ASIAN INFRASTRUCTURE INVESTMENT BANK

ICS2021-332
March 28, 2022

Sovereign-backed Financing

Project Document

P000512 Republic of Indonesia: Development of Pumped Storage Hydropower in Java Bali System

Currency Equivalents
(As of July 1, 2021)

Currency Unit – Indonesian Rupiah (IDR)
IDR1.00 = USD0.0000684
USD1.00 = IDR14,612

Borrower's Fiscal year
January 1 – December 31

Abbreviations

AIIB	Asian Infrastructure Investment Bank
BMP	Biodiversity Management Plan
CAA	Contract Amendment Agreement
CHMP	Cultural Heritage Management Plan
CCGT	Combined Cycle Gas Turbine
COVID-19	Coronavirus Disease 2019
DIPA	Budget Implementation List (*Daftar Isian Pelaksanaan Anggaran*)
EIRR	Economic Internal Rate of Return
EPP	Emergency Preparedness Plan
ES	Environmental and Social
ESCP	Environmental and Social Commitment Plan
ESDM	Ministry of Energy and Mineral Resources (*Kementerian Energi dan Sumber Daya Mineral Republik Indonesia)*
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
ES Panel	Environmental and Social Panel
FIRR	Financial Internal Rate of Return
FPF	Forest Partnership Framework
GBV	Gender-based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoI	Government of Indonesia
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
IBRD	International Bank for Reconstruction and Development
ICSC	Independent Construction Supervision Consultant
IDR	Indonesian Rupiah
IESM	Independent Environmental and Social Monitoring
KPPN	State Treasury Service Office (*Kantor Pelayanan Perbendaharaan Negara)*
LARAP	Land Acquisition and Resettlement Plan
LMP	Labor Management Plan

MCE	Maximum Credible Earthquake
MDB	Multilateral Development Bank
MoF	Ministry of Finance of the Republic of Indonesia (*Kementerian Keuangan Republik Indonesia*)
MoN	Memorandum of Negotiation
MPS	Matenggeng Pumped Storage
NDC	Nationally Determined Contribution
NK/NJ	Nippon Koei Co. Ltd. and NEWJEC Inc.
NPV	Net Present Value
OCGT	Open Cycle Gas Turbine
OMP	Operation and Maintenance Plan
PAP	Project-affected People
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PLN	PT Perusahaan Listrik Negara (Persero)
PLN-E	PT Prima Layanan Nasional Enjiniring
PMO	Project Management Office
PMU	Project Management Unit
Pokko HPP	Pokko Hydropower Project
PPM	Project-affected People's Mechanism
PPSD	Project Procurement Strategy for Development
PRP	Project Review Panel
PSH	Pumped Storage Hydropower
RCC	Roller Compacted Concrete
RPJMN	Medium-term National Development Plan *(Rencana Pembangunan Jangka Menengah Nasional)*
RUED	Local Energy Plans *(Rencana Umum Energi Daerah)*
RUEN	National Energy General Plan *(Rencana Umum Energi Nasional)*
RUKD	Local Electricity Plans (*Rencana Umum Ketenagalistrikan Daerah)*
RUKN	National Electricity Plan *(Rencana Umum Ketenagalistrikan Nasional)*
RUPTL	Electricity Supply Business Plan *(Rencana Usaha Penyediaan Tenaga Listrik)*
SEP	Stakeholder Engagement Plan
SLA	Subsidiary Loan Agreement
TA	Technical Assistance
UCPS	Upper Cisokan Pumped Storage
UIP	*Unit Induk Pembangkitan*
UPP	*Unit Pelaksana Proyek*
USD	United States Dollar
VAC	Violence Against Children
VRE	Variable Renewable Energy
WACC	Weighted Average Cost of Capital
WB	World Bank

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1. Summary Sheet

AIIB Member	Indonesia
Borrower	Republic of Indonesia
Guarantor	Not Applicable
Project Implementation Entity	PT Perusahaan Listrik Negara (Persero)
Sector Subsector	Energy Renewable energy generation – hydropower
Alignment with AIIB's thematic priorities	Green infrastructure
Project Objective	The objective is to support Indonesia's energy transition and decarbonization goal by 1) developing the first large-scale pumped storage hydropower to improve power generation peaking and storage capacity of the Java-Bali grid and 2) strengthening PLN's capacity for hydropower development and management.
Project Description	The Project will support PLN's development of the Upper Cisokan Pumped Storage (UCPS) Hydropower Plant, including its environmental and social risk and impact management, implementation, and monitoring, as well as capacity building for PLN in hydropower project preparation and management. There are three components of the Project: Component 1: Development of the UCPS Plant, which covers the preparation, construction, and commissioning of a 1,040 MW pumped storage hydropower plant located in about approximately 150 km southeast of capital city Jakarta at the upstream of the Cisokan River Basin in West Java Province. (i) Sub-component 1.1: Preparation, Construction, and Commissioning of the UCPS Plant. (ii) Sub-component 1.2: Project Supervision and Support to the Project Implementation Unit. Component 2: ES Impact Management for the UCPS Plant, which includes the implementation of the various ES plans, and development and implementation of additional plans to mitigate the adverse ES impacts of the UCPS plant. Component 3: Technical Assistance and Capacity Building, which supports the preparation of the Matenggeng Pumped Storage (MPS) Plant, Pokko Hydropower Project (Pokko HPP), and the Java-Bali System Master Plan.
Implementation Period	01.May.22 31.Dec.27
Expected Loan Closing Date	30.Jun.28
Proposed Amount of AIIB Financing	USD230 million
Financing Plan	Component 1: AIIB (USD230 million), WB (USD333 million), PLN (USD110 million) Component 2: WB (USD5 million), PLN (USD35 million) Component 3: WB (USD42 million)
ES Category (or AIIB equivalent, if using another MDB's ES Policy)	A
ES Category Comments	The WB has categorized the ES risks of the Project as High, which is equivalent to Category A if AIIB's ESP were applicable.
Risk	High

Conditions of Effectiveness	1. The Subsidiary Loan Agreement (SLA) has been entered into between the Borrower and PLN. 2. The Project Review Panel (PRP) has been established in accordance with the provisions of the Environmental and Social Commitment Plan (ESCP); and PLN is in full compliance with its obligations to be satisfied at that time under the ESCP. 3. Execution of a Project Co-Lender's Agreement between AIIB and the WB. 4. The WB's Financing Agreements have become effective.
Key Covenants	1. PLN shall contract the services of an independent construction supervision consultant, starting from a date which shall be no later than two months after the Effective Date of the WB loan. 2. PLN shall ensure that, no later than the date which falls sixty days after the declaration of effectiveness of the Contract Amendment Agreement (CAA), the Dispute Board in accordance with the provisions of the Construction Contract, and thereafter maintain it throughout the implementation of the Project. 3. PLN shall implement the Project in accordance with the ESCP. 4. PLN shall prepare and adopt the Project Implementation Manual (PIM).
Conditions for Disbursement	No withdrawal shall be made until: 1. the independent construction supervision consultant has been recruited. 2. documentary evidence has been received confirming that PLN and its contractor have finally resolved their grievances and that all conditions precedent to the commencement of works have been satisfied. 3. PLN is up to date and fully compliant with those planning and implementation provisions of the action plan for the LARAP, and all LARAP tasks to be completed and issues to be addressed in connection with the UCPS Plant under the ESCP have been completed and addressed.
Retroactive Financing (Loan % and dates)	0.00 12
Policy Waivers Requested	No
Policy Assurance	The Vice President, Policy and Strategy, confirms an overall assurance that AIIB is in compliance with the policies applicable to the Project.
Economic Capital (ECap) Consumption	USD29 million

President	Liqun Jin
Vice President	Urjit Patel
Director General	Rajat Misra
Manager	
Team Leader	Ziwei Liao, Senior Private Sector Operations Specialist
Back-up Team Leader	Amanda Dompas, Investment Operations Specialist
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Credit Officer	

2. Project Description

A. Project Overview

1. **Project Objective.** The objective is to support Indonesia's energy transition and decarbonization goal by 1) developing the first large-scale pumped storage hydropower to improve power generation peaking and storage capacity of the Java-Bali grid and 2) strengthening PLN's capacity for hydropower development and management.

2. **Project Description.** The Project will support PLN's development of the Upper Cisokan Pumped Storage (UCPS) Hydropower Plant, including its environmental and social risk impact management, implementation, and monitoring, as well as capacity building for PLN in hydropower project preparation and management.

3. The Project has three components:

(i) Component 1: Development of the UCPS plant, which covers the preparation, construction, and commissioning of a 1,040 MW pumped storage hydropower plant located in about approximately 150 km southeast of capital city Jakarta at the upstream of the Cisokan River Basin in West Java Province. Component 1 consists of two sub-components:

1) *Sub-component 1.1: Preparation, Construction, and Commissioning of the UCPS Plant.*

2) *Sub-component 1.2: Project Supervision and Support to the Project Implementation Unit.*

(ii) Component 2: ES Impact Management for the UCPS Plant, which includes the implementation of the various ES plans, and development and implementation of additional plans to mitigate the adverse ES impacts of the UCPS plant.

(iii) Component 3: Technical Assistance and Capacity Building, which supports the preparation of the Matenggeng Pumped Storage (MPS) Plant[1], Pokko Hydropower Project (Pokko HPP)[2], and the Java-Bali System Master Plan.

4. The UCPS plant will be the first pumped storage hydropower (PSH) in Indonesia. It makes use of two water reservoirs at different elevations. At times of low electricity demand or when there is abundant generation from clean power sources (such as solar), power from the grid is used to pump water to the upper reservoir. During peak demand when electricity price is high, power is generated by discharging water down to the lower

[1] MPS, with an estimated capacity of 943 MW, will be located in Cijolang River Basin in West Java near the border with Central Java, approximately 300 km southeast of Jakarta.
[2] Pokko HPP will be located in the Sulawesi Island on Mamasa River, around 22 km upstream of the existing Bakaru hydropower plant.

reservoir using a turbine. The plant will be connected to the Java-Bali grid system using two 16 km double circuit 500 kV transmission lines.

5. The UCPS can flexibly switch between pumping and generating modes within minutes, allowing it to meet the system balancing need nearly instantaneously. Thus, it can provide numerous ancillary services to the grid, such as peak-shaving and load-leveling, provision of spinning reserve, black-start, voltage and frequency control, and energy storage. In doing so, the plant supports efficient system balancing, especially helps manage the variability of solar generation, resulting in greater absorption of variable renewable energy (VRE) in the system.

6. **Project History.** The WB previously approved a USD640 million IBRD loan to support the development of the UCPS in May 2011. In 2017, the WB decided a partial cancelation of the loan after several delays during early implementation, mainly due to incompletion of the permanent access road and prolonged contractual disputes between PLN and the dam and civil works contractor. Since then, the previous project has been restructured to focus on technical assistance (TA) for MPS to PLN with a total of USD44 million and is expected to close on December 31, 2021.

7. As a key aspect of the restructured project, the WB continued its supervision of resettlement activities in compliance with the three Land Acquisition and Resettlement Action Plans (LARAPs) for the reservoirs, the transmission line, and the permanent access road. After partial cancellation of the loan, PLN continued to develop the UCPS and completed most resettlements and compensation payments to the project-affected people (PAP).

8. In August 2019, PLN expressed interest in having the WB finance the Project again. The WB restarted the project preparation after considering several key reasons, including 1) the permanent access road (PAR) has been repaired, 2) the LARAPs have been largely completed by PLN, 3) PLN has appointed an owner's engineer to update the design of civil works, 4) PLN and the dam and civil works contractor have concluded the negotiations, and 5) the economic case for PSH has been strengthened with imperative to integrate more VRE.

9. In March 2021, PLN and the contractor signed the memorandum of negotiation (MoN)[3] with key terms agreed. The Contract Amendment Agreement (CAA) is ready to be signed upon No-Objection from the WB, paving the way for construction works to start soon after approval. Key lessons learned from the previous loan have been incorporated to strengthen the Project design (refer to para. 18). The WB and the Ministry of Finance of the Republic of Indonesia (MoF) have signed the Loan Agreement for the Project with an amount of USD380 million on December 17, 2021[4].

10. The WB invited AIIB to co-finance the Project in late 2020. Since then, the AIIB team has worked closely with the WB on technical design, ES, procurement, and

[3] The MoN records the agreement of the resolution of the claim and the price implication of the contract. The claim, if any, will not be financed by the WB or AIIB.
[4] https://documents1.worldbank.org/curated/en/463721640195084459/pdf/Official-Documents-Loan-Agreement-for-Loan-No-9278-ID.pdf

economic analysis of the Project. Together, we have carried out six virtual missions to date[5]. On June 23, 2021, the MoF officially requested AIIB to provide a loan of USD230 million for the financing of the Project.

11. **Expected Results.** The Results Monitoring Framework is provided in Annex 1 and lays out the Projects' indicators, targets, and monitoring arrangement. The key Project Objective Indicators include:

(i) Addition of peaking generation capacity in the Java-Bali system: 1,040 MW.

(ii) Addition of power storage capacity to the Java-Bali grid from the UCPS: 1,478.70 GWh.

(iii) Reduction of the greenhouse gas (GHG) emission enabled by the UCPS by 2040[6]: 7.3 $MtCO_2e$.

12. **Expected Beneficiaries.** The beneficiaries of the Project are all electricity consumers in the Java-Bali system. The Project will also contribute to socio-economic development of the communities. The local population nearby the UCPS site are expected to benefit from employment opportunities during the construction, improvement of local infrastructure, provision of public services, and increased tourism and economic activities. As the UCPS enables VRE integration, it will also create investment opportunities for VRE developers and financiers and related local employment.

