



The World Bank

Preparation of the Agus Pulangi Hydropower Complex for Rehabilitation

Project Information Document/ Identification/Concept Stage (PID)

Concept Stage | Date Prepared/Updated: 02-Oct-2019 | Report No: PIDC171845

**BASIC INFORMATION****A. Basic Project Data**

Project ID	Parent Project ID (if any)	Environmental and Social Risk Classification Substantial	Project Name
P169280			Preparation of the Agus Pulangi Hydropower Complex for Rehabilitation
Region	Country	Date PID Prepared	Estimated Date of Approval
EAST ASIA AND P	Philippines	02-Oct-2019	
Financing Instrument Investment Project Financing	Borrower(s) National Power Corporation	Implementing Agency National Power Corporation	

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	0.70
Total Financing	0.70
Financing Gap	0.00

DETAILS**Non-World Bank Group Financing**

Trust Funds	0.70
Miscellaneous 1	0.70

B. Introduction and Context

Country Context

The Philippines experienced high economic growth in recent years, supported by a favorable external environment and robust domestic consumption The Philippines is a middle income, archipelago nation in Southeast Asia with a population of about 105 million and recent, strong economic growth of over 6 percent. In the past years, the country kept investment grade ratings from major credit rating agencies as a result of its sound macroeconomic fundamentals. It is increasingly characterized by robust inclusive economic growth, healthy current account surplus, adequate international reserves, and a sustainable fiscal



position. The Philippine Development Plan (PDP) 2017-2022 outlines strategic directions and priorities of the Government. One of the fundamental objectives of the PDP is to “Accelerate Strategic Infrastructure Development”, which is supported by the government infrastructure development agenda, through *Build, Build, Build*. Under this program, public investment aims to increase from 5.4 percent of GDP in 2017 to 6.9 percent of GDP in 2020. The successful implementation of these projects could generate positive spillover effects for the rest of the economy, spurring additional business activity, accelerating job creation.

The Philippines’ medium-term growth outlook is positive driven by strong domestic demand and supported by an expected rise in public investment spending. The economy is expected to continue to grow at solid rates, and the World Bank projects the country’s GDP to expand at an annual rate of 6.5 percent in 2018, and 6.7 percent in 2019. Investment growth is likely to be the key driver of growth, which is expected to rise on the back of public investment and the timely implementation of the government’s infrastructure and human capital investments. As strong correlation remains between economic growth and energy use, the energy sector will continue to play a key role in supporting further economic growth of the country.

Sectoral and Institutional Context

The power sector in the Philippines is mostly privately owned and operated. Power generation has become highly competitive and new investments are made exclusively by the private sector. Government continues to own some older oil-fired power plants and some key hydroelectric assets, especially in Mindanao. A competitive wholesale electricity market has been operating for more than a decade in Luzon and the Visayas. A spot market is not yet fully operational in Mindanao, but new investments in generation capacity could lead to the emergence of wholesale competition. Transmission remains state-owned, but new investment and operations have been assigned to a private concessionaire on a long-term basis. The Luzon and Visayas grids are interconnected and there are plans to build an undersea interconnect to the Mindanao grid. Distribution is a mix of 20 investor-owned utilities, including world-class companies providing services in the cities of Manila, Cebu, and Davao; and 121 rural electric cooperatives (ECs), which are owned by their member-consumers. One hundred of these ECs are connected to the main transmission networks in Luzon, the Visayas and Mindanao; the remaining 21 are spread across islands that have no connection to the larger grids.

The sector institutional structure accompanying privatization of operating assets, dates from the passage of the Electric Power Industry Restructuring Act (EPIRA) 2001. The Department of Energy (DOE) is the lead policy agency. The Energy Regulatory Commission (ERC), an independent Government agency, provides economic regulation for the sector as a whole. The National Electrification Administration (NEA), a Government-owned and controlled corporation (GOCC), is the apex agency for the 121 ECs. The Philippines Electricity Markets Corporation (PEMC) is the operator of the Wholesale Electricity Spot Market (WESM). The Power Sector Assets and Liability Management (PSALM) corporation holds the remaining government assets in the sector, including the transmission assets, hydro facilities, and distributed generation plants of the Small Power Utilities Group of the National Power Corporation (NPC-SPUG).



