TERMS OF REFERENCE FOR CONSULTANTS

A. Project Background

1. The proposed technical assistance (TA) will help strengthen the capacity of the Perusahaan Listrik Negara (State Electricity Corporation) [PLN] in (i) power grid system planning and automation, (ii) solar photovoltaic (PV) integration to the grid, electric vehicle (EV) charging services, utility-scale energy storage systems. As Indonesia is close to achieving its goal of universal electricity access and to support its continued economic growth trajectory, low carbon initiatives and poverty reduction, the government is prioritizing sustainable and reliable electricity supply in Java. Supplying reliable electricity to meet this demand and to support increased use of renewables requires strengthening Java’s power grid which suffers from power quality issues, frequent interruptions, and electricity losses that impact economy growth, increases carbon dioxide emissions and delays business investment. The need for grid strengthening was further demonstrated by the cascading power failures and massive blackouts that occurred in August 2019.

2. The impact of the TA will be strengthened capacity of PLN staff on emerging technologies like energy storage systems and solar PV, which will assist in the optimum integration of renewable generation to the electricity network. Further, the training on EV charging will assist in expanding the EV charging infrastructure in Indonesia to cater to the government’s planned increase in EV deployment. Capacity building on distribution planning will help PLN staff to reduce distribution network losses.

3. The TA will also help facilitate a series of participatory workshops will be organized for the PLN staff to provide exposure and hands-on application of emerging technologies. The Republic of Korea e-Asia and Knowledge Partnership Fund will provide financial assistance on a grant basis, and the TA will facilitate knowledge sharing between the Republic of Korea and Indonesia in emerging technologies. The TA will facilitate selected staff of PLN, including eligible female staff, to visit and/or utilize applications to/from the Republic of Korea to gain knowledge and experience in the use of emerging technologies.

B. Scope of Work

4. The TA will conduct a cluster of capacity building activities for PLN staff/unit/office on (i) power grid system planning and automation; and (ii) energy storage system, solar PV integration to grids, and EV charging station. This will assist in achieving the outputs of the proposed results-based lending (RBL) program, and improve PLN’s knowledge and experience in the application of emerging technologies.

5. The TA will be carried out over 24 months, from December 2021 to December 2023. It is estimated that a total of 22.5 person-months of consulting services, comprising 10.5 person-months of international consulting services and 12 person-months of national consulting services, are required to undertake this work. ADB will engage the consultants following the ADB Procurement Policy (2017, as amended from time to time) and its associated staff instructions and guidance notes.

6. The TA will engage and mobilize an international firm together with an individual national consultant. The firm shall have extensive experience in distribution network planning and distribution automation, energy storage systems, solar PV, and EV and charging stations. The firm shall also have experience in designing and delivering training programs for international audiences in developing member countries, specifically in Southeast Asia. The firm shall have
experience working with ADB operations and be well versed in ADB procurement and reporting methods.

7. The firm will design and conduct training for PLN across four multi-day workshops to be held throughout the TA period. The final areas of focus for the workshops and training will be decided during implementation in consultation with PLN. In addition to the multi-days workshops. Topics to be covered shall include:

(i) Reviewing present plans, status of power transmission and distribution network, and providing recommendations to improve power grid reliability and quality and minimize the potential challenges in large scale grid integration of rooftop solar PV;
(ii) Assessing the present policies and regulations in Indonesia to promote emerging technologies such as EVs and energy storage system and provide recommendations to PLN;
(iii) Developing capacity on addressing potential challenges in power transmission and distribution network planning and automation to improve reliability in Western and Central Java, Indonesia;
(iv) Developing capacity on addressing potential challenges in expanding the EV charging infrastructure in Western and Central Java, Indonesia to cater to the government’s planned increase in EV deployment;
(v) Integrating energy storage systems for the integration of variable renewable energy into the grid. Assessing various energy storage technologies and proposing how to decide optimal size and optimal location for various applications such as: (a) smoothing, (b) firming, (c) time shifting, (d) ramp management, (e) curtailment avoidance, and (f) voltage regulation; and
(vi) Conducting activities required by PLN and ADB.