B. Rationale

13. **Strategic fit for AIIB.** The Project is fully aligned with AIIB's Energy Sector Strategy and AIIB's thematic priority of promoting Green Infrastructure. It improves reliability and flexibility of the Java-Bali system by providing the least-cost solution and enables the reduction of carbon intensity of power supply in the long run. The Project will contribute to Indonesia's Nationally Determined Contribution (NDC), which outlines the country's commitment as part of the 2015 Paris Agreement to reduce GHG emissions by 29 percent on its own efforts and up to 41 percent with international support, compared to the Business as Usual (BAU) scenario, by 2030[7]. Furthermore, it will also support the GoI's Long-Term Strategy for Low Carbon and Climate Resilience 2050, targeting for carbon neutrality by 2060 or sooner[8]. The Project is critical for energy transition and grid decarbonization of the country in the following aspects:

(i) **A catalyst for renewable energy development.** VRE penetration has been limited to date in Indonesia due to PLN's concern over grid stability. The UCPS provides the necessary ancillary services and storage capacity to enable

[5] For the WB, the six virtual missions were comprised of four preparatory missions and two implementation support missions.
[6] The GHG emission reduction benefit will continue beyond 2040 as the typical lifespan of PSH is more than 50 years.
[7] GoI. 2021. Updated Nationally Determined Contribution.
[8] GoI. 2021. Long-Term Strategy for Low Carbon and Climate Resilience 2050.

integration of VRE on the Java-Bali grid. It is estimated that the share of VRE will rise from 11.5 percent (without UCPS) to 14 percent (with UCPS) of the total installed capacity in 2028[9].

(ii) **Greenhouse gas emissions avoidance.** The UCPS plant allows to lower investment in gas capacity (around 1GW of investment in combined cycle gas turbine (CCGTs) avoided in 2028)[10]. It is estimated that the UCPS will contribute to GHG emission reduction of 7.30 $MtCO_2e$ by 2040 and 13.6 $MtCO_2e$ by 2053 (counting the full 25 years lifetime of the plant)[11].

14. **Value addition by AIIB.** AIIB's financing will close the financing gap and support the development of the first large-scale PSH project in the country to align with international standards. AIIB's joint due diligence and supervision of the Project with the WB will enhance the Project's implementation readiness and quality. Given the substantial ES impacts of the Project, AIIB's perspective will enable comprehensive ES review for a project of such scale and nature. Furthermore, the experience AIIB has recently gained in its standalone PLN East Java and Bali Distribution Strengthening Project will facilitate the collaboration with PLN for the Project.

15. **Value addition to AIIB.** AIIB will expand its institutional knowledge from financing the Bank's first PSH project. PSH is similar to conventional hydropower, but with different aspects in structure and operational procedure. The experience gained in the Project will help guide AIIB's future investments in large-scale hydro dam infrastructure, especially standalone projects such as Tamakoshi V hydroelectric project currently under preparation in Nepal.

16. The Project will open future collaboration opportunities with the GoI and PLN in the renewable energy space where the country has a huge potential. GoI recognizes that among over 400 GW potential capacity from sources such as hydropower, solar and geothermal, only around 2.5 percent has been utilized[12]. The operation of the UCPS will help create stronger renewable energy development in the country where fossil fuel still plays a dominant role in electricity generation.

17. The Project will further strengthen AIIB's institutional relationship with PLN, the country's key stakeholder in power sector, and support AIIB's operations in other energy projects in the country involving PLN. The Project will be AIIB's second project with PLN and expand our cooperation from distribution to generation. AIIB's involvement in the Project will also open opportunities to support PLN's renewable ambitions, following PLN's intention to undertake environmental and social transformation[13].

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[9] Castlerock Consulting. May 2021. Economic Evaluation of the Upper Cisokan Pumped Storage Project.
[10] Castlerock Consulting. May 2021. Economic Evaluation of the Upper Cisokan Pumped Storage Project.
[11] The GHG emissions are calculated by performing least-cost system simulations with system planning software. The reductions are calculated by subtracting the emission with the Project from emissions without the Project using carbon emission factors based on real plant data.
[12] Reuters. October 22, 2020. Indonesian Govt Finalises New Rules for Renewable Electricity.
[13] In 2020, PLN published the Statement of Intent on Sustainable Financing Framework, aiming to access new financing sources to support PLN's green transformation. Following the launch of this framework, PLN raised its inaugural green loan of USD500 million to finance renewable projects.

18. **Lessons learned.** The Project has incorporated the lessons learned from AIIB's hydropower projects[14] and other MDB's hydropower related experiences, especially the previous WB loan for the UCPS plant.

(i) **Enhanced social due diligence.** As hydropower projects usually change the entire landscape and topography, the impact on the local community is significant. To minimize the adverse impacts, it is critical to confirm that appropriate studies on resettlement have been conducted thoroughly to cover project-affected people. For this Project, PLN has prepared three LARAPs since 2011 and largely completed the compensation payments. PLN carried out an implementation completion review of the LARAPs, which identified outstanding tasks and new issues that have emerged during the LARAP implementation. Preparation of action plan to address these issues will be completed before the first disbursement. The Project Team will be actively engaged to review compliance with ES requirements.

(ii) **Active engagement of local community.** For a project of such scale, one of the key aspects is the relationship with the local community. Conflict with the local community is the most likely source of delay in large hydropower projects. PLN has carried out extensive stakeholder engagement and public consultation for this Project under the WB's previous loan. The Stakeholder Engagement Plan (SEP) was prepared by PLN and will be implemented under the guidance of AIIB and the WB.

(iii) **Dam design and construction.** Large hydropower projects pose significant construction risk, dam safety risk, and irreversible changes to the physical environment. Dams are typically situated in remote area, intensifying the difficulty of undertaking civil works. Given the nature and scale of the UCPS plant, the project should be prepared with robust design and involve contractors with proven track record. The overall dam design in the previous loan has been reviewed by a Project Review Panel (PRP) of internationally and nationally reputable experts specializing in hydropower. A new PRP will be recruited for this Project to review and approve the updates to the design of UCPS.

(iv) **Early preparation and implementation supervision.** Another important lesson is that the project implementing entity shall have adequate and dedicated resources with clear roles and responsibilities, as well as necessary support from experienced independent consultants. During the original WB financing, the delay in PLN's hiring of the owner's engineer and the delay in finalizing the dam design had severe negative consequences to the project implementation. For this Project, an independent construction supervision consultant (ICSC), comprising of Nippon Koei Co. Ltd., NEWJEC Inc., PT. Indokoei International, PT Wiratman JO and PT Prima Layanan Nasional Enjiniring (PLN-E), will also act as the PLN's owner's engineer for the UCPS.

[14] All AIIB's approved hydropower projects were consulted, including Nepal Upper Trishuli-1 Hydropower Project, Tajikistan Nurek Hydropower Rehabilitation Project Phase 1, Pakistan Tarbela 5 Hydropower Extension Project, and Pakistan Balakot Hydropower Development Project.

The ICSC will support PLN in construction supervision, contract management, and quality and schedule control.

(v) **Strengthened ES measures.** During the implementation of the previous WB loan, it was found that support from external experts was needed for PLN to implement the complex LARAPs, ESMP, and other ES plans. Under this Project, an Independent Environmental and Social Monitoring (IESM) consultant and ES Panel will be actively engaged to provide quality control in the implementation of the ES plans for UCPS.

C. Cost and Financing Plan

19. The total Project cost is USD755 million, of which USD230 million will be financed by AIIB, USD380 million by IBRD, and USD145 million by PLN. AIIB will only co-finance the Sub-component 1.1 of the Project. The Component 2 will be largely financed by PLN as most of the ES plans have already been implemented. The WB will solely finance Component 3, which includes capacity building to support PLN in hydropower project preparation and management. Table 1 provides the detailed cost and financing plan of the Project.

Table 1. Detailed Cost and Financing Plan (in USD million)

Components		Estimated Cost *(incl. contingencies)*	Financing Plan		
			IBRD	AIIB	PLN
1.	**Development of the UCPS Plant**	**673**	**333**	**230**	**110**
1.1[15]	**Subcomponent 1.1**	***607***	***322***	***230***	***55***
	Dam and civil works[16]	351.5	201.0	143.0	7.5
	Electro-mechanical equipment	161.0	93.5	67.5	
	Hydraulic metal works	49.5	27.5	19.5	2.5
	Transmission lines	45			45
1.2	**Subcomponent 1.2**	***66***	***11***	***0***	***55***
	PIU administrative cost	9	2		7
	Engineering Services	48			48
	PRP (incl. Dam Safety)	4	4		
	Just-in-time additional engineering services	5	5		
2	**Environmental and Social Impact Management for the UCPS**	**40**	**5**	**0**	**35**
2.1	***Subcomponent 2.1***	***35***	***0***	***0***	***35***

[15] Dam and civil works, Electro-mechanical equipment, Hydraulic metal works are referred to as 1.1 a) and Transmission Line is referred to as 1.1 b) in the loan agreement to differentiate the main source of financing of the contracts.

[16] Counterpart financing of USD7.5 million for Dam and civil works and of USD2.5 million for Hydraulic metal works are related to claims for activities that were conducted between signing and the end of 2017 and cannot be financed by the IBRD or AIIB loans.

Components		Estimated Cost *(incl. contingencies)*	Financing Plan		
			IBRD	**AIIB**	**PLN**
	Social costs *[Community infrastructures (US$ 15 million) and remaining LARAP issues (US$ 5 million)]*	20			20
	Environmental costs *[BMP (US$ 10 million) and others]*	15			15
2.2	***Subcomponent 2.2***	***5***	***5***	***0***	***0***
	Independent E&S Monitoring Consultant	3	3		
	ESP	2	2		
3.	**Technical Assistance and Capacity Building**	**42**	**42**	**0**	**0**
3.1	Preparation of the Matenggeng Pumped Storage Project	18	18		
3.2	Preparation of Pokko Hydropower Project	14	14		
3.3	PRP and ESP - MPS and Pokko	3	3		
3.4	Preparation of the Java-Bali Masterplan	2	2		
3.5	Capacity Building and Support to Project Implementation Management	5	5		
	Total	**755**	**380**	**230**	**145**

D. Components

20. The Project comprises of three components as described below.

Component 1: Development of the UCPS plant (USD673 million).

Sub-component 1.1: Preparation, Construction, and Commissioning of the UCPS plant (USD607 million).

21. This Sub-component covers the preparation, construction, and commissioning of the UCPS plant with a total capacity of 1,040 MW. The development of the UCPS includes the following main works:

- an upper dam with a maximum height of 75.5 m and a 375 m long crest;
- a lower dam with a maximum height of 98 m and a 294 m long crest;
- waterways connecting the two dams: consisting of two intakes, two headrace tunnels each 1.2 km long, two restricted orifice surge tanks, two inclined steel-lined penstocks, four short tailrace tunnels and outlet structures;
- an underground powerhouse, 51 m high, 26 m wide and 156.6 m long, housing four pump-turbine units each with a nominal generating capacity of 260 MW;
- an outdoor 500kV switchyard; and
- two 500 kV double circuit transmission lines with the length of 16 km each.

22. The UCPS plant will be developed with a multi-package contract strategy. The construction is divided into four packages: 1) package 1: Civil Works – Upper Dam, Lower Dam, Powerhouse, and Waterways; 2) package 2: Electromechanical Equipment – Pump-Turbine, Generator-Motor and Auxiliary Equipment; 3) package 3: Transmission

Line; and 4) package 4: Hydraulic Metal Works. The packages 1, 2 and 4 have been procured during the previous WB loan. The procurement process for the transmission lines contract will be initiated in 2022 in order for construction to start in early 2024.

23. Works will take place within six years, including one year for ensuring a safe first reservoir filling and commissioning and the defect liability period. It will also allow for confirming that all parts, including the PS facilities, dam safety, operation management structure and adequate staffing are fully in place and tested.

Sub-component 1.2: Project Supervision and Support to the Project Implementation Unit (USD66 million).

24. The Sub-component will finance Engineering Services (refer to Table 1) provided by the ICSC. The ICSC, which comprises of Nippon Koei Co. Ltd., NEWJEC Inc., PT. Indokoei International, PT Wiratman JO and PT Prima Layanan Nasional Enjiniring (PLN-E), will also act as PLN's owner's engineer for the UCPS. The ICSC will supervise the implementation of the construction activities, general administration tasks, including decision for procurement and contract management, technical supervision, financial management, quality and schedule control, and monitoring of issues related to health, safety, security, as well as environmental aspects of all contract packages.

25. This Sub-component will also support the preparation of an Operation and Maintenance Plan (OMP) and an Emergency Preparedness Plan (EPP), and provision of training and capacity building to PLN staff on sediment management, long-term asset management, and dam safety. It will also finance the costs associated with the Project Implementation Unit (PIU) and the tasks necessary for project implementation.

26. It will also finance a PRP that includes dam safety experts that will support PLN in undertaking periodic, comprehensive, and independent reviews of the design, construction, quality, and initial reservoir filling in line with WB ESF's Environmental and Social Standard 4 annexure on dam safety.

Component 2: ES Impact Management for the UCPS Plant (USD40 million).

Sub-component 2.1: Implementation of ES Plans (USD35 million).

27. This Sub-component will finance the implementation of the ES plans, and development and implementation of additional plans, to mitigate the adverse ES impacts of the UCPS. Several plans have been developed under the previous loan in line with relevant government policies and the WB's operational policies. To comply with the WB ESF and the latest relevant government policies, the following plans have been updated, and will be implemented under this Project: 1) Environmental and Social Management Plan (ESMP), 2) Biodiversity Management Plan (BMP), 3) Forest Partnership Framework (FPF), 4) Cultural Heritage Management Plan (CHMP), 5) Land Acquisition Resettlement Action Plan (LARAP), 6) Land Acquisition and Resettlement Policy Framework (LARF), and 7) Social and Community Management Plan (SCMP). The details of the ES plans are explained in Section I: Environmental and Social.

Sub-component 2.2: IESM consultant and ES Panel (USD5 million).

28. This Sub-component includes the financing of an IESM consultant and an ES Panel to provide quality control in the implementation of the ES plans for UCPS. The role of the IESM Consultant will be to provide independent monitoring of compliance of the implementation of the ES obligations related to the UCPS. These obligations are detailed in the ESMP. The ES Panel will review and confirm the quality of the implementation of the ESMP, Contractors' ESMPs (C-ESMPs), FPF, LARAPs and the other plans.

