Project Information Document/ Identification/Concept Stage (PID)

Concept Stage | Date Prepared/Updated: 22-Jan-2019 | Report No: PIDC171754

BASIC INFORMATION

A. Basic Project Data

Project ID	Parent Project ID (if any)	Environmental and Social Risk Classification	Project Name
P169259		Moderate	Indonesia Sustainable Least-cost Electrification (ISLE)
Region	**Country**	**Date PID Prepared**	**Estimated Date of Approval**
EAST ASIA AND PACIFIC	Indonesia	22-Jan-2019	
Financing Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	PT PLN (Persero)	PT PLN (Persero)	

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	0.70
Total Financing	0.70
Financing Gap	0.00

DETAILS

Non-World Bank Group Financing

Trust Funds	0.70
Clean Technology Fund	0.70

B. Introduction and Context

Country Context

28 million out of 260 million Indonesians currently live below the poverty line with a relatively higher percentage of poor households located in the Eastern Islands. Indonesia has 6,000 inhabited islands, with 300 distinct ethnic groups and over 700 languages and dialects. With a purchasing power parity gross domestic product (GDP) per capita of US$ 3,847 (2017), it has more than halved extreme poverty to 11.3 percent in the past fifteen years. However, employment growth has been slower than population growth, and public services remain inadequate by middle income country standards. In addition, despite rising government spending in recent years, Indonesia's core infrastructure stock, such as electricity, road

networks, ports, and telecommunication facilities, has not kept pace with economic growth especially in the Eastern Islands.

Indonesia's Intended Nationally Determined Contribution (INDC) aims at reducing by 29 percent its GHG emissions against the business-as-usual scenario by 2030 based on national efforts and a further reduction of up to 41 percent if adequate international support is provided. 63 percent of the current emissions are the results of land use change, and peat and forest fires and 19 percent are due to fossil energy combusted. However, even though emissions from land use are expected to reduce over time, emissions from fossil energy are expected to greatly increase.

Sectoral and Institutional Context

Government of Indonesia (GoI) has made it a priority to support the development of the Eastern Islands through increasing access to affordable and sustainable energy supply. From 92.7 percent electrification ratio (2017), the GoI is targeting universal access by 2024. The majority of the 13 million people who lack access to electricity are located in the Eastern Islands of Indonesia, such as Papua, Maluku, West Nusa Tenggara (NTB) and East Nusa Tenggara (NTT). In addition to displaying some of the lowest electricity access rates, the Eastern Islands are also characterized by some of the highest poverty rates in the country.

The Eastern Islands are facing two main challenges: (i) electrification remains to be completed; and (ii) high cost of generation. Electrification in the Eastern Islands, which is on average below 80 percent, is difficult due to the remoteness of these islands, the small size of the grid, the limitations that households face to afford the grid connection and the inaccessibility of some villages. Furthermore, the Eastern Islands are characterized by small to medium size grids (below 150 MW) which are mostly powered with diesel generators, and their cost of generation is the most expensive in the country. Indeed, the 2017 average generation cost in those islands was between 0.14 and 0.20 USD/kWh, compared to around 0.065 USD/kWh in Java-Bali grid, and faced a 15-20 percent increase from the 2016 average generation cost mostly due to the increase in diesel fuel cost.

Different electrification programs are currently in place such as the Indonesia Terang program (or Bright Indonesia), a pre-electrification program or the Renewable Energy for Electrification Program but there is no overall Government electrification strategy in place. In 2016, the Ministry of Energy and Mineral Resources (MEMR) launched a new program called "Indonesia Terang" aiming at increasing the electrification ratio in the Eastern Islands. However, the program was never fully operationalized due to lack of funds, implementation strategy and agreement between the different ministries (MEMR, the Ministry of Fisheries, and the Ministry of Villages, Disadvantaged Areas Development and Transmigration), and within PT PLN (Persero) (PLN), the Indonesian State utility. Under the pre-electrification program, MEMR provides free solar home systems (SHS) to households as pre-electrification planned for a period of 2 to 3 years before the grid reaches that area. However, there are currently weak links between MEMR's pre-electrification plan and PLN's electrification plan. Under the Renewable Energy for Electrification Program led by KfW, commonly known as the 1000 island program, PLN is developing solar PV hybrid mini-grids in 94 locations. However, the

implementation of the program has been slow, and locations had to be changed due to the lack of coordination between PLN HQ and the regional PLN.

Economic development is the main priority for the government and therefore, renewable energy deployment is not expected to result in electricity price increases and is encouraged to reduce the average generation cost. The GoI has set an ambitious target of 23 percent of new and renewable energy in the national energy mix by 2025. However, the amount PLN, the State utility, is allowed to pay for variable renewable energy (VRE) is capped at or below the average generation costs in each specific power grid through specific regulations. Thanks to the reduction in solar and wind equipment procurement and construction (EPC) costs in the last five years, VRE was proven to be cost-competitive and be at or below grid price parity in many countries.