The Philippines has a rapidly growing electricity sector. The Philippines has a rapidly growing electricity sector. The installed power generation capacity increased from 15.7GW to 22.7GW while electricity consumption went up from 49.2 TWh to 77.8 TWh in the past decade. The table below provides a breakdown of installed capacity by the type of generation at the end of 2017.

Type of Generation	Installed Capacity, MW	Installed Capacity, %
Coal-fired	8,049	35
Oil-based	4,153	18
Natural gas	3,447	15
Hydropower	3,627	16
Geothermal	1,916	8
Solar	885	4
Wind	427	2
Biomass	224	1
TOTAL	22,728	100

Power generation capacity additions were dominated by coal fired power plants. In recent years, power generation capacity additions were dominated by coal fired power plants owing to government's 'technology neutral' and cost sensitive approach to meet growing power demand. Coal fired installed capacity increased from nearly 6 GW to above 8 GW between 2015 and 2017. While coal power generation capacity accounted for about 35% out of the total installed capacity, coal power plants generated 46.8 TWh, or nearly 50% of electricity produced in the Philippines in 2017.

Coal is set to continue playing a major role in power mix in the future. As per the Philippine Energy Plan 2016-2030, the Government is looking to develop a technology neutral power sector in line with a so-called 70-20-10 strategy. Within this context, power plant technologies considered per type of operation are as follows: 70 percent baseload capacity from coal, geothermal, big hydropower, natural gas, nuclear and biomass, 20 percent mid-merit capacities from natural gas and 10 percent of peaking capacities from oil-based plants and variable renewable energy such as solar photovoltaic (during daytime) and wind. According to the Department of Energy forecasts, some 17 GW of power capacity will need to be added by 2030 to support continued electrification, increases in consumption by households as a result of higher income levels, and economic growth. Coal fired power generation is seen by the energy authorities as a main solution to reliable, sufficient and affordable supply of electricity. As per the Philippine Energy Plan 2016 - 2030, coal consumption will increase from 11.7 mtoe in 2016 to 51.3 mtoe under a business-as-usual scenario and to 40.7 mtoe under a clean energy scenario in 2040.

The Mindanao power system mirrored developments in the sector. The installed nameplate capacity of the Mindanao power system grew from about 1.7 GW in 2003 to nearly 3.6 GW in 2017. Coal power plants accounted for about 70% of the capacity additions during that time, with the bulk of coal capacity having been added in the past three years. The table below gives installed capacity at the end of 2017.

Type of Generation	Installed Capacity, MW
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Coal-fired	1,370
Oil-based	906
Hydropower	1,080
Geothermal	108
Solar	59
Biomass	36
TOTAL	3,559

The Agus Pulangi Hydropower Complex (APHC) will keep playing a key role. The APHC has been the backbone of the power generation system in Mindanao for decades and until recently accounted for more than 50% of the power generation output in Mindanao. However, most of the APHC plants have been in operation for more than three decades and badly require rehabilitation to extend their lifetime, increase capacity and subsequently generated energy, and enhance safety of dams.

The APHC is located on the island of Mindanao in the Philippines archipelago and it consists of seven run-of-river hydropower plants with a total installed capacity of about 1,000 MW. Mindanao is the second largest island in the Philippines. Mindanao and the smaller islands surrounding it make up the island group of the same name. Located in the southern region of the archipelago, the entire Mindanao island group had an estimated total of 25.5 million residents (2018). The Mindanao power system is not connected to the Luzon-Visayas power system, but there are plans to interconnect them in the space of the next few years.

Six of the plants of the Agus Pulangi Hydropower Complex are located on the Agus River that flows for 36.5 km from Lanao Lake to Iligan Bay. The seventh plant is the Pulangi IV Plant, the first of five plants envisaged on the Pulangi River, which is the longest river in the province of Bukidnon. It has a length of 320 kilometers and is one of the major tributaries of the Rio Grande de Mindanao, an extensive river system in Mindanao.