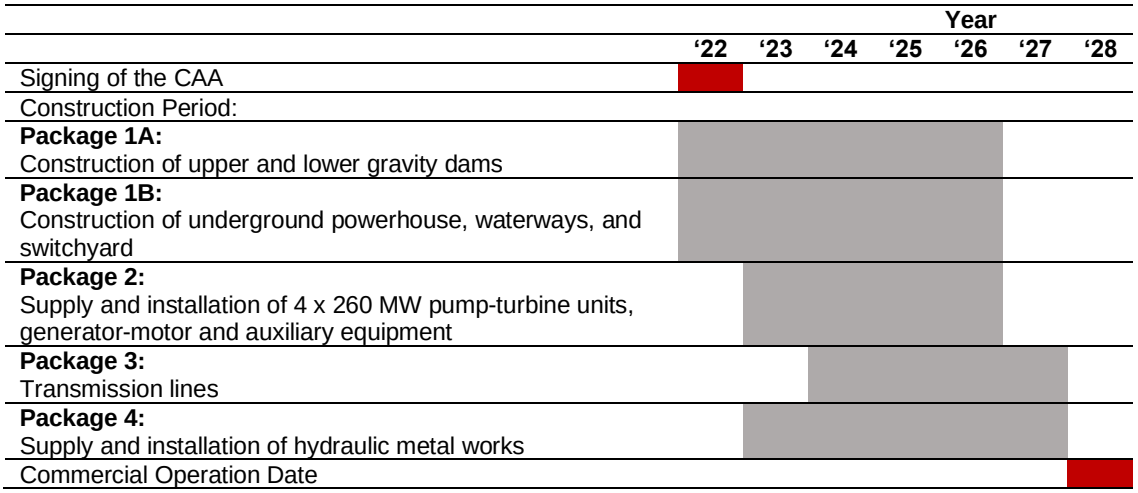
Component 3: Technical Assistance and Capacity Building (USD42 million).

29. This component will finance technical assistance to strengthen PLN's capacity in hydropower development through support to the preparation of the MPS, Pokko HPP, and the Java-Bali System Masterplan. Similar to UCPS, MPS with an estimated capacity of 943 MW will provide ancillary services to the Java-Bali grid. The plant will be located in Cijolang River Basin in West Java near the border with Central Java, approximately 300 km southeast of Jakarta. Pokko HPP is included in the RUPTL 2021-2030 as one of the strategic projects for the Java-Bali system. The plant will be located in the Sulawesi Island on Mamasa River, around 22 km upstream of the existing Bakaru hydropower plant. The objective of the Java-Bali System Masterplan will be to conduct long-term capacity expansion planning of the system to establish an environmentally acceptable, reliable, economical and high-quality power network. The Masterplan will also include a scenario analysis for achieving net-zero carbon by 2060.

E. Implementation Arrangements

30. **Implementation period.** The construction of the UCPS is expected to take six years and commissioning is expected in 2028. The construction of temporary works is expected to commence once the CAA has been signed, conditions precedents are met, and ICSC with international experience has been recruited and mobilized. Figure 1 provides an overview of the indicative implementation timeline.

Figure 1. Indicative Project Implementation Timeline



31. **Implementation management.** PLN will be the Project Implementation Entity (PIE) for the Project. PLN is Indonesia's state-owned electric utility company and is wholly owned by the GoI, which is represented by the Ministry of State-Owned Enterprises. PLN owns and operates most of the public electricity and electricity infrastructure in Indonesia, including power generation, transmission, distribution, and retail sales of electricity.

32. Like the PLN East Java and Bali Distribution Strengthening Project[17], the preparation and implementation of this Project involves several directorates within PLN head office and the regional units. During the preparation stage, the Corporate Planning Directorate is the focal point and serves as the coordinator of the Project Management Unit (PMU)[18]. The PMU will coordinate the Project planning, implementation, budgeting, monitoring, and reporting. PLN will establish a PMO under the newly created Mega-Project Directorate for the Project. The PMO will act as the coordinator of the PMU from implementation until Project completion, with inputs from PIUs and the PMU (refer to Figure 2 for a schematic organizational chart for UCPS implementation). The UCPS PIU will manage the implementation of Components 1 and 2 on the ground while the TA PIU will oversee activities under Component 3.

33. **UCPS Project Implementation Unit (PIU).** Activities under the Components 1 and 2 will be implemented by the UCPS PIU[19], which is under the Mega-Project Directorate. The UCPS PIU has been established and is already operational with adequate staffing. It has contracted PLN-E to conduct the remaining preparatory work, supervise the construction works, and provide quality control, contractor management, and satisfactory implementation of the C-ESMPs. PLN-E will also support the UCPS PIU in coordination with the relevant local government authority and other related public entities.

34. The ICSC will review and update the detailed design, preparing construction drawings, supervising and monitoring the contractors' work, as well as managing all contracts and overall project. A Project Implementation Manual (PIM) will be prepared to guide the project implementation with the support of the ICSC. To facilitate quality control, the UCPS PIU will also retain a PRP consisting of international and nationally reputable experts with specializations relevant to hydropower.

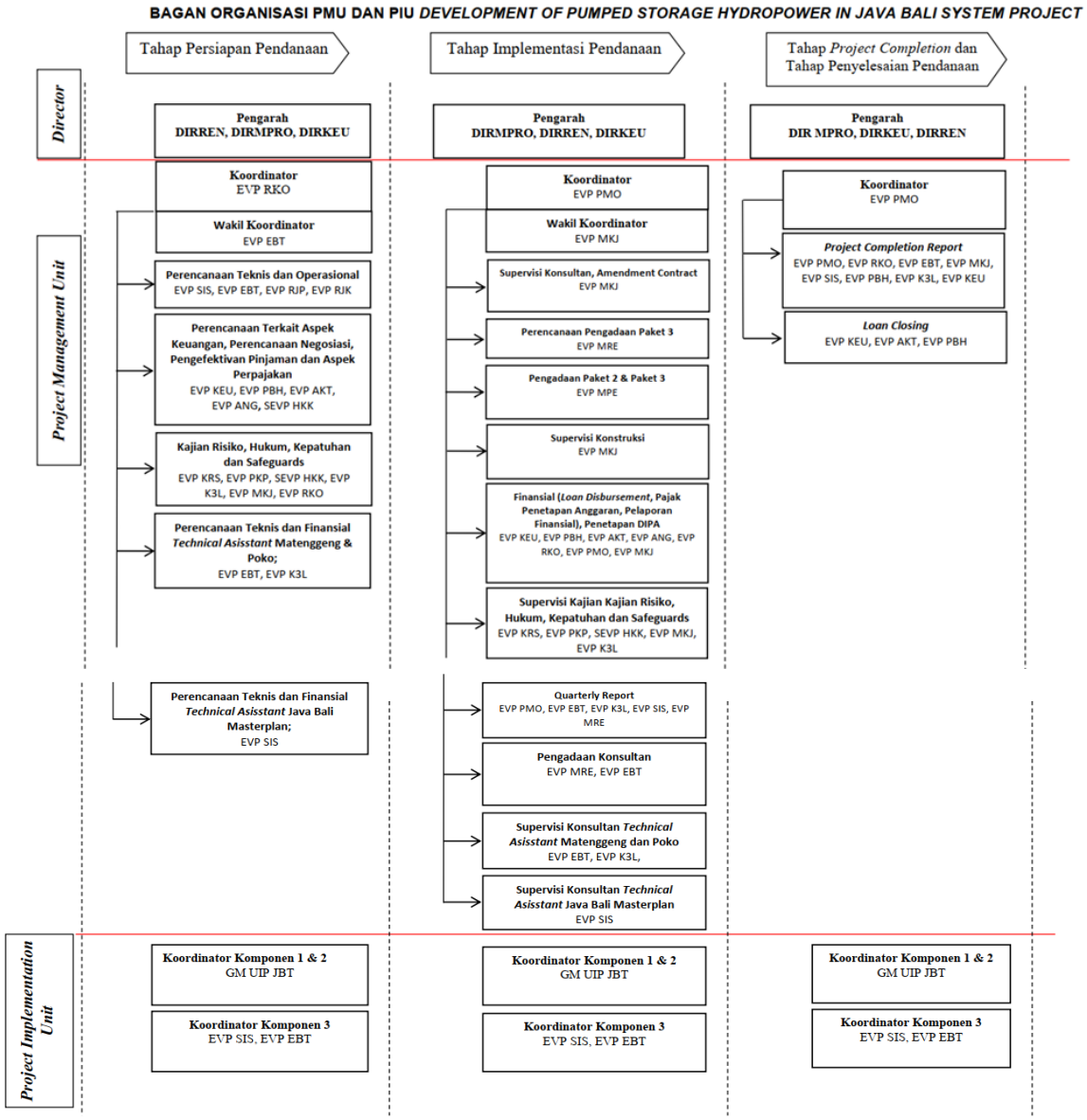
35. For ES implementation, the UCPS PIU will establish and maintain an ES team to coordinate and supervise the ES work. The team will consist of two units, the Environmental, Social, Health, Safety and Security (ESHSS) unit and the LARAP Unit. Perum Perhutani (Perhutani)[20], together with the Forest Management Unit, is responsible for the implementation of the BMP and FPF. The ES team will be supported by the ICSC to supervise the implementation of the C-ESMPs. UCPS PIU will also be supported by an IESM Consultant in monitoring the overall implementation of the

[18] PMU includes representatives from PLN's several business divisions.
[19] PLN Unit Induk Pembangkitan or Main Development Unit of Central Java I (UIP) will be the UCPS PIU
[20] Perhutani is a state-owned enterprise, which manages the state forests in Java and Madura islands of Indonesia.

Environmental and Social Impact Assessment (ESIA), ESMPs, BMP, FPF, CHMP and SCMP. It will also be advised by the ES Panel for quality control.

36. **Technical Assistance Project Implementation Unit (TA PIU).** Activities under Component 3 supporting the preparation of MPS and Pokko, and the Java-Bali masterplan will be coordinated by the Corporate Planning Division under the Corporate Planning Directorate. The activities will be implemented by units-in-charge (UICs) that come from specific directorates. The preparation of MPS Plant and Pokko HPP will be implemented by a UIC within the Corporate Planning Division (RKO), New and Renewable Energy Division (EBT), Health Safety Security & Environment Division (K3L), and the Java-Bali Masterplan by a UIC within the System Planning Division (SIS).

Figure 2: Schematic Organizational Chart for UCPS Implementation Based on the Decree of the PLN's Board of Directors No. 0478.K/DIR/2021



37. **Procurement.** The WB will play the leading role with support from the AIIB team for procurement preparation and implementation in accordance with the Co-financing

Framework Agreement between the WB and AIIB. Procurement of Goods, Works, Non-Consulting and Consulting services under the project will be in accordance with the WB's Procurement Regulations for Investment Project Financing Borrowers, November 2020. UCPS PIU will be responsible for procurement under Component 1 to be financed by AIIB. The Project Procurement Strategy for Development (PPSD) including a Procurement Plan (PP) has been prepared by PLN. The PPSD identifies the risks and sets out mitigation measures and key performance indicators for contract implementation, including the existing contracts awarded under the previous WB project.

38. Based on the analysis of procurement options, the PPSD concluded that the most suitable and Fit for Purpose option for 1) package 1: Civil Works – Upper Dam, Lower Dam, Powerhouse, and Waterways; 2) package 2: Electromechanical Equipment – Pump-Turbine, Generator-Motor and Auxiliary Equipment; 3) package 3: Transmission Lines; and 4) package 4: Hydraulic Metal Works, under the Subcomponent 1.1, is to continue with the contracts awarded under the original WB project, with a direct contracting approach. This approach will provide value for money. These contracts will be considered as advance procurement for possible financing under this Project, subject to satisfactory resolution of the contractual issues, the WB's prior review, and provision of No-Objection on the CAA. The PPSD also provides details of the procurement approaches and strategy for the other packages which are to be tendered under the Project.

39. **Financial Management (FM).** The FM arrangements will follow PLN's system, except for the budgeting under the Subsidiary Loan Agreement (SLA) and payment processes with the State Treasury Service Office (*Kantor Pelayanan Perbendaharaan Negara*, or KPPN), which will follow the government's system. The PMO will prepare semi-annual interim financial reports (IFRs) in the format following the WB and AIIB's requirements to reflect both budget and actual usage of project funds. PLN will also submit the entity's audited reports to AIIB and the WB annually within six months after the end of the fiscal year during the loan period. The Notes to the Financial Statements will include the loan status.

40. **Monitoring and Evaluation.** The Project's progress and performance will be monitored based on the Project Objective Indicators and Intermediate Results Indicators in the Results Monitoring Framework. The PIUs will be responsible for collecting and verifying data and providing inputs to the periodic progress reports to be submitted to AIIB and the WB on all work progress and achievement of all indicators.

41. **AIIB's Implementation Support.** The Project Team will conduct regular implementation support and supervision missions together with the WB physically and virtually, with the frequency based on implementation progress and complexity.

3. Project Assessment

F. Technical

Project Design

42. The UCPS will have two reservoirs with an active volume of 10 million m^3. The upper and lower dam will have a maximum height of 75.5 m and 98 m, respectively. The

total land area required for the Project is approximately 731.76 hectares. Compared to conventional run-of-river hydropower, UCPS requires a much smaller reservoir and watershed because it releases excess water downstream to maintain active storage capacity[21]. The water supply in a PS plant is typically not dependent on hydrological variability like run-of-river hydropower, enabling UCPS as a reliable system backup in case of frequency variations. The Project is also near the Java-Bali system's load center[22]; therefore, it can help manage grid congestion and reduce transmission losses in the system better than more distant power plants in Central and East Java[23].

43. The technical design of UCPS has been prepared according to international standards and reviewed extensively by a PRP under the WB's existing restructured loan (refer to para. 6). PRP consists of professionals with expertise in pumped storage hydropower, including rock mechanics, geotechnical engineering, dam construction, seismic structural design, electro-mechanical equipment, hydraulic metal works, and ES management. To address the latest recommendations by the PRP and update the overall dam design, PLN-E recruited Nippon Koei and Newjec (NK/NJ) as a consultant for civil works design update for package 1. During the design review by NK/NJ and in consultations with PLN-E, some additional studies need to be completed to update the final dam design, including Seismic Hazard Assessment (SHA) and Hydraulic Model Test. The PRP will review and approve the updated design before the work can start on the ground.

Dam Safety

44. **Seismic Hazard Assessment (SHA).** It had previously been reviewed and agreed by PRP to design the project structures under a Maximum Credible Earthquake (MCE) of 0.48 g. The new seismic hazard map of Indonesia in 2017[24] has updated the MCE value near the UCPS plant site. On the recommendation of the reinstated PRP, PLN has engaged Bandung Institute of Technology (LAPI ITB) to carry out additional field survey and analysis. NK/NJ will review the results, including the seismic parameters, and be responsible for the SHA revision. The revised value of MCE will be adopted for the final dynamic analysis of the dam structure. PLN-E, NK/NJ, and the PRP will be involved throughout the SHA revision. The reservoir-triggered earthquake will also be examined.