Due to the technical and commercial constraints that PLN faces, the integration of VRE is complex and PLN has limited the amount of VRE to 5-10 percent of the installed generation in each grid. In the smaller grids, PLN does not have a SCADA system nor automatic generation control (AGC) which makes it difficult to integrate large shares of VRE. Plus, due to take or pay contracts PLN has with Independent Power Producers (IPPs), commercial constraints are inhibiting the flexibility some of these generators could provide to the grid. Based on these constraints, PLN has decided to cap the amount of VRE it can integrate in the grid to 5-10 percent.

To support very large penetration of VRE into a small size grid, PLN will need to technically assess how flexible the grid is, and how to take advantage of recent technology improvements such as in battery storage. To reach substantial levels of VRE generation in a grid, countries need to first look at the technical and commercial flexibility in their grid. Once the current grid technical and commercial situation has been maximized, countries can look at using new technologies, such as battery storage, to enable even higher levels of VRE penetration.

Relationship to CPF

The Technical Assistance (TA) is in line with the Indonesia Country Partnership Framework (CPF) FY16-20 Engagement Area 2: Sustainable Energy and Universal Access. The Project will support Indonesia to leverage private sector investments and expertise while developing renewable energy, increase access to modern energy services and support its energy transition. The proposed TA plans to support PLN in targeting specific investments in grid dispatch and transmission upgrades that are crucial to integrate VRE generation, and in developing business models that would leverage private sector investments for generation. Such business models would help bringing together private capital in support of public policy including through direct investments and public-private-partnerships (PPP) applying the maximizing finance for development (MFD) concept where public funds use is maximized. Furthermore, in the WBG InfraSAP, energy is identified as one

of the key sector that should be prioritized to promote private sector involvement, and for which further work on business model and financing needs to be completed.

C. Project Development Objective(s)

Proposed Development Objective(s)

The Development Objective is to support the Government of Indonesia, and in particular PLN, in adopting a platform approach for electrifying eastern Indonesia in a sustainable and cost-competitive manner while leveraging private sector investments.

Key Results

The Key Results are the outcome of activities that will be conducted under Bank-Executed Trust Fund (BETF) and Recipient-Executed Trust Fund (RETF). The BETF and RETF work are fully intertwined and will be learning from each other to answer the Development Objective at best.

Component 1: Increase Access to Electricity

- The GoI electrification strategy is informed by a technical, institutional and financial framework, that incorporates international good practice, sustainability criteria and leverages private sector investment
- The GoI endorses a sustainable market-based approach to SHS deployment
- PLN endorses a sustainable framework to mini-grid deployment that leverages private sector investments

Component 2: Reduction in Generation Cost

- PLN's planning strategy in Eastern Islands is informed by a least-cost generation planning exercise identifying renewable energy/hybrid projects
- Development of a pipeline of renewable energy/hybrid projects to be financed through the identified framework
- PLN has identified investments to improve VRE integration (through new/upgrades of SCADA systems, Automatic Generation Control (AGC), updated grid codes and potential use of battery storage)

Component 3: Support and Capacity Building

- PLN dispatch team has improved VRE integration capacity through trainings and certifications
- PLN and MEMR through focus group discussions and workshops have an increased capacity to implement the endorsed framework

D. Preliminary Description

Activities/Components

Through BETF and RETF activities, the TA would enable PLN to develop and pilot a sustainable and least-cost framework to electrification. The BETF activities will focus on the upstream development of the strategy and framework while the RETF activities will focus on piloting such framework. During the piloting phase, lessons learnt will be collected to inform the framework that will be then implemented at a larger-scale.

PLN is identifying with the support of the WB, 10-12 islands that are representative of different categories of small to medium size island grids to enable the electrification work to be replicated in all islands that would fall into such categories. The islands are selected based on the following criteria: (i) the size of PLN grid (5-150 MW); (ii) average generation cost; and (iii) existing electrification rate. The islands are divided into three groups, (i) islands with a small installed generation capacity and limited electrification, (ii) islands with an installed generation capacity of 50-150 MW with only diesel generation and very high average generation cost and (iii) islands with an installed generation capacity of 50-150 MW with diesel and coal generation and high average generation cost.

The TA will enable PLN to provide a set of tools and solutions to PLN to better integrate large shares of VRE into a grid, price flexibility that generators can provide and procure VRE in a planned and easier to integrate manner, all of these being key for larger grids as well. By piloting the deployment of VRE projects in smaller grids, PLN will be able to develop a framework for least-cost electrification and generation in the Eastern Indonesia. By improving PLN's staff capacity in integrating VRE and be better equipped to answer the different constraints VRE brings, the country may be able to scale it up to the larger grids.

The TA is composed of three components (i) Increase Access to Electricity, (ii) Reduction in Generation Cost and (iii) Support and Capacity Building.