8. The following team of international experts will be engaged under the consulting firm:

9. **Power system planning and automation specialist** (International, 4.5 person-months). The specialist shall conduct a capacity building training program for PLN staff on power grid planning, including but not limited to demand forecasting, computer modelling of network expansion, distribution loss reduction, periodic reassessment, and estimation of annual transmission and distribution investment costs. He/she shall review the existing grid planning studies carried out by PLN and provide necessary recommendations for PLN for further improvement, and he/she shall conduct capacity building of PLN staff on transmission and distribution automation, with specific technologies, equipment, software and decision tools used internationally. This will enable PLN to efficiently operate its remote-controlled switchgear in its 20 kV distribution network, to help achieve reliability targets. The specialist shall also review the existing and planned grid automation facilities at PLN and would provide recommendations for further improvement.

10. The specialist shall have a postgraduate or master’s degree in electrical engineering and/or power system engineering with a minimum of 15 years of experience in the power sector and a minimum of 5 years of international experience in distribution planning and automation for electricity utilities. The specialist should have proven experience in teaching or in conducting training for electrical engineers, in the general area of electric utility network planning and grid automation.

11. **Energy storage specialist** (International, 2.5 person-months). The specialist shall (i) conduct technical due diligence of PLN’s battery energy storage system (BESS) development plan including impact study for energy storage system (e.g. BESS) with a utility size energy
storage connected to the grid; (ii) provide technical support to PLN in applying BESS for improving reliability and quality electricity services; and (iii) recommend PLN to plan or expand energy storage system suitable for PLN in the Western and Central Java based on international standards and best practices.

12. The specialist shall have a postgraduate or master’s degree in electrical engineering and/or power engineering with a minimum 15 years of experience in the power sector and minimum 8 years of international experience in design and operation of energy storage system including the BESS for electricity utilities. Experience in teaching or in conducting capacity building for utility engineers would be an advantage.

13. **New technology and electric vehicle charging expert** (International, 3.5 person-months): The specialist shall conduct a capacity building training program for PLN staff and selected external personnel on new technologies (such as energy storage) and EV charging. The training program will assist PLN to develop capacity on addressing potential challenges in large scale integration of distributed generation (especially rooftop solar PV) into the distribution network and to expand the EV charging infrastructure in Indonesia to cater to the government’s planned increase in EV deployment. Use of energy storage facilities at distribution and transmission level for optimum renewable energy integration to the network and for addressing issues arising due to the intermittent nature of the renewable resources shall also be covered during the training and the exposure visit. The specialist shall share the policies and regulations used internationally to increase the use of new technologies and EVs, and recommend suitable policies and regulations to be adopted by PLN.

14. The specialist shall have a postgraduate or master’s degree in electrical and/or power engineering with a minimum 15 years of experience in the power sector and minimum 10 years of international experience in one or several of many aspects (analysis, design, operation, grid integration analyses) of renewable energy-based distributed generation and energy storage projects. He/she shall preferably have minimum 5 years of experience in EV charging infrastructure development projects.

15. The following national position will be filled through individual consultant selection and will report to ADB project officer.

16. **Research analyst/program coordinator** (National, 12 person-months). The consultant shall have a minimum of a bachelor’s degree in international relations, development, finance, economics, environment, or other relevant fields and minimum 3 years of experience in assisting research and program administration, preferably in the energy and/or international development fields. The consultant shall also have good knowledge of Indonesian government organizations, including state-owned enterprises. The program coordinator shall undertake the following tasks:

(i) Assist PLN to implement and monitor the training program; including in (a) developing and reviewing the selection criteria of the candidates and the training program agreements; (b) maintaining financial accounts and keeping records; and (c) adopting adequate policies, systems, and procedures to assess and monitor the performance of the training program;

(ii) Support the ADB project officer, knowledge partner representative, and consulting firm in providing background research and data and developing and finalizing training materials and reports; and

(iii) Support workshops logistics.

C. **Reporting Requirements**
17. The following deliverables will be required from the consulting firm:

(i) preparation of manuals for workshops and training,
(ii) conduct workshops and training,
(iii) inception report,
(iv) progress report (quarterly), and
(v) final report.