45. **Hydraulic Model Test.** The updated design indicates that an energy dissipator is required for the lower dam to avoid uncontrolled scoring in the downstream river that could cause landslides and consequently affect the dam safety. The engineering consultant evaluated three alternatives for the energy dissipator and recommended an ungated spillway crest, stepped chute, and stilling basin. To confirm this option, LAPI ITB, with the supervision of the engineering consultant, will perform a hydraulic model

[21] Saguling and Cirata, two nearby operating hydropower plants located 15 km to the east and 30 km to the north of the Project site, were considered in the Project's feasibility study, including the hydrology and sedimentation assessments.
[22] The Project is approximately 150 km south-east of capital city Jakarta and 30 km west of Bandung, both of which are the biggest load centers in the Java-Bali grid.
[23] PLN-E, NK/NJ, PT. Indokoei International, PT. Wiratman. June 2021. Feasibility Study Review and Update Report of Upper Cisokan Pumped Storage Power Plant Project.
[24] Irsyam, M. et al. 2017. New National Seismic Hazard Maps of Indonesia.

test to verify that the stepped chute provides enough energy dissipation for the stilling basin to be hydraulically stable. Following the test, subsequent design updates will be completed before the start of excavation for the diversion arrangements.

46. **Sedimentation.** The dead storage for sedimentation in the upper reservoir was assessed to be sufficient; however, the dead storage for the lower reservoir appeared to be on the margin especially if a higher reservoir rate is considered. To mitigate this risk, the sedimentation process in the Lower Reservoir will be further investigated by field investigations. Based on sedimentation simulations, a sediment management plan will be prepared and mitigation measures to maintain the active storage will be proposed.

Operation and Maintenance (O&M)

47. **Emergency Planning.** An EPP up to international standard will be prepared at least one year prior to the first filling of the dams to allow implementation of the emergency measures and consultation with the impacted population.

48. **Operational Sustainability.** An OMP will be prepared to define the role of UCPS in the system on peaking, storage, and ancillary services. The WB and AIIB will work closely with PLN's System Planning Division to develop the plan. The preparation and satisfactory implementation of the OMP will also be monitored and reported under the Results Monitoring Framework. Under Component 3 of the Project, the capacity building will be provided on sediment management, long-term asset management, and dam safety, which will support PLN in managing the UCPS plant.

49. **Climate Change Risks.** The dam structures and spillways of UCPS have been designed to endure climate externalities including extreme floods. According to the feasibility study[25], the UCPS dams are designed to accommodate 1 in 10,000 years flood events through the spillway. In extreme floods, concrete gravity dams, like UCPS, are relatively robust against limited overtopping[26]. The design has also considered and mitigated the potential flooding risks in the underground powerhouse, occupational health and safety risks, and community health and safety risks during construction and operation. The dam and safety monitoring procedures will also be included in the OMP.

50. PSH is regarded not sensitive to hydrological variability from climate change, compared to conventional hydropower. UCPS is essentially considered as a closed circuit, with minor water losses due to evaporation from the reservoirs, which can be compensated by a small increase of active storages at the beginning of dry season. Therefore, hydrological regime changes due to climate change do not affect power generation by the Project.

51. At present the downstream Cihea irrigation system already suffers significant water shortages during the dry season, broadly estimated at 20 to 50 MCM for the season, which will only slightly be aggravated by climate change. The Project adds a

[25] PLN-E, NK/NJ, PT. Indokoei International, PT. Wiratman. June 2021. Feasibility Study Review and Update Report of Upper Cisokan Pumped Storage Power Plant Project.
[26] Bureau of Reclamation, Government of U.S. 2019. Best Practices and Risk Methodology for Dam Safety.

minor 1.5 MCM or less to these water shortages, which can be compensated by a minor variation of the minimum and maximum operational levels of the lower reservoir.

G. Economic and Financial Analysis

52. **UCPS Economic Analysis.** Indonesia has enormous potential in hydropower generation, estimated at around 75 GW[27], but hydropower currently only accounts for less than 10 percent of total installed capacity. At present, coal- and gas-fired power plants are the main power generation source in the country, accounting for more than 70 percent of total installed capacity[28]. The UCPS plant is part of the least-cost development plan for Indonesia's low-carbon transition by unlocking the hydropower and VRE potential, as well as offering reliability and flexibility to the Java-Bali power grid.

53. The economic analysis for UCPS was carried out by the WB[29]. The analysis only considered Components 1 and 2, for which the economic values can be identified and measured. Therefore, the economic analysis excludes the benefits from the TA component. The basis for the economic analysis is modeling the Java-Bali power system with and without UCPS. The analysis consists of a long-term (LT) capacity expansion analysis and more detailed short-term (ST) chronological production cost simulation in finer granularity of hourly or sub-hourly resolutions. The long-term analysis covers 20 years (2021-2040), with expected Project commissioning in 2028. The short-term analysis covers one year (2035) with greater data granularity and completeness to allow for the modeling of reserve provision. In addition, the model assumes that the installation of solar photovoltaic systems (PV) will be set to the maximum extent and will only be constrained by the need for the power grid to maintain a minimum operating load.

54. The least-cost generation method (or the avoided-cost approach) is used in an energy simulation model of the Java-Bali power system and estimates the cost and benefit differences between the with and without UCPS scenarios while serving the same system demand. The avoided-cost approach estimates the lower bound of the economic benefits as it accounts mostly for energy arbitrage, CO_2 emission reduction and investment deferral.

55. The difference in VRE capacity between the with and without UCPS scenarios was estimated. In the "with UCPS" scenario, the economic costs include construction of additional VRE generation capacity compared to the capacity in the "without Project" scenario. The economic benefits are the avoided investment in gas capacity and fuel cost savings. The higher VRE capacity in the "with UCPS scenario" generates these incremental economic benefits despite the actual VRE investment being outside the Project scope.

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[27] Ministry of Energy and Mineral Resources. 2019. Renewable Energy Roadmap for Indonesia. Presentation by F.X. Sutijastoto, Director General of New, Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources (ESDM). 8th IndoEBTKE ConEX 2019. 6 November 2019

[28] Fitch Indonesia Infrastructure Report Q4 2021.

[29] The WB's Economic and Financial Analysis for UCPS is provided in Annex 3 of the WB's Project Appraisal Document. https://documents1.worldbank.org/curated/en/844471635952134217/pdf/Indonesia-Development-of-Pumped-Storage-Hydropower-in-the-Java-Bali-Project.pdf

56. The results from the long-term analysis show that the UCPS is the least-cost option for adding storage capacity to the Java-Bali power grid system, and that it reduces operating costs. The impacts stem from the energy arbitrage: consuming power for pumping water at times of lower demand and generation costs that can then be stored for use in generating power at times of higher demand. The other benefits are the increased penetration of VRE and the lowering of unserved energy.

57. The short-term analysis further illustrates that the UCPS could increase the provision of energy reserve, abridge the unserved energy, and defer the investment of coal and gas facility. The UCPS provides a large amount of reserve during the evening peak, displacing very high-cost peaking plants. In turn, UCPS generates during the early morning displacing CCGTs and allows pumping during the day when PV is generating.

58. The cost-benefit analysis for this project is conducted by comparing the present value of total costs, which includes both construction cost and the operation and maintenance cost, to the future benefits. The economic internal rate of return (EIRR) and the net present value (NPV) of net benefit are used to assess the economic viability.

59. Table 2 summarizes the economic analysis results. Without applying a carbon price for GHG emission, the NPV and the EIRR are USD315 million and 11.7 percent, respectively. Under the low-carbon price scenario, the NPV and the EIRR are USD463 million and 14.0 percent, respectively. Under the high-carbon price scenario, the NPV and the EIRR are USD611 million and 16.1 percent, respectively. In all scenarios, the UCPS project is considered economically viable.

Table 2: Summary of EIRR

Without carbon price	
NPV of Net Benefit (USD million)	315
EIRR (%)	**11.7**
Low carbon price	
NPV of Net Benefit (USD million)	463
EIRR (%)	**14**
High carbon price	
NPV of net benefit (USD million)	611
EIRR (%)	**16.1**

60. **UCPS Financial Analysis.** Due to the absence of market for storage and ancillary services, as well as peak and off-peak tariff in Indonesia, it has not been possible to fully account for the financial benefits of the UCPS[30]. Nevertheless, as demonstrated in the economic analysis, the Project will generate considerable benefits through the effective provision of peaking and reserve capacity as well as storage capacity in the Java-Bali grid. The Financial Internal Rate of Return (FIRR) is estimated to be roughly equal to the EIRR since 1) there are few price distortions, 2) taxation plays a very minor role, and 3) the difference in environmental benefits is minor between the

[30] The WB is expecting to address this in the P-for-R and associated advisory work that are under discussion with PLN and the government of Indonesia. It will support a more conducive tariff framework to enable PLN to fully quantify and capture the financial benefits of future pumped storage schemes.

with and without UCPS scenarios. The financing offered by AIIB and the WB will result in a weighted average cost of capital (WACC) of under 5 percent[31], which is lower than the estimated FIRR of 10-12 percent.

61. PLN, as the owner of the UCPS, will monetize the mentioned benefits in the form of lower generation cost and spinning reserve. The Project is estimated to bring an undiscounted net saving of USD1,526 million[32] to the Java-Bali system over 25 years. Therefore, it will marginally contribute to reduce PLN's operational deficit and thereby the need for state subsidies.

62. The Project Team has also investigated financial viability of PSHs in other markets. The revenue streams[33] of a typical large-scale PSH include energy arbitrage revenue i.e., price differential between peak and off-peak, ancillary revenues, and other revenue sources under market-specific mechanisms. For example, in China, the project revenue could include capacity charge and electricity revenue[34], while PSH in developed markets like Australia could generate revenue from cap contracts (call options purchased by energy users to protect them against extreme prices volatility)[35]. PSH projects in other countries shows a range of FIRRs between 8%-12%, which is comparable to the estimated FIRR of the Project[36].

63. The costs include both construction cost and the operation and maintenance cost. The estimated construction cost of UCPS is around USD170/kWh (refer to Annex 3: Member and Sector Context for further PSH comparison with other sources of energy storage technologies). According to International Forum on Pumped Storage Hydropower, the cost of PSH remains below the estimated price of lithium-ion, in 2030, even after taking account of anticipated cost reductions for chemical batteries[37].

64. **PLN's Financial Analysis.** As a SOE, PLN has a regulated revenue model with a significant subsidy component. PLN receives an investment-grade rating of BBB (negative outlook) and Baa2 (stable outlook) from S&P and Moody's respectively, which are on par with the sovereign rating of Indonesia. The respective upgrades from the

[31] The Project's financing plan includes loans from AIIB and IBRD (80%), while PLN contributes 20% of the Project cost. Assuming PLN's cost of equity to be roughly 8%, the Project's WACC is expected to be under 5%.
[32] The fixed O&M cost of the UCPS is assumed to be USD2.4 million per year and variable O&M cost 0.15 cent per MWh.
[33] U.S. Department of Energy. March 2021. Pumped Storage Hydropower Valuation Guidebook: A Cost-Benefit and Decision Analysis Valuation Framework.
[34] In China, the National Development and Reform Commission in April 2021 launched a new revenue-setting methodology for PSH plants, whereby a two-tier pricing mechanism applies. The PSH will receive a capacity charge (estimated to be long-term sovereign bond returns plus 1-3% return; a benchmark capacity charge is expected to be developed over time), as well as electricity revenue (based on spot market mechanisms or coal-fired power benchmark price). The energy cost for pumping is 75% of the benchmark price of coal-fired power benchmark price. This payment is expected to reward the PSH plant for supporting maintenance of the demand–supply balance and providing ancillary services to maintain grid stability.
[35] As is the case for Cultana Pumped Hydro Energy Storage in South Australia. A sensitivity analysis on the project's post-tax internal rate of return (IRR), has shown a range of IRRs between 8% to 12%. (Source: Australian Renewable Energy Agency).
[36] Reference FIRR includes the FIRR of Guangzhou Pumped Storage II Project and Hebei Zhanghewan Pumped Storage Project in China (Source: ADB) and Cultana Pumped Hydro Energy Storage in Australia (Source: Australian Renewable Energy Agency).
[37] International Forum on Pumped Storage Hydropower. September 2021. PSH Capabilities and Costs.

standalone credit rating reflect the expectation of a very high likelihood of government support in case of severe financial challenges, given the 100 percent ownership on PLN and the critical role that PLN plays in the country's power sector as the only vertically integrated utility in Indonesia.[38]

65. The views by the credit agencies are substantiated by Article 66 of the Law of the Republic of Indonesia (No. 19/2003) as most recently amended by law No. 11 year 2020 concerning Job Creation, which suggests that GoI will provide sufficient compensation to SOEs for the costs incurred (currently with a margin of 7 percent) in carrying out its strategic assignment in the national economy. This article has been widely considered as the legal basis for the expectation of a continuous obligation of the GoI in covering PLN's financial shortfall through subsidies.

66. PLN's revenue has been growing at 5-7 percent per annum in line with the electricity demand growth, but its overall financials remain vulnerable to both fuel costs and subsidy payments. Consequently, PLN relies on market financing to pay for its capex investments and repay or refinance existing debts.

67. In FY2020, PLN recorded revenue of USD24.5 billion, including a public service obligation and compensation subsidy of USD4.7 billion (19.1 percent of revenue). The revenue was 5% lower than in FY2019 because of the pandemic. The high reliance on subsidy from the GoI is a structural issue as the average cost of electricity is higher than the weighted average tariff charged by PLN. The government's strong support to PLN have been crucial for PLN to maintain a net profit and sufficient cash balance over the past years.

68. Driven by the stable operating performance and the increasing electricity demand of the country, PLN has been increasing its generation capacity, as reflected in robust growth in PLN's property, plant and equipment on the balance sheet. However, PLN adjusted the capital expenditure to mitigate the impact of the pandemic. The long-term debt, often supported by sovereign guarantee, decreased from USD30.7 billion to USD28.5 billion in FY2020. As a result, debt-to-equity ratio stabilized, from 0.48x as of FY2019 to 0.47x as of FY2020. Net debt-to-EBITDA[39] coverage also managed to decline in 2020 at 5.19x. COVID-19 poses severe challenged to PLN's credit standing, i.e., lowered electricity sales from a macroeconomic slowdown (resulting in a 4.6 percent cut in revenue excluding subsidies) and need for cash for USD debt repayment and IPP payments, driven by the growth plan committed over the past years. The imminent liquidity problem has been solved by the capital injection from the GoI, which almost doubled from USD3.6 billion in FY2019 to USD6.5 billion in FY2020.