Component 1: Increase Access to Electrification (BETF USD 350,000 and RETF CTF USD 100,000)

- **Mapping of Grid Connected, Mini-Grid and SHS Areas** (BETF). By screening non-grid connected areas in the selected islands using work already completed under previous Asian Development Bank (ADB) and WB TAs, areas/villages will be clustered between (i) economic connection to the main grid; (ii) mini-grids with anchor customers or larger demand; and (iii) scattered household demand where SHS/communal solar might be more economical. Such mapping exercise will need to be revised as the grid is expanded and should be replicated in all other islands. Therefore, it is key to build capacity within PLN to conduct such exercise.
- **Optimal Technical Solution for Mini-Grids** (BETF). In the technical development of mini-grids, an optimal technical solution promoting VRE and storage will be developed. Such technical solution will be used as the baseline for new mini-grids.
- **Mini-grid and SHS Feasibility and Structuring** (BETF and RETF). A strategy for mini-grids and SHS deployment will be developed based on Indonesian legislations and international success stories to ensure financial viability, affordability for the connection of households, leverage private sector

investments and reduce gender gaps. The IFC and other private sector parties will be involved in the structuring of the business models to ensure that the point of view of lenders and investors is integrated in the strategy. Feasibility studies will be conducted by PLN for identified mini-grids that will be piloted. The strategy shall be endorsed by the Government of Indonesia and identified business models piloted in the selected islands to gain lessons learnt before scaling-up to other islands.

Component 2: Reduction in Generation Cost (BETF USD 350,000 and RETF CTF USD 400,000)

- **VRE Integration and Grid Constraints** (BETF). To assess the amount of VRE that can be integrated in the grid as well as assess the grid and dispatch upgrades needed a load flow study and a dispatch diagnosis will be conducted for each selected island.
- **Least-Cost Generation Planning Exercise** (BETF)**.** For each selected island including identified areas to be connected to the grid and integration of isolated systems, and using the result of a resource assessment (solar, wind, biomass, geothermal and hydropower), a least-cost generation planning exercise will be conducted with PLN.
- **Deployment Business Models** (BETF and RETF)**.** Deployment schemes will be developed with the inputs from IFC and other lenders and investors, to allocate who will be financing, building and operating the new plants that would have feasibility studies. The piloting of the deployment scheme with those identified sites will be able to be replicated at a larger scale in other islands.
- **Feasibility Studies of VRE Hybrid and Storage Projects** (RETF). Ten feasibility studies and Environmental and Social Impact Assessment (ESIA) of VRE hybrid and storage projects will be conducted based on the results of the technical and financial assessments, the load flow study, the business model development and the planning exercise.

Component 3: Support and Capacity Building (BETF USD 37,500 and RETF CTF USD 200,000)

- **Trainings** for dispatch and planning team (RETF)
- **Workshops and focus discussion groups** for MEMR and PLN on the framework (BETF)
- **Support technical team** working with PLN Project Management Unit (RETF)

Environmental and Social Standards Relevance

E. Relevant Standards

ESS Standards		Relevance
ESS 1	Assessment and Management of Environmental and Social Risks and Impacts	Relevant
ESS 10	Stakeholder Engagement and Information Disclosure	Relevant
ESS 2	Labor and Working Conditions	Relevant

ESS 3	Resource Efficiency and Pollution Prevention and Management	Relevant
ESS 4	Community Health and Safety	Relevant
ESS 5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
ESS 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
ESS 7	Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Relevant
ESS 8	Cultural Heritage	Relevant
ESS 9	Financial Intermediaries	Not Currently Relevant

Legal Operational Policies

Safeguard Policies	Triggered	Explanation (Optional)
Projects on International Waterways OP 7.50	No	
Projects in Disputed Areas OP 7.60	No	

Summary of Screening of Environmental and Social Risks and Impacts

The nature of the TA activities would be mapping, pre FS, and FS, which the outcome will be a platform. No direct risks and impacts associated with the project activities and outcome, except the remote islands as project locations, that may create exclusion of stakeholder engagement or participation in planning. Poor quality of stakeholder engagement in planning may decrease the quality of the TA outcome that fail addressing issue on electrification in last mile locations. On the other hand, based on the 2014 LEGEN Guidelines on Safeguard Application for TA, indirect impacts when the outcome is implemented for future investment in small-scale electricity generation shall be considered, in addition to the potential risks from the TA itself and its salient physical locations of the participating islands as well as the capacity of the PLN in the regions. The future investments using the FS outcome would likely involve moderate social risks and impacts. The potential risks are not likely to be significant, because the project is not complex or large in scale, does not involve activities that have a high potential for harming people and environment. All ESS applies except ESS 9 as there is no FI involvement envisaged in this project. The potential impacts for future investment (if any) can be mitigated in predictable manners. To screen, assess and manage environment and social risks and impacts in the TA a simple and standalone ESMF will be prepared and the elements under the ESMF would be factored in the FS undertaken by the TA. In addition, a Stakeholder Engagement Plan (SEP) will be developed to ensure stakeholders inclusiveness. ESMF and SEP will be included in ESMP.

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