The APHC capacity and commissioning dates are summarized in the following table:

Plant	Current Installed Capacity	Year Commissioned
Agus I	2x40 MW	1992 & 1994
Agus II	3x60 MW	1979
Agus IV	3x52.7 MW	1985
Agus V	2x27.5 MW	1985
Agus VI	2x34.5 MW + 3x50 MW	1969, 1971 & 1977
Agus VII	2x27 MW	1983 & 1982
Pulangi IV	3x85 MW	1985 to 1986

While recently power generation mix in Mindanao shifted towards coal and at present, total installed capacity of nearly 3.6 GW is largely sufficient to supply electricity to connected customers, demand for APHC energy and capacity is expected to increase in the years to come because of the following three reasons:



- According to DOE forecasts, system peak demand in Mindanao is expected to increase to about 3.4 GW in 2025 and 5 GW in 2030. A number of factors contribute to the projected rapid rise in demand: continued electrification, increases in consumption by households as a result of higher income levels, and economic growth. The rehabilitated APHC can play an important role in meeting the increased demand in a least-cost and environmentally sustainable manner, including supporting integration of intermittent renewable energy sources such as solar and wind.
- In the immediate future, increases in power capacity in Mindanao are likely to be dominated by coal-fired generation. This will further increase base load capacity of the system and will need to be accompanied by adequate regulating (hydropower) capacity to provide load-following and other ancillary services.
- The planned connection of the Mindanao power system to the Luzon-Visayas system and integration of the Mindanao power market into the Philippines Wholesale Electricity Supply Market would create additional demand for APHC capacity and energy.

Security risks. A number of the plants of the Agus hydropower cascade are located in a post conflict-affected area. A five-month-long armed conflict between Philippine government security forces and militants affiliated with the Islamic State of Iraq and the Levant (ISIL) took place during May-October 2017. While the conflict formally ended in October 2017, the region remains prone to security risks as armed elements still exist and operate in the area.

Relationship to CPF

The proposed TA is linked to the Bank's Country Partnership Strategy (CPS) for the period FY15-18, supporting two pillars: (i) Climate Change, Environment, Disaster Risk Management; and (ii) Rapid, Inclusive & Sustained Economic Growth. The TA will prepare the ground for subsequent investments in rehabilitation and a related increase in power generation from clean hydropower energy. Additional hydropower generation would substitute coal power generation and in this way will support the climate change and sustained economic growth agendas. Also, increased hydropower generation and related continued electrification will open new possibilities for health, education, and social development and thus will support the implementation of the CPS pillar related to rapid and inclusive growth.

C. Project Development Objective(s)

Proposed Development Objective(s)

The development objective of this activity is to support the National Power Corporation in preparing the Agus-Pulangi Hydropower Complex for rehabilitation, including feasibility study, tender design, technical specifications and bidding documents. Subject to availability of funds, the project could also finance additional activities in support of preparation of APHC rehabilitation.



Key Results

The key results of the activity are the preparation of a feasibility study by end-December 2020, and tender design, technical specifications and bidding documents by end-March 2021.

D. Preliminary Description

Activities/Components

The project will finance feasibility study, tender design, technical specifications and bidding documents for rehabilitation of APHC. These activities will be implemented under a single component.

The feasibility study will likely focus on the following three rehabilitation options:

Option 1: Rehabilitation to restore the rated capacity of the plants, extend their operating life and ensure the safety of the power complex. This would cover addressing, through rehabilitation or replacement, equipment issues that currently constrain production and availability, including obsolescence issues, and an upgrade of their operational performance and conditions with installation of state-of-the-art monitoring, control, protection and dispatch systems. This would also cover addressing dam safety issues and restoring effective instrumentation. For the Pulangi IV Plant, it would include conceptual design of the proposed measures and estimate their costs.

Option 2: Option 1 plus additional measures to increase the capacity and energy production through efficiency improvements of the generating units without major changes to the existing civil works and embedded parts.

Option 3: Option 2 plus all additional measures to increase the capacity and energy production of the plants through increased water availability as a consequence of the removal (or reduction) of the constraint on