69. In response to the liquidity concern, PLN cut its capital expenditure by 30.4 percent in FY2020 by delaying non-priority projects. In July and September 2020, PLN received a new equity injection of IDR20.2 trillion (USD276 million equivalent) from the GoI. These were positively received by international investors, which demonstrated keen interest on PLN's bond offerings, including the new issuances with an aggregate

[38] PLN receives a standalone credit rating of B+ and Ba3 from S&P and Moody's respectively.
[39] Total debt less unrestricted cash divided by operating EBITDA.

amount of USD2 billion in FY2020. At the end of 2020, PLN also raised its inaugural USD500 million MIGA-guaranteed green loan from international banks, demonstrating the market's interest to support PLN's renewable ambitions and transformation[40].

70. With the gradual opening-up of the Indonesian economy, electricity sales are expected to pick up after the pandemic crisis is gradually settled. Together with the additional capital from bond proceeds and equity injection, PLN's liquidity and financial standing are deemed to be much healthier than in 2020.

Table 3: Financial Highlights of PLN (Source: PLN Annual Reports, Fitch)

(In USD million*)	2016	2017	2018	2019	2020
Income Statement					
Revenue	20,904	22,770	23,668	25,869	24,489
Operating EBITDA	4,032	4,610	4,602	5,273	5,258
Operating EBIT	1,964	2,437	2,473	2,822	2,821
Net Income	***604***	***876***	***283***	***307***	***422***
Balance Sheet					
Cash & Marketable Securities	3,120	3,138	2,383	3,391	3,906
Accounts Receivable	2,542	2,769	3,743	5,076	2,791
Property, Plant & Equipment	85,357	89,260	92,257	101,141	101,984
Other Assets	3,789	4,126	4,250	4,417	4,410
Total Assets	***94,809***	***99,293***	***102,633***	***114,024***	***113,092***
Short-term Debt	3,251	2,738	2,458	2,471	2,876
Accounts Payable	2,247	3,226	3,343	3,741	2,776
Other Current Liabilities	3,553	4,301	4,509	4,703	4,430
Long-term Debt	17,304	20,867	23,615	29,730	28,417
Provisions	3,064	3,368	4,927	6,512	7,518
Other Long-term Liabilities	12	69	7	10	446
Total Liabilities	***29,432***	***34,570***	***38,858***	***47,167***	***46,462***
Equity	***65,377***	***64,723***	***63,775***	***66,857***	***66,630***
Total Liabilities and Equity	***94,809***	***99,293***	***102,633***	***114,024***	***113,092***
**) USD/IDR*	*13,436*	*13,548*	*14,542*	*13,901*	*14,105*

[40] PLN. Dec 28, 2020. https://web.pln.co.id/media/siaran-pers/2020/12/pln-peroleh-dukungan-usd-500-juta-dari-miga-untuk-infrastruktur-kelistrikan-yang-berbasis-ebt-dan-ramah-lingkungan

H. Fiduciary and Governance

71. **Procurement.** PLN has implemented several WB-financed projects and is familiar with the WB's requirements related to procurement[41]. A detailed procurement assessment of PLN was carried out by the WB. The procurement risks were identified, and appropriate remedial measures proposed. Some of the risks identified are 1) conflicts between the WB guidelines and PLN and/or government regulations including local content, 2) complicated review procedures due to the high value of contracts, 3) uncertainty over capacities of procurement committee members and the PIU, 4) delay in ICSC recruitment, and 5) delays in contract management and disputes.

72. Proposed mitigation measures include 1) preparation of a PIM which will include adequate description of all procurement issues and mechanisms to proactively resolve potential challenges, 2) preparation of detailed and realistic schedules of procurement activities for monitoring and supervision, 3) assignment of dedicated competent and experienced staff to the procurement committees and PIUs, 4) provision of training and capacity building to the procurement committees, and 5) appointment of dispute boards before the contract effectiveness of all high-value contracts.

73. **Financial Management.** PLN has extensive experience in implementing MDB-financed projects. Based on the FM assessment conducted, the main risk is delay of the SLA budget availability and lengthy payment process, which may cause delay of payment to the contractors and therefore, the project implementation.

74. In Indonesia, project financing is dictated by MoF's *Daftar Isian Pelaksanaan Anggaran* (DIPA) or Budget Implementation List and subsequent payment processing strictly follows what is stipulated in the DIPA. As such, eligible expenditures designated in the DIPA to be financed by specific financing source (AIIB, WB, or counterpart funds for this Project) are always at 100 percent, inclusive of taxes. Project components to be financed by AIIB and WB loans are therefore budgeted under respective DIPA SLA, which is part of the government's integrated budget. The financing sources for Project activities, including financing percentages, are detailed in the DIPA. '100 percent of Bank Share' refers to 100 percent of the Bank's share of the financing split as determined between the WB and AIIB for the financing of Sub-component 1.1.

75. The PMO will monitor the commitments made (contracts signed) and payment schedule based on information provided by the PIUs so that the SLA budget allocation is adequate to cover the project activities. The PMO will include information regarding the commitments (contract value) and estimated payment schedule in the IFRs. Treasury Division (DIV PBH) will submit invoices to KPPN *Khusus Investasi* (KPPN KI) and KPPN *Khusus Pinjaman and Hibah* (KPPN PH) for verification and ensuring the completeness of supporting documents. The PIM will define the payment process and responsibilities of each division/unit, include supporting document requirements, and set a standard time for the internal processing of payment.

[41] Several WB-financed projects include Pumped Storage Technical Assistance Project (approved in 2011), Power Distribution Development Program-for-Results (approved in 2016), and Transitioning to Sustainable, Clean and Efficient Energy - Program for Results (pipeline as of September 2021).

76. **Disbursements.** The applicable disbursement methods include 1) direct payment, 2) reimbursement and 3) special commitment. No separate designated account will be established under the Project and advance disbursement method will not be utilized. All documentation evidencing expenditures shall be retained by PLN and shall be made available to the auditors and to the Bank and its representatives if requested. The Borrower will submit the Withdrawal Application (WA), which covers the financing of both AIIB and the WB, for the WB's review. The same WA from the Borrower will be used to process both AIIB and the WB financing under Sub-component 1.1. Once the WB validates the WA, the WB will notify AIIB to disburse. Other components will be financed solely by the WB and counterpart funds.

77. **Governance and Anti-corruption.** To the extent that the requirements stipulated in the WB's Anti-Corruption Guidelines are consistent with AIIB's Policy on Prohibited Practices, the WB's policy will apply, and to the extent it diverges from AIIB's policy, AIIB's policy will apply to all components with contracts financed in whole or in part by the proceeds of the proposed AIIB loan. Detailed requirements will be specified in the Loan Agreement and included in the Co-Lender's Agreement.

I. Environmental and Social

78. The Project will be jointly co-financed with the WB as lead co-financier, and the project's ES risks and impacts have been assessed in accordance with the WB's Environmental and Social Framework (ESF). To support a harmonized approach to addressing the ES risks and impacts of the Project, and as permitted under AIIB's Environmental and Social Policy (ESP), the WB ESF will apply to the Project in lieu of AIIB's ESP. AIIB has reviewed the WB ESF and is satisfied that: 1) it is consistent with AIIB's Articles of Agreement and materially consistent with the provisions of AIIB's ESP; and 2) the monitoring procedures that are in place are appropriate for the Project.

79. **Categorization.** Given the risks and impacts of the Project, the WB has categorized the ES risks of the Project as High (which is equivalent to Category A if AIIB's ESP were applicable). The UCPS plant comprises of two dams with ancillary facilities. The entire Project will impact and result in the relocation of a significant number of households. Although situated in predominantly modified habitat, the area is home to several critically endangered species. Potential environmental impacts of UCPS are wide ranging, significant and adverse. Permanent changes in hydrological regime and land use, dam safety risk, occupational and community health, and safety risks result in residual impacts which are long term, permanent and irreversible. Specific mitigation measures for UCPS such as the Biodiversity Management Plan (BMP) are complex. These plans will require specialized expertise to effectively implement.

80. **Environment.** The civil works for UCPS under Component 1 include the construction of two reservoirs, two dams, ancillary works, and transmission lines. The key environmental risks and impacts are 1) potential loss of habitats and key species of conservation concern; 2) temporary downstream river impacts because of sediment discharge from construction affecting water quality and stream bed patterns; 3) changes in hydrological regime in Cisokan river; 4) long term changes to erosion and deposition patterns downstream Cisokan river because of reduced sediment load during operation;

5) potential significant negative impacts on communities during the construction period from sediment runoff, fugitive dust, increased noise and traffic, pedestrian and road safety risks, and increased waste from construction camps; and 6) dam safety risks to life, property, and ecosystem. Several safeguard instruments have been agreed upon and finalized to manage these risks and impacts. These instruments, which include the ESIA, FPF, BMP, and ESMP, have been publicly consulted and disclosed (refer to para. 92).

81. **Biodiversity**. The Project has carried out a series of biodiversity surveys in the greater UCPS plant area. The impacted critical habitat areas include 400 ha of directly impacted and 2,288 ha of indirectly impacted areas. Along the transmission line, the impacted area comprises 100 ha of directly impacted and 341 ha of indirectly impacted areas. In total, the impacted critical habitat areas consist of 500 ha of directly impacted areas and 2,629 ha of indirectly impacted areas. There are potentially significant adverse impacts on modified habitats, which are home to at least ten key species of conservation concern identified in the UCPS area, including two critically endangered species (Javan Leopard and Javan Slow Loris).

82. The BMP will be implemented through an integrated water catchment management approach which simultaneously addresses biodiversity, environmental and social aspects of landscape management. The BMP is prepared to manage the direct and indirect impacts of the UCPS on the biodiversity condition and for the maintenance of Project-affected areas. An integrated catchment management through a Forest Partnership Framework (FPF) aims to offset impacts by reforesting a connected (agro) forest landscape across 3,800 ha of land around the UCPS reservoirs and plant facilities. The 3,800-ha restoration aims to provide a net positive gain, offsetting the 500 ha of directly impacted areas and the 2,629 ha of indirectly impacted areas, or 1,867 ha under the counterfactual scenario. The establishment and management of this restoration area has been agreed between PLN and Perhutani. The restoration also simultaneously aims to restore the terrestrial biodiversity component by significantly increasing ecological connectivity among the forest areas, benefiting species that triggered the Critical Habitat criteria, such as the Javan Slow Loris and Grizzled Leaf Monkey. It is also expected to benefit the aquatic habitat by improving ecological conditions alongside tributaries flowing into the reservoirs and through improved fish management. The range of actions in the BMP include construction-related impact mitigation and management, reforestation and forest management, wildlife management, stakeholder participation and community engagement. The BMP provides clear guidance on how to protect and restore habitats and to protect and manage endangered species in the UCPS influence area. The approach is based on adaptive management, requiring continuous monitoring of success.

83. **Dam Safety.** As discussed above, an independent PRP will undertake periodic, comprehensive, and independent reviews of the design, construction, and initial reservoir filling of the project works. The revised value of MCE from the SHA will be adopted in the dam safety reviews by the PRP. An Emergency Preparedness Plan will be included in the dam safety planning.

84. **Climate Change.** The GHG emission reduction from UCPS will be based on: 1) the displacement of gas-based generation capacity that is required to meet peak

demand, and 2) the absorption of VRE generation, avoiding the need for curtailment. It was estimated that the share of VRE will rise from 11.5 percent (without UCPS) to 14 percent (with UCPS) of the installed capacity in 2028[42]. In this regard, AIIB financing will qualify as climate mitigation finance. In addition to mitigation, five percent will qualify as climate adaptation finance as per the joint MDB methodology for climate finance tracking.

85. In addition, the Project's climate co-benefits will also come from preparatory support to the development of MPS, which has similar climate benefits of UCPS, and Pokko HPP, which will provide a clean source of power generation. The Project's support to the preparation of the Java-Bali System Masterplan will help promote VRE penetration by guiding the planning process for future investments in a greener, more efficient, and more reliable way.

86. **Social Aspects.** The total number of households affected by land acquisition is 2,063, including 765 households who were physically resettled[43]. The LARAPs have been under implementation since the previous loan and continued despite the loan cancellation. As of February 2021, the Project has acquired 721.92 ha of land, or 98.65 percent of the total, largely completed the LARAP compensation payment delivery and the implementation of the livelihood assistance activities planned under all three LARAPs. The LARAP implementation completion review conducted by PLN as a requirement for this Project indicates general satisfaction among the affected population regarding the LARAP implementation and their current livelihood status. The review also identified some outstanding tasks and issues that will need to be addressed: 1) pending compensation for waqf land (land donated for religious purpose or public welfare), village land, and community land remaining above the inundation line and lands whose access will be affected after impoundment; 2) some households who have not moved from the reservoir area[44]; and 3) delay in community infrastructure development at the host resettlement villages per the government policy. Resolution of these issues will require more time for investigation, planning and consultation with communities and local administration and will be undertaken during Project implementation as reflected in the Environment and Social Commitment Plan[45]. A Land Acquisition and Resettlement Framework (LARF) has been prepared to guide resettlement planning to address any unexpected additional land acquisition and resettlement needs, particularly during construction.

87. Furthermore, under the previous loan, several physical cultural resources, such as mosques, and cemeteries were identified, and a Physical Cultural Resources Management Plan (CHMP) was prepared in consultation and agreement with the

[42] Castlerock Consulting. Economic Evaluation of the Upper Cisokan Pumped Storage Project. May 2021.
[43] Combined total from the three LARAPs prepared for the reservoirs, access roads, and as well as transmission lines. This excludes additional land that may be needed for the project.
[44] These households have received their full compensation package per LARAP. Their reasons for staying in the reservoir area vary from household to household and requires working on a household level to understand the constraints they face before they agree to move. PLN has fielded a team to develop a household-specific relocation plan with implementation schedule and will complete this prior to reservoir filling.
[45] Preparation of action plan to address these issues to be completed before disbursement can start for sub-component 1.1. This disbursement condition is referenced in the Project legal agreement. Dam filling (first impoundment) can only start when the action plan to address LARAP outstanding issues is implemented. This condition is referenced in the project legal agreement.

communities who owned these assets. Some physical cultural resources have since been relocated, compensated, or protected under the LARAP. The updated Cultural Heritage Management Plan includes a chance find procedure, mitigation measures and training programs.

88. **Occupational Health and Safety, Labor and Employment Conditions.** The Project is estimated to employ approximately 2,700 workers during the peak period of construction and there may be informal immigrants following the construction camps. Risks associated with the large and diverse workforce could have impact on working conditions, occupational health and safety, child labor, gender-based violence (GBV) and conflict issues. A Labor Management Plan (LMP) has been included in the Social Community Management Plan and includes: 1) procedures relevant to each category of workers; 2) overview of key labor risks; 3) overview of Indonesia's labor legislation; and 4) Grievance Redress Mechanism (GRM) for Project workers. The contractors will also develop their respective C-ESMP in line with the LMP to manage their workforce.

89. **Gender Aspects.** Currently, 54 percent of women participate in the labor force in Indonesia compared to 82 percent of men[46]. Only 12 percent of graduates with science, technology, engineering, and mathematics (STEM) majors are women, and women constitute 12 percent of workers in the energy sector[47]. In PLN, there are significantly more men than women working, but hiring data in recent years show that there is consistently an increasing share of women being recruited into the company. To address the gaps, the Project has committed to increasing the percentage of women in technical roles in UCPS PIU from 5 to 20 percent. In addition, UCPS PIU will design interventions to address identified barriers to women's representation in the technical and management positions, such as strategies to increase women recruitment, mentorship program, leadership training for female staff, and internship program for female students in STEM program. The UCPS PIU will also invest in basic and segregated sanitation facilities for women and men, lactation room, and on-site childcare facilities for staff.

90. The Project also examined the overall Project context for GBV and violence against children (VAC). Both West Java province and the local regencies have a relatively high rate of violence against women and children according to the publicly available data. The number of child marriages in the UCPS area is quite high. Project activities and the influx of people, including Project workers and informal migrants, could exacerbate the situation and increase GBV and VAC risks. Based on the above analysis, PLN has developed a GBV action plan to manage the identified risks of GBV and VAC. The mitigation actions include establishment of GBV and VAC complaint team, GBV-sensitive approach in GRM, clear GBV requirements in the C-ESMPs and bidding documents, clear code of conduct in contractual arrangement, hiring a qualified GBV service provider, and a clear referral mechanism to respond to GBV cases, staff training, and community awareness raising.

[46] Even though females achieve higher levels of educational attainment than males at all levels, according to World Bank Indonesia Country Gender Action Plan, 2019

[47] PDB and National Labor Force Survey (SAKERNAS), 2017; The Ministry of Women Empowerment and Child Protection (MoWECP), and BPS, 2018

91. **Stakeholder Engagement, Consultation, and Information Disclosure.** Stakeholder engagement for UCPS started in 2009 under the previous loan and continued at different stages of the project in the past decade. In the preparation of the proposed Project, PLN carried out extensive stakeholder consultations to inform them of the project planning status and collect their feedback for updating and developing Project ES plans. These consultations were conducted through partly face-to-face meetings and partly virtually during the COVID-19 pandemic. The key stakeholders consulted included governments of West Java Province, West Bandung and Cianjur Regencies, village officials, Perhutani, as well as the affected population, community leaders, teachers and students, CSOs, and universities. PLN has developed SEP and GRM for this project. The SEP documents early consultations, provides an analysis of the stakeholders, describes various means of information disclosure and methods of stakeholder engagement, as well as its program to continue stakeholder consultation through the project implementation. The Project has instituted two GRMs, one for the Project and one specifically for Project workers.

92. The final versions of the ES documents have been disclosed on the client's[48] and the WB's websites[49] in Bahasa and English. AIIB has included on its website[50] a link to PLN and the WB's websites.

93. **Project Grievance Redress Mechanism.** Under this Project, a grievance unit will be established to replace the Complaint Handling Task Force which was established by PLN in 2013. The Project will have two GRMs: one for the Project and one for the Project workers. The Project Grievance Unit will be led by the Grievance Officer, who is the primary point of contact for the Unit and will coordinate the implementation of the GRM with the Village Facilitators, PLN HSE Officers, UCPS Project Public Relations Officer, and Community Liaison Officer. PLN will publicize this grievance mechanism procedure to local communities, authorities, and contractors.

94. **Independent Accountability Mechanism.** Pursuant to AIIB's agreement with the WB, the WB's ESF will apply to this Project instead of the AIIB's ESP. The WB's corporate Grievance Redress Service (GRS) and its Independent Accountability Mechanism, the Inspection Panel, which reviews the WB's compliance with its policies and procedures, will handle complaints relating to the WB's compliance with its ESF under the Project. In accordance with AIIB's Policy on the Project affected People's Mechanism (PPM), submissions to the PPM regarding such complaints under this Project will not be eligible for consideration by the PPM. Information on the WB's corporate GRS is available at http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service. Information on the WB's Inspection Panel is available at http://www.inspectionpanel.org.

95. **Monitoring and Supervision.** Under sub-component 2.2, the Project will establish and maintain an ES team within the UCPS PIU and an internal monitoring

[48] https://web.pln.co.id/stakeholder/plta-upper-cisokan-pumped-storage
[49] https://projects.worldbank.org/en/projects-operations/document-detail/P172256?type=projects
[50] https://www.aiib.org/en/projects/details/2021/proposed/Indonesia-Development-of-Pumped-Storage-Hydropower-in-Java-Bali-System.html

system for its regular management of the ES programs. While the ICSC will also have a team of specialists to supervise the implementation of the C-ESMPs, the IESM Consultant will support PLN in monitoring the implementation of the C-ESMPs. The IESM Consultant will also carry out regular monitoring missions per its terms of reference and submit its monitoring reports to the UCPS PIU and the WB. An ES Panel will be set up to review and support the quality of the implementation of the ESMP, Contractor's ESMPs, Biodiversity Management Plan, FPF, LARAPs and other plans. A separate PRP will provide oversight on dam safety aspects of the project. The PRP will be engaged by PLN and retained and utilized for the duration of the Project. The PRP will consist of a Panel of Experts with expertise in roller-compacted dam design and concrete technology, dam building, hydrology and sediment management, seismic hazards, hydraulic structures, underground structures, mechanical and electrical design and geotechnical expertise. The recruitment of PRP will be finalized before the loan becomes effective.

96. AIIB will conduct regular supervision missions together with the WB. AIIB and the WB's environmental and social specialists will be working in close coordination and will share information on a periodic basis.

97. **ES Aspects for Component 3.** Component 3 covers activities that are not financed by AIIB. Although the Project is not directly funding physical construction and operation of the proposed MPS project or proposed Pokko project, ES risks and impacts are expected to be significant and WB ESF compliance requirements will be considered in the detailed project design. The preparation of ES documents, including ESIA, ESMP, SEP, LMP, and LARAP for the MPS are included in this component. It will also support the update of the 2019 draft ESIA, ESMP, Cumulative Impact Assessment, SEP, and the preparation of the LMP, LARAP, and if necessary, Indigenous Peoples Plan for Pokko. Indigenous communities which may be present in Pokko project area... Preparation of the Java-Bali Masterplan will follow relevant WB guidelines regarding ES implications of TA activities.

J. Risks and Mitigation Measures

98. The overall risk rating for the Project is estimated as high. Risks have been identified and the related mitigation measures have been proposed, as summarized in the table below.

Table 4: Summary of Risks and Mitigating Measures

Risk Description	Assessment (H/M/L)	Mitigation Measures
Technical Risk.	Medium	International contractors with proven track record will undertake the dam and civil works construction. The update on the technical design will be reviewed extensively by the PRP (including dam safety experts), together with the ICSC. PLN will recruit an ICSC of international

Risk Description	Assessment (H/M/L)	Mitigation Measures
		experience to facilitate quality control and support in construction supervision.
Environmental and Social Risk.	High	PLN will receive capacity building support to substantially strengthen its existing capacity for implementation of the ES risk mitigation plans. This will be achieved through the implementation of SEP and the support of an ES Panel and PRP (including dam safety experts) with the role of supporting the PLN to manage the ES and dam safety risks.
Procurement Risk.	High	PIM will include adequate description of all procurement issues and mechanisms to proactively resolve potential risks. Detailed and realistic schedules of procurement activities will be prepared for monitoring and supervision. PIUs, along with procurement committees, will be provided training and capacity building.
Financial Management Risk.	Medium	The main risk is delay of SLA budget availability and lengthy payment process to the contractors. PMO will define payment process and responsibilities of each division. It will aggregate payment information from PIUs and report in the part of IFR semi-annually.
Implementation Capacity Risk.	High	PLN will assign dedicated staff with clear roles and responsibilities, involving people from several directorates and UIP. Further, PLN also accumulated experience from implementing the previous WB loan. PLN's capacity in contract and interface management will be enhanced by the support from PRP and ES Panel.

Annex 1: Results Monitoring Framework

Project Objective:	To support Indonesia's energy transition and decarbonization goal by 1) developing the first large-scale pumped storage hydropower to improve power generation peaking and storage capacity on the Java-Bali grid and, 2) strengthening PLN's capacity for hydropower development and management.										
Indicator Name	**Unit**	**Baseline** 2021	**Cumulative Target Values**						**End Target**	**Frequency**	**Responsi-bility**
			2022	**2023**	**2024**	**2025**	**2026**	**2027**			
Project Objective Indicators:											
1. Addition of peaking generation capacity in the Java-Bali System	MW	0	0	0	0	0	0	0	1,040	Semi-Annually	UCPS PIU
2. Addition of power storage capacity to the Java-Bali grid from the UCPS	GWh	0	0	0	0	0	0	0	1,478.70	Semi-Annually	UCPS PIU
3. Reduction of the greenhouse gas emission enabled by the UCPS by 2040	$MtCO_2e$	0	0	0	0	0	0	0	7.3	Semi-Annually	UCPS PIU
4. Satisfactory implementation of the ESMP for the UCPS	-	n/a	Satis-factory	Satis-factory	Satis-factory	Satis-factory	Satis-factory	Satis-factory	Satisfactorily implemented	Semi-Annually	UCPS PIU
5. Preparation of Operation and Maintenance Plan (OMP) for the UCPS	-	Not yet Prepared	Not yet Prepared	Not yet Prepared	Not yet Prepared	Not yet Prepared	Prepared	Prepared	Prepared	Semi-Annually	UCPS PIU
6. Satisfactory implementation of the OMP	-	N/a	N/a	N/a	N/a	N/a	N/a	Satis-factory	Satisfactorily implemented	Semi-Annually	UCPS PIU
Intermediate Results Indicators:											
1. Construction of UCPS civil works	%	0	10	25	60	90	100	100	100	Semi-Annually	UCPS PIU
2. Supply, erection, and commissioning of equipment	%	0	10	30	70	90	100	100	100	Semi-Annually	UCPS PIU
3. Construction of transmission line	%	0	0	0	30	60	100	100	100	Semi-Annually	UCPS PIU
4. Preparation of Emergency Preparedness Plan (EPP)	-	Not yet prepared	Not yet prepared	Not yet prepared	Not yet prepared	Not yet prepared	Not yet prepared	Prepared	Prepared	Semi-Annually	UCPS PIU

5. Preparation of an Reservoir Impoundment Plan (RIP)	-	Not yet prepared	Not yet prepared	Prepared	Prepared	Prepared	Prepared	Prepared	Prepared	Semi-Annually	UCPS PIU
6. Trial run results of the UCPS meeting PLN's performance targets	-	Not yet started	Not yet started	Not yet started	Not yet started	Not yet started	Completed and met PLN's performance target	Completed and met PLN's performance target	Completed and met PLN's performance target	Semi-Annually	UCPS PIU
7. Labor-related grievances registered under the Project GRM	%	0	100	100	100	100	100	100	100	Semi-Annually	UCPS PIU
8. Labor-related grievances registered under the Project GRM and addressed/resolved within the stipulated service standards for response time	%	0	0	80	80	80	100	100	100	Semi-Annually	UCPS PIU
9. Project-related grievances registered under the Project GRM and addressed	%	0	0	90	90	90	100	100	100	Semi-Annually	UCPS PIU

Annex 2: Detailed Project Description

1. **Location.** The UCPS plant is in the Cirata River catchment and spans two districts, West Bandung Regency and Cianjur Regency, in West Java Province. The UCPS is also relatively close to Jakarta and Bandung, the Java-Bali system's two biggest load centers, enabling UCPS to manage transmission congestion and reduce transmission losses than more distant power plants in Central and East Java.

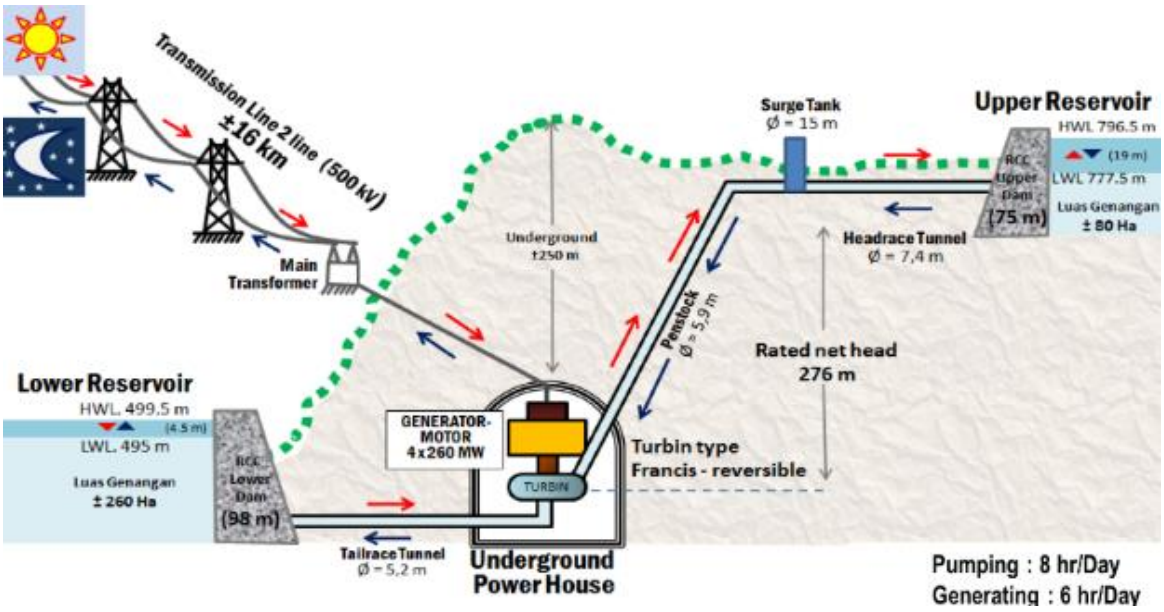
2. **Dam Structure.** The UCPS has two dams with active storage of around 10 million m^3 for daily power plant operation, sufficient to support the UCPS operating in its full capacity at daily generation mode for about 8 hours. The upper dam is 75.5 m high on the Cirumamis River with a catchment area of 10.5 km^2 and a reservoir surface area of 0.8 km^2. The effective depth of the upper reservoir is 19 m. The lower dam is 98 m high on the Cisokan River with a catchment area of 374 km^2 and a reservoir surface area of 2.8 km^2. The effective depth of the lower reservoir is 4.5 m. Compared with operating hydropower plants near the UCPS site, the UCPS plant requires a much smaller catchment area. Gravity concrete dam body will be constructed with roller compacted concrete (RCC) for both upper and lower dams. RCC method is usually estimated to have similar or greater strengths than conventional concrete in non-freezing temperature[51].

3. The dam structures and outlets have been designed to the International Commission on Large Dams (ICOLD) seismic standards. According to the feasibility study,[52] dams are designed to accommodate 1 in 10,000 years flood event through the spillway. The bottom outlets were also designed to release water in a controlled manner. The dead storage for sedimentation in the upper reservoir was assessed to be sufficient, while the dead storage in the lower reservoir appeared to be on the margin. Further field investigations and sedimentation simulations were necessary as recommended by the PRP. Based on the simulations, the ICSC will prepare a sedimentation management plan and mitigation measures to maintain the active storage in the long-term.

4. The dam safety instrumentation has been developed during the detail design of the dams. The dam safety monitoring procedures will be included in the OMP.

5. **Equipment and Facilities.** The power plant with a capacity of 1,040 MW (260 MW x 4 units) and a pump capacity of 1,100 MW will be placed underground. The daily generation duration is 6 hours and the daily pumping duration is 8 hours. The waterways connecting the two dams will consist of two intakes, two headrace tunnels, two restricited orifice surge tanks, two inclined steel-lined penstocks, four short tailrance tunnels and outlet structures. The UCPS plant will be connected to the existing Java-Bali grid at the Cibinong-Saguling line and the Tasik-Depok line using two 16 km-long 500 kV transmission lines. The illustration of the UCPS plant is provided in Figure 4.

[51] Kalantari, B., et al. 2009. RC Concrete versus Conventional Concrete in Pavement.
[52] PLN-E, NK/NJ, PT. Indokoei International, PT. Wiratman. June 2021. Feasibility Study Review and Update Report of Upper Cisokan Pumped Storage Power Plant Project.



6. **Access Road.** The access road includes an existing road of 6.7 km and new road of 27.4 km from the Cipari Intersection to the Project site. The width of the road is designed to accommodate movement of electrical and mechanical contractors, and transport of rock staples. The path selection considered topography and land use to minimize ES impacts.

7. **Project Design Update.** To address the latest recommendations of the PRP, design of civil works has been reviewed by a recognized international consultant recruited by PLN-E. PLN has also appointed LAPI ITB to undertake the hydraulic model test and conduct field work to update the SHA. These recent updates will be reviewed by the PRP and found acceptable before works can start on the ground.

8. The revised design indicates that an energy dissipator is required for the lower dam to avoid uncontrolled scoring in the downstream river that could cause landslides in the riverbanks and consequently jeopardize the dam safety. To confirm the preferred option, it has been agreed that LAPI ITB will perform hydraulic model tests to ascertain that the stepped chute provides enough energy dissipation for the stilling basin to be hydraulically stable. NK/NJ will prepare specifications and supervise the tests to be performed by LAPI ITB.

9. To facilitate quality control, the UCPS PIU will also retain a PRP consisting of international and nationally reputable experts with specializations relevant to hydropower to support PLN in undertaking periodic, comprehensive, and independent reviews of the design, construction, quality, and initial reservoir filling. The internationally reputable experts on the ES Panel will provide independent advice on ES aspects of the UCPS plant design and implementation, as well as measures to enhance the ES outcome of the Project.

Annex 3: Member and Sector Context

A. Member Context

1. **Indonesia has witnessed strong growth and poverty reduction in the last two decades.** The country has grown at an average rate greater than 5% per year since the Asian Financial crisis. It has made considerable gains in poverty. Solid macroeconomic fundamentals have allowed creation of jobs and led to inclusive growth. The Jokowi administration has recognized the need for increasing infrastructure investments along with developing human capital. The government's strategy has focused on reallocating energy subsidies to infrastructure development and increasing expenditure on health, education, and nutrition. The medium-term National Development Plan, *Rencana Pembangunan Jangka Menegah Nasional* (RPJMN), also focuses on aspects of infrastructure and human development.

2. **Despite the negative impact of the pandemic, Indonesia maintains a healthy long-term growth prospect.** Indonesia experienced a major downturn in the first half of 2020, as domestic containment measures led to sharp declines in consumption, investment, and exports. However, the economy is now recovering with the easing of restrictions and acceleration of vaccine efforts. The growth outlook remains positive as the GDP is expected to grow by 3.2 percent in 2021. Internal factors, such as strong government support as well as increased public spending and external factors will help speed up the recovery process. Economic growth prospects could be challenged by elongation of the pandemic and vaccine supply situation.

3. **Fiscal and monetary support to counter the effects of the pandemic have been strong.** The government disbursed IDR579.8 trillion (about 3.8 percent of GDP) as part of the *Pemulihan Ekonomi Nasional*, the national recovery program. The program consists of support to healthcare, increased benefits, and coverage of social assistance schemes to low-income households, unemployment benefits, tax reliefs and permanent reductions of the corporate income tax. It also includes capital injections, interest subsidies, credit guarantees and loan restructuring. To undertake fiscal measures, amidst declining revenues, the government has relaxed the fiscal deficit cap of 3 percent until 2022. Similarly, the central bank, Bank Indonesia, has also taken initiatives such as reducing policy rates, lowering reserve require ratio, introducing daily repo auctions, and increasing the frequency of FX swap auctions.

4. **Going forward, infrastructure development will continue to remain on the government's agenda.** The government has allocated about 3 percent of GDP for infrastructure development targeted at economic recovery, provision of basic services and improved connectivity. Infrastructure and connectivity are also at the forefront of the 2020-2024 RPJMN. The National Strategic Project program, launched in 2016, is a pipeline of more than 200 projects. The Indonesia Investment Authority (INA), the country's newly established sovereign wealth fund under the enacted Omnibus Law on job creation aiming to reduce uncertainty in the legal and financial framework for foreign investors, aims to also promote sustainable infrastructure investments in Indonesia.

5. **Further investments in infrastructure are necessary to realize Indonesia's growth ambitions.** The government has relied primarily on State Owned Enterprises to

deliver infrastructure by facilitating capital injections and guarantee. Public resources may not be enough to finance Indonesia's infrastructure plan. Therefore, continuation of reforms could be key for the government to attract private capital in infrastructure investments and close the financing gap. Improvement in regulatory framework for PPPs in terms of adequate risk allocation, in addition to good project preparation could help the government maximize finance for infrastructure development. Providing for cost-reflective tariff arrangements that could also enhance the capital expenditure and long-term financing needs of the utilities will be key in mobilizing financing in the energy sector. Similarly, reducing distribution losses and theft could also help improve the financials and the credit worthiness of the distribution companies.

B. Sector Context

6. In 2019, PSH accounted for just 12% of global hydropower capacity and about 2.6% of total hydropower generation. However, PSH represented more than 90% of global electricity storage capacity with an estimated 158 GW of installed capacity in 2019.[53] According to the International Hydropower Association (IHA), all PSH projects built to date can store about 9 terawatts (TWh) of electricity globally – equivalent to about the annual electricity consumption of both China and India combined in 2019. The International Energy Agency (IEA) forecasts that PSH will grow by a record 75 GW from 2021 to 2030, driven mainly by the Asia-Pacific region.[54]

7. Depending on the country, PSH can provide several essential services in the power system such as 1) support demand-side response, 2) meet increasing peak demand, 3) provide balancing and ancillary services, and d) enable system flexibility and support integration of variable renewable energy capacity (e.g., wind and solar). As illustration of the potential benefits of PSH - globally about 250 TWh of variable renewable electricity was curtailed in 2019, which is almost equivalent to Spain's electricity consumption per year that year. If this electricity had been stored in PSH, it could have avoided about 180 $MtCO_2e$ per year – equivalent to 3% of US CO_2 emissions in 2018. However, adequate renumeration and pricing signals are essential for PSH projects to be economically and financially attractive, which will require suitable policies, regulations, and support mechanisms.[55,56]

8. Despite PSH's high initial capital expenditure, PSH still has one of the lowest costs of production and storage on per kWh basis compared to all storage technologies, primarily due to its long lifetime and large scale. PSH schemes have a lifespan of 50-150 years[57] and can be cost-effective if topological conditions are favorable as is the

[53] IHA. 2020. https://www.hydropower.org/factsheets/pumped-storage
[54] IEA. 2021. Hydropower Special Market Report 2021 (to be published)
[55] IEA. 2020. Renewable Energy Market Report 2020. https://www.iea.org/reports/renewables-2020/key-trends-to-watch
[56] IHA. 2020. Pumped Storage Hydropower. https://www.hydropower.org/factsheets/pumped-storage
[57] Immendoerfer, A., Tietze, I., Hottenroth, H. et al. "Life-cycle impacts of pumped hydropower storage and battery storage." International Journal of Energy and Environmental Engineering 8, 231–245 (2017). Though it is important to stress that proper operation and maintenance (O&M) of electro-mechanical (E&M) equipment, and civil work structures and periodic refurbishment and rehabilitation works, are critical for ensuring sustainability. The average life expectancy of plant parts and systems under normal conditions of O&M is indicated as 40 years for main generating equipment and main inlet valves; 10 years for turbine runners; 70 years for penstocks, gates, stoplogs, trash racks, per 2014 IFC Guide.

case for UCPS, which can be constructed at around USD170/kWh. Meanwhile, utility-scale battery energy storage, e.g., using lithium-ion technology, represents an emerging technology with the biggest project currently at 120 MW/1,200 MWh.[58] The latest battery projects have a cost benchmark of USD400/kWh[59] but costs are projected to be reduced to half that value by 2030.[60] Nevertheless, PSH is water resource dependent while other storage technologies normally do not have no location limitations. Both storage technologies will be needed for a net-zero carbon future.[61]

9. Indonesia possesses abundant renewable energy resources, with an estimated technical potential of 75 gigawatts (GW) hydropower, 30 GW geothermal, 19 GW mini and micro hydro, 33 GW bioenergy, 208 GW solar, 61 GW wind and 18 GW ocean energy. But only a fraction of this potential is realized by 2020. [62]

10. Indonesia is highly dependent on fossil fuels for power generation and has fast growing electricity needs. In 2009, the country had a total of 32 GW installed power capacity (on-grid), which more than doubled to 67 GW in 2019. In 2019, majority of the existing power capacity was from steam power plants with a 52% share of total capacity, followed by combined cycle power plants with 17%, gas power plants with 8%, hydropower plants with 7%, diesel power plants with 7%, geothermal with 3%, biogas/biomass plants with 0.3%, wind power plants with 0.2%, and solar power plants with 0.2%. In 2019, total power generation was 278,942 GWh[63], of which coal generation accounted for 63%, gas power for 22%, hydropower for 6%, geothermal for 5%, diesel power for 4% and wind power with 0.2%.[64]

11. The Java-Bali region had a total installed power capacity of 41 GW in 2019, representing over 62% of the national installed power capacity. [65] Like the national power system, the Java-Bali system is dominated by fossil fuels, with coal-fired power accounting for around 60% of the total capacity, gas power for 30%, hydropower for 6%, geothermal for 3%, and diesel power for 1% in 2019.[66]

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[58] The project is in Monterey, California, U.S., according to Energy Storage News, January 7, 2021.

[59] BNEF28 estimates that the total system cost in 2017 for a utility scale Li-ion battery energy system with 4 hours storage is US$421/kWh. These costs are split roughly 50:50 between the battery pack costs (USD209/kWh) and rest of system (or non-battery pack) costs (USD212/kWh).

[60] US Department of Energy, Office of Scientific and Technical Information: Cost Projections for Utility-Scale Battery Storage: 2020 Update

[61] PNNL. 2020. 2020 Grid Energy Storage Technologies Costs and Performance Assessment. https://www.pnnl.gov/sites/default/files/media/file/Final%20-%20ESGC%20Cost%20Performance%20Report%2012-11-2020.pdf

[62] Ministry of Energy and Mineral Resources. 2019. Renewable Energy Roadmap for Indonesia. Presentation by F.X. Sutijastoto, Director General of New, Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources. 8th IndoEBTKE ConEX 2019. 6 November 2019

[63] On-grid only

[64] Ministry of Energy and Mineral Resources. 2020. Handbook of Energy and Economic Statistics of Indonesia 2019.

[65] PLN. 2020. Statistical Report 2019. Note that compared to ESDM statistics, PLN statistics does not include non-PLN managed areas, captive power plants, and off-grid capacities.

[66] Consolidated figures from PLN Statistical Report and ESDM Statistical Yearbook 2019.

