying problems and solutions to facilitate effective overview of the works and assignments provided by existing ETP-funded consultants. 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, as well as the consultants working on the three parallel ETP-funded assignments for these three counterparts.
53. To address the complementary work and scope indicated on the separate terms of reference for Ricardo PLC, NEL Consulting, the Ancillary Services Concept Note, and the external consultants mentioned under Part 23, Table 1 of this Concept note, Component 1 is intended to provide a common reference and strategize logical, effective, and timely implementation of these programs in fulfilling the overall objective of ETP by engaging them with the Technical Working Group (TWG) of the DOE and ERC which usually happens once a month, and the frequency of these engagements may be increase to substantiate and solidify the assignment understanding .

Component 1: Roadmap for Regulatory and Investment Upgrades.

54. The consultant will carry out the following tasks under this component:
- 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, and able to absorb and evacuate increasing amounts of variable RE and distributed energy generation.
 - Task 1.2. Define challenges and solutions. In this task, the consultant will describe the 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 and institutional landscape concerning Philippine grid investments, drawing on any relevant work on regulatory investment barriers defined by Ricardo PLC in their regulatory work for DOE, or other consultancies outlined in Table 1. 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 had been carried out, the results will be presented and discussed in a focus group.

- c. Task 1.3. 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), concessionaires (e.g., NGCP) and key industry stakeholders to discuss and debate the proposed roadmap, identifying challenges and offering amendments and improvements.
- d. Task 1.4. Final report with a detailed road map for investment upgrades. The consultant will develop a final road map 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 explore the technical and market feasibility of its recommendations.

Component 2: Review of the Electricity Governance Structure

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

- a. Task 2.1. Review of current regulatory governance structure, mechanisms, and regulations in the Philippines. To avoid duplication, this review be carried out at the same time as the review under Task 1.1; will draw largely on data collected and analysed by the consultants carrying out the ETP-funded regulatory review for ERC and be analysis of a BESS market for PEMC (See Table 1); and will be supplemented by desk research and interviews as needed. The focus of the regulatory review will be on the governance structures and mechanisms, how they may be either ignoring, or actively hindering, necessary investment sand upgrades into the grid infrastructure needed for a smart grid that will be needed to operate a grid that will receive increasing amounts of variable RE and will also need to rely on reserve markets and ancillary services for efficient grid operation.
- b. Task 2.2. Review of grid governance structures and related regulations in similar unbundled power systems internationally. In this task, the consultant should select at least three international examples for case studies, and these should be agreed upon with DOE in advance of carrying out the analysis. In each case study, the review should 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 should include an analysis of how policymakers and regulators dealt with governance challenges, and how they ultimately resolved those challenges. The review should 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.

- c. Task 2.3. Inter-agency Workshop to Share and Reflect on Report Findings. The consultant will coordinate with DOE to implement an inter-agency brainstorming workshop in which the consultant will share the findings and recommendations from its review and gains feedback and input from DOE, ERC, PEMC, NCGO, 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.
- d. Task 2.4. Final report with recommendations on regulatory governance structure. The consultant will revise its report to take into account input from the workshop and to develop a final report, which will serve as a review and an “alternative viewpoint” of the governance structure for DOE 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).

Component 3: Ancillary Market Design

56. Successful implementation of this component will require the active involvement of a broad spectrum of energy actors in identifying problems and solutions to increase the participation of AS in the reserves market, specifically the entry of DG and VRE into the grid. The Project is, subsequently, highly inclusive in terms of the involvement of key officials and personnel in DOE and ERC to effectively design, implement and operate the Reserves Market in the Philippines.

57. The component includes three tasks with the following activities with their respective timeframes:

- a. Task 3.1: Stocktake of policies and baseline diagnosis. The consultant will carry out a comprehensive desk review of the policy regulations and technical guidelines on the Reserve Market as well as the regulatory framework and economic incentives of DOE and ERC over AS Providers. To avoid duplication, this review should be coordinated with the regulatory review being carried out under Task 1.1 and 2.1. This task should include the following activities:
 - i. Initiate planning and develop an inception report;
 - ii. conduct a desk review of all existing policies, studies and reports on the design and implementation of the Reserve Market, including the generation of policy and measure matrices;
 - iii. interview key informants and experts, such as officials of DOE, ERC, PEMC, NGCP, legislators, and other relevant energy stakeholders; and
 - iv. facilitate consultations, dialogues and conversations with the energy-related agencies and sectoral groups to jointly evaluate the policy challenges and measures in resolving inter-agency issues.
 - v. develop a detailed understanding of the current initiatives of DOE and