12. By 2019, approximately 98.9% of the population had access to electricity nationwide.[67] However, electricity access remains unreliable and unevenly distributed across the country with frequent blackouts. The uptake of renewable energy is slow, and a draft renewable energy law has been in discussion for several years but yet to be approved. The World Bank highlights the need for urgent reform to improve sector governance and accelerate the energy transition in the country. Current challenges include lack of incentives for renewable energy investments, high dependence on fossil fuel subsidies, limited regulation and government policies to drive planning changes and utilities operations.[68]

13. The Ministry of Energy and Mineral Resources (ESDM) is the primary body governing the energy sector in Indonesia, including electricity, mining, energy conservation, among others. Within the ESDM, the Directorate General of Electricity is responsible for formulating and implementing policies in the electricity sector. It also holds the rights to grant operating areas (*Wilayah Usaha*) to private sector and local entities. The Directorate General of New Renewable Energy and Energy Conservation is responsible for formulating and implementing policies on energy conservation, geothermal energy, bioenergy, other renewable energy including hydropower.[69]

14. PLN is the vertically integrated state-owned electricity utility and the sole off-taker of electricity generated. Although the 2009 Law on Electricity abolished its monopoly status, PLN is given the priority rights over electricity supply business across Indonesia, except for the operating areas (Wilayah Usaha) granted to private enterprises, cooperatives and self-reliant community. PLN is also the monopoly in system operation, electricity transmission and distribution. Ministry of Finance approves electricity subsidy to PLN in the national budget, and reviews government's guarantees of PLN loans. In 2020, PLN presented its ambition in environmental and social transformation in the Statement of Intent on Sustainable Financing Framework, aiming to access new financing sources that align with this ambition.[70]

15. The National Energy Council (DEN) comprises of 8 ministers and 8 representatives of key energy stakeholders. It holds the responsibility to design and formulate national energy policy and oversee its implementation. The Investment Coordination Board (BKPM) issues power-related licenses through a "one-stop" Online Single Submission (OSS) System, including the electricity supply business license (IUPTL), operating license (*Izin Operasi*), cross-border power trade license, geothermal license, and other project licenses.

16. Under the decentralized political system, local governments are provided with an administrative role in licensing and determining electricity tariffs for power projects that

[67] Ministry of Energy and Mineral Resources. 2020. Handbook of Energy and Economic Statistics of Indonesia 2019.
[68] World Bank Group, 2021. Country Partnership Framework for The Republic of Indonesia (FY2021-25). https://documents1.worldbank.org/curated/en/306831620760881407/pdf/Indonesia-Country-Partnership-Framework-for-the-Period-FY21-FY25.pdf
[69] Ministry of Energy and Mineral Resources. 2021. https://www.esdm.go.id/en/
[70] PLN. 2020. Statement of Intent on Sustainable Financing Framework. https://web.pln.co.id/statics/uploads/2020/10/Statement-of-Intent-on-Sustainable-Financing-Framework.pdf

fall within their jurisdictions, as well as the responsibility to devise local energy and electricity plans.

17. The National Energy Policy (2014) is the overarching long-term national energy strategy, formulated by the National Energy Council and approved by the Parliament. It provides specific national energy targets towards 2025 and 2050 such as:

(i) Energy supply mix to comprise,
by 2025: 23% new and renewable, 22% natural gas, 25% oil, 30% coal
by 2050: 31% new and renewable, 24% natural gas, 20% oil, 25% coal

(ii) Total installed capacity to reach 115 GW in 2025 and 430 GW in 2050.

(iii) Per capita electricity consumption to reach 2,500 kWh by 2025 and 7,000 kWh by 2050.

18. Indonesia's NDC aims to reduce energy-related greenhouse gas emission by 11% against business as usual by 2030, and by 15.5% if international finance support is made available.[71]

19. The National Energy General Plan (RUEN - 2017) is the implementation plan to achieve the National Energy Policy (2014), prepared by the central government, and reviewed at least every five years. The Local Energy Plans (RUED-P) are the provincial level implementation plan for RUEN. Progress is slow due to budget constraints and overlapping planning – only 14 out of 34 Indonesian provinces are developing their RUED-P at different stages. The Bali RUED-P (2020-2050) aims to increase the uptake of clean energy sources and reduce the use of fossil fuel generation.[72] The West Java RUED-P (2018-2050) also prioritizes energy conservation and renewable energy, including the development of up to 4 GW pumped storage by 2050.[73]

20. The National Electricity Plan (RUKN - 2019-2038) is the central government plan for the electricity supply system, based on both the National Energy Policy (2014) and the RUEN (2017). The plan is stipulated by the Ministry of Energy and Mineral Resources (ESDM) and is reviewed at least every three years. Due to COVID-19 pandemic, the updated RUKN has been postponed. The Local Electricity Plans (RUKD) is the provincial level implementation plan for RUKN. Progress is typically slow due to budget constraint and overlapping planning. The target electricity generation mix for 2025, as set out in RUKN (2019-2038), comprises of 55% coal, 23% new and renewable energy, 22% gas, and 0.4% fuel oil.[74]

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[71] Updated Nationally Determined Contribution for the Republic of Indonesia. 2021. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Indonesia%20First/Updated%20NDC%20Indonesia%202021%20-%20corrected%20version.pdf

[72] Bali RUED-P (2020-2050). https://jdih.baliprov.go.id/produk-hukum/peraturan-perundang-undangan/perda/28615

[73] West Java RUED-P (2018-2050). http://esdm.jabarprov.go.id/wp-content/uploads/2019/09/Rencana-Umum-Energi-Daerah-RUED-Jawa-Barat.pdf

[74] RUKN (2019-2038). https://gatrik.esdm.go.id/assets/uploads/download_index/files/0e997-rukn-2019-2038.pdf

21. The 35 GW Power Development Acceleration Program (2015) was launched by President Joko Widodo's administration to fast-track 35 GW of power generation capacity between 2015 and 2019. 25% of the proposed capacities were to be developed by PLN, and 75% by IPPs through Power Purchase Agreements (PPAs). The program was implemented as part of the RUPTL. By June 2021, only 10.6 GW of power capacity had reached commercial operation (30% of the target). Furthermore, around 17.7 GW is under construction and the remaining 7.6 GW is still not yet constructed.

22. The latest RUPTL 2021-2030 was published in October 2021, outlining the country's 10-year electricity business plan. It contains a list of projects, to be developed by PLN and IPPs, as well as the procurement route for IPPs, including the Upper Cisokan PSH Project. RUPTL aims to add around 40.5 GW of generation capacity by 2030, including 13.8 GW of coal power plants, 5.8 GW of gas power plants, 5 GW of hydropower plants, 4.7 GW of solar power plants, 4.2 GW of pumped storage, 3.4 GW of geothermal plants, 1.1 GW of mini-hydro, 2.5 GW of other renewables including wind, rooftop solar, biofuel, and waste-to-energy plants by 2030. Specific to Java, Madura, Bali region, the RUTPL is planning to install an additional 8.5 GW coal power plants and 3.4 GW of gas power plants.[75]

23. Hydropower resource is available across Indonesia, but the majority is located in the less developed region of Papua (22 GW) and Kalimantan (21 GW). A Master Plan Study for Hydropower Development was released by PLN in 2011, providing a list of 8 GW feasible hydropower projects, including substantial PSH capacities in West and East Java such as Upper Cisokan; run-of-river capacities in Aceh, North and West Sumatera; and reservoir-type capacities in South and Central Sulawesi, among others.[76] The ADB's Indonesia Energy Sector Assessment indicates that large reservoir-based plants and PSH are well-suited to supply peaking demand in power demand centers such as Java, whereas small run-of-the river projects are ideal for improving rural electrification in less populous regions.[77]

24. PLN is considering a series of closed-loop PSH projects in Java-Bali including the Upper Cisokan (1,040 MW), Matenggeng (943 MW) and Grindulu. The PSH projects will help PLN to better manage transmission constraints between the two main loads centers – Jakarta and Bandung. Furthermore, the Upper Cisokan will be able to quickly respond to power demand fluctuations and help better manage grid stability.

25. **PLN Overview.** As the country's largest power producer and supplier, PLN owns a total installed capacity of 44,175MW, while managing IPPs with a total contracted capacity of 17,720MW. Renewable capacity contributes only a small portion of PLN-owned capacity, which is predominantly fossil fuel-based. PLN relies on purchased energy to increase the renewable portion in the energy mix of its fleet. Table 5 summarizes PLN's installed generating capacity as of end of FY2020. Separately, as

[75] RUPTL (2021-2030). https://web.pln.co.id/statics/uploads/2021/10/ruptl-2021-2030.pdf
[76] JICA, 2011. Project for the Master Plan Study of Hydropower Development in Indonesia. Final Report. Vol. I - Executive Summary. Japan International Cooperation Agency (JICA). August 2011. Project https://openjicareport.jica.go.jp/pdf/12037610.pdf
[77] ADB, 2016. Indonesia – Energy Sector Assessment, Strategy and Roadmap. https://www.adb.org/documents/indonesia-energy-sector-assessment-strategy-and-road-map

the monopoly in the country's transmission and distribution network, PLN owns a transmission network of 58,959 circuit kilometers.

Table 5: System Installed Generating Capacity of PLN, 2020 (Source: PLN Statistics)

PLN's Power Plants	MW	%	Purchase from	MW	%
Coal	20,278	32.0	Private Power Plants		
Natural Gas	14,168	22.4	IPPs	17,720	28.0
Diesel	5,548	8.8			
Hydropower	3,584	5.7	Others		
Geothermal	579	0.9	Leased Plants	1,441	2.3
Others	18	0.0			
Subtotal	44,175	69.8	Subtotal	19,161	30.3
			Total	**63,336**	**100.0**

Annex 4: Sovereign Credit Fact Sheet

A. Recent Economic Development

1. Indonesia is an upper middle-income country with a GDP per capita at around USD3,869 and a population of 273.5 million. The economy grew robustly, over 5.0 percent per annum, in 2018 and 2019, but contracted by 2.1 percent in 2020 for the first time since the Asian Financial Crisis, due to weaknesses in exports, investments and consumer spending following the COVID-19 pandemic. The economy rebounded in the second quarter of 2021, growing by 7.07 percent year-on-year, after four quarters of recession. The expansion was mainly driven by base effects and a pick-up in domestic and international demand. However, a surge in COVID cases in July-August due to the Delta variant has slowed the recovery. Consumer sentiment and retail sales declined while manufacturing production contracted modestly.

2. Inflation declined to 2 percent in 2020 from 2.8 percent in 2019, reflecting depressed demand for goods and services. Lower food prices, thanks to a strong harvest in 2020, also helped contain inflation. Low inflation allowed Bank Indonesia (BI) to undertake expansionary monetary policy. BI has reduced the policy rate cumulatively by 150 basis points to 3.5 percent since 2020 and has also announced various measures to ease liquidity conditions.

3. To address the fallout of the COVID-19 pandemic, the government relaxed the 3 percent of GDP budget deficit cap for 2020-22, for the first time since the provision was issued in 2003. Fiscal deficit increased from 2.2 percent of GDP in 2019 to 5.9 percent of GDP in 2020. The government disbursed a total of IDR590 trillion (about 3.8 percent of GDP) in 2020 as part of the national economic recovery program (PEN). For 2021, the government has budgeted a total of nearly IDR700 trillion for the same program. Fiscal support has been geared towards the health sector, additional social assistance to vulnerable population, unemployment benefits, reductions of corporate income tax rate, financial support to state-owned enterprises and injection of funds in commercial banks to increase guaranteed working capital loans for corporations.

4. The current account deficit shrank in 2020 as imports declined by a larger proportion compared to the decline in exports. Exports decreased by 2.6 percent as a result of weakened demand in Indonesia's key export destinations. Imports declined by 17.3 percent due to depressed domestic demand.

B. Select Macroeconomic Economic indicators (2018-2022)

Economic Indicators	2018	2019	2020	2021*	2022*
Real GDP growth	5.2	5.0	-2.1	3.2	5.9
CPI Inflation (average, % change)	3.3	2.8	2.0	1.6	2.5
Current account balance (% of GDP)	-2.9	-2.7	-0.4	-0.3	-1.0
General government overall balance (% of GDP)	-1.8	-2.2	-5.9	-6.1	-4.8
General government gross debt (% of GDP)	30.4	30.6	36.6	41.4	43.3
Public gross financing needs (% of GDP)	4.0	4.1	8.5	8.3	6.8
External debt (% of GDP)	36.0	36.1	40.2	38.0	36.5
Gross external financing need (% of GDP)	8.2	8.1	6.4	6.1	6.6

Gross international reserves (USD billion)	120.7	129.2	135.9	152.3	168.2
Exchange rate (IDR/USD, EOP)	14409	13832	14034	14198	14255

Note: * denotes projected figures
The exchange rate is sourced from Bank Indonesia. For 2022, as of January 25, 2022.
Data source: IMF Article IV for Indonesia concluded in March 2021 (No. 21/46) and IMF WEO October 2021

C. **Economic Outlook and Risks**

5. When looking ahead, the economy is expected to rebound in 2021 but with a slower growth rate than previously expected. The IMF has adjusted its growth prediction down by 0.7 percentage point to 3.2 percent whereas ADB and WB have made similar adjustments. Growth is expected to be driven by improvements in consumer spending, increased public investment, rising global demand and higher commodity prices. Relatively slow vaccine rollout was a main factor setting back the recovery momentum in 2021. The government's plan of vaccinating two thirds of the population by March 2022 is expected to add greater confidence in the market.

6. The current account deficit is expected to remain stable in 2021 but lower than pre-pandemic levels, as demand for imports rebound in line with the expected economic recovery. Although export growth will likely experience some improvement, the growing exports combined with subdued tourism revenues might not be enough to offset the growth in imports. As a result, external financing needs are likely to increase slightly but are expected to be sustainable given the adequate level of reserves.

7. Inflation is expected to lower to 1.6 percent, and within the target band. Continuing low domestic demand and business spending are expected to result in low inflation. Nevertheless, inflationary pressure could arise as global prices of oil and commodities increase, and faster recovery and inflation in industrial countries induce higher interest rates there.

8. The main economic risk emanates from a longer-than-expected COVID-19 pandemic. A sluggish vaccination campaign as well as propagation of new virus variants can further exacerbate shortfalls in domestic consumption and investment thereby delaying recovery in 2021. Other risks include uncertainties in global trade (including a rise in pandemic-related protectionist measures), reversals in capital flows, and financing challenges.

9. Indonesia's public debt as well as external debt remain sustainable. Public debt is projected to gradually increase to be around 43 percent by 2022 due to higher government borrowing to cushion COVID-19 impact. Public debt is expected to stabilize around 2 percent in the medium-term. External debt is projected to gradually decline over the medium-term as a result of declining fiscal and current deficits. Exchange rate shocks could threaten Indonesia's external debt sustainability.

10. In April 2021, S&P affirmed Indonesia's sovereign rating at 'BBB' and the outlook on the long-term rating remains 'negative', citing the negative impact of the pandemic on fiscal and external risks. Moody's and Fitch affirmed the rating at Baa2/BBB respectively, with a stable outlook.