ERC to harmonize ancillary service-related issuances that address various problems and bottlenecks related to ancillary services, including resolutions and joint policies of DOE and ERC for the enhancements and/or resolutions of issues on the implementation of AS,

- vi. propose an official agreement to establish an inter-departmental committee between DOE, ERC, NGCP, Transco and PEMC, and
- vii. identify multilateral assistance from development partners, ongoing and proposed, to ensure alignment in the technical grant and avoid resource redundancies.

- a. Task 3.2: Capacity-building of DOE and ERC on simulation modelling. Analyse and diagnose the design and operation of the reserves market, including the economic structures, technicalities, protocols for reserve requirements, and grid readiness for penetration of distributed generation and variable RE. Introduce simulation models, such data analytics, to assist the DOE and ERC in resolving reserve deficiencies and facilitating incentive-based markets for effective pricing and cost recovery of AS Providers. The second phase shall cover the third month of the Project with the following activities:

- i. Review the variables involved in the Market Reserve design for regulatory oversight of AS Providers, which include policy, structural, technical, and economic incentives;
- ii. Develop capacities of selected DOE and ERC technical personnel in the knowledge and skills relevant to the optimal use of the simulation modelling software, such as the appropriate levels of reserve cap offer, offer floor and price cap, and cost recovery of the ancillary services providers;
- iii. determine market mitigating measures to resolve pricing information asymmetry in the WESM; and
- iv. conduct a seminar or workshop with agency stakeholders to demonstrate the modelling software and the associated challenges and opportunities in its implementation. Together with ETP, IRENA and OFGEM intend to support the Philippines request for technical assistance by delivering workshops on sharing international best practises on designing Ancillary Services Framework. OFGEM's contribution to this workshop will involve the UK's journey and experience on how the country has overseen and designed the regulatory framework of the ancillary services. IRENA's contribution to the workshop would involve sharing worldwide practises in developing ancillary service markets in other countries, particularly developing countries like the Philippines, to support the integration of high shares of variable renewable energy in power systems.

- b. Task 3.3: Support inter-departmental coordination on Ancillary Services between DOE and ERC. Facilitate establishment of institutional mechanisms to harmonize policies and initiatives between DOE and ERC in oversight of the reserve market.

The third task shall cover the fourth and fifth months, with the following activities:

- i. conduct a virtual public consultation with key stakeholders on proposed AS framework and market mitigating measures.
- ii. secure the support and buy-in among key officials in DOE and ERC on the policy and regulatory reforms for the Reserve Market.
- iii. submit finalized draft changes to DOE and ERC to adjust the framework in the design and implementation of Reserve Market;
- iv. present the final design and implementation of the Reserve Market framework and its recommended measures in an official briefing before key officials of the DOE and ERC for approval; and
- v. write and submit a draft report based on the agreed outline, not to exceed 20 pages (excluding annexes), providing result-based recommendations to the Government of the Philippines in the context of the specific conditions prevailing in the Philippines.

58. The overall work to be undertaken by the grid diagnostics consultant is outlined in a Gantt Chart presented below:

TASK	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
Project Mobilization								
Steering Committee Review Process								
Contract Bidding Process								
Component 1: Roadmap for Regulatory and Investment Upgrades								
Task 1.1: Review of current grid regulations, codes, circulars								
Task 1.2: Define features and requirements								
Task 1.3: Focus group consultation								
Task 1.4: 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 structure from other countries								
Task 2.3: Inter-agency workshop to share and report on findings								
Task 2.4: Final report with recommendations on regulatory governance								
Component 3: Ancillary Market Design								
Task 3.1: Build-up on stocktake of policies and baseline diagnosis								
Task 3.2: Capacity-building of DOE and ERC on simulation and modelling								
Task 3.3: Support Inter-departmental coordination on AS								

* The Consultant will provide an updated Gantt chart with actual work accomplishments. The Consultant will also indicate the completed task at each subtask for each month.

Assumptions

59. This Concept Note assumes that DOE, ERC, and PEMC will cooperate with this consultancy; that the 2 existing ETP-funding consulting teams (working with ERC and PEMC) will cooperate and share data; that this work will be performed in parallel with the two ongoing assignments; and fundamentally, that this Grid Diagnostics consultancy will be informed by the work done by the other two consulting teams and leverage and build on their work.

60. The consultant will possess competent knowledge on the energy transition issues, as well as the regulatory conditions and standards in the Philippines.

61. 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.
62. The consultant will capitalize on the latest global information available for the energy regulatory frameworks and the role of regulators to ensure a dynamic and conducive regulatory basis for the evaluation of energy systems in the direction that can meet the NDC objectives.
63. 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.

Project Management

64. This Consultancy, on Regulatory Support for Smart Grid Development and Energy Storage Systems, is envisioned to run for 6 months.
65. The Regulatory Support for Smart Grid and Development and Energy Storage will be financially managed and administered by the ETP Secretariat in Bangkok, Thailand.
66. It is recommended that the proposal evaluation process consist of a review against screening criteria by an Evaluation Panel, with subsequent evaluation by the ETP Steering Committee before the grant award is made, according to the flowchart below. A majority of the Evaluation Panel will be comprised of ETP Secretariat (and/or other UNOPS-contracted) staff; if required external advisors may be appointed that have specific subject matter expertise in power systems, and specifically smart grid technologies, policies, and regulations in the Philippines.



** The level of depth of this review, and the information forwarded for approval, will be determined depending on the number of applications received; if there are large numbers of applications, the evaluation panel may undertake an optional pre-screening eligibility check to reduce the number of detailed evaluation reviews it is required to perform.

67. A risk assessment will be performed that covers technology risk, market risks, counterparty risks in terms of financial control, management and project structuring, and operational delivery risk upon forwarding to the Steering Committee.
68. Grant payments shall be determined by established milestones and paying against grantee's progress will require financial and evaluation reports.
69. Project monitoring and evaluation requirements will be embedded in the Grant Agreement and will take place 9 months after inception. The evaluation will be led by the ETP secretariat. Key parameters of the evaluation will include commentary against the key objectives, specific deliverables and the scaling up of grid diagnostics outcomes and investments, including outputs and deliverables, and outcomes in the overall program objectives.

Sustainability Measures

70. All ETP calls for proposal (CFPs) will include the following clause: "The bidder shall provide a response that demonstrates its commitments to support gender equality and women's empowerment throughout its operations." This evaluation will consider the applicant's response on this point as part of the evaluation process.

4 CONCLUSION

71. This Concept Note sets out the need of the Philippines government (and specifically for DOE) for an alternative point of view on the governance structure that can help to overcome the gaps and ambiguities not covered by NGCP franchise law and the Concession Agreement, and a propose a roadmap for the necessary grid upgrades and investment to happen effectively. ETP is well positioned to address this need, by funding strategically targeted technical assistance, which will build capacity and enable effective regulatory support for smart grid and energy storage systems, as outlined in this document. Approval of the outlined concept, and execution of the **Regulatory Support for Smart Grid Development and Energy Storage Systems** in the Philippines, will increase the operational efficiency of the renewable energy, energy storage and smart grid investments in the Philippines and will contribute to ETP's objective of accelerating the energy transition in the emerging economies of Southeast Asia.

5 ANNEX – 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	Updated regulations targeted towards Government’s NDC commitments	Philippine Grid Code Philippine Distribution Code	Amendments to the PGC and PDC;	DOE and ERC Codes and Standards;
		Concession Agreement	Improvement and modifications to the Concession Agreement	DOE issued circulars ERC Board approval
		DOE circulars and resolutions Market Mechanism Manuals for: 1. Ancillary Services 2. BESS & ESS 3. Smart Grid	Updated and harmonization od DOE Circulars; Established rules and guidelines for the Ancillary Service Market, Battery Energy Storage & Smart Grid Mechanisms	
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 the governance structure and regulation framework	Strengthened ERC authority and understanding on grid governance;	ETP assessment
		Alternative assessment for regulatory updates to be aligned with Philippine NDC and climate goals	DOE and ERC strengthened capacity on RE and clean technology outlook	
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 3.1 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 regards to RE, BESS, Ancillary Services, and Smart grid	Seminars and Workshops between the Consultant, DOE, ERC, PEMC, NGCP and other key stakeholders	Necessary frequency of workshops, seminars, and consultations between the TWG, the consultant, and other key stakeholders to substantiate project objectives	Implementation reports by ERC
		Rules and Guidelines drafting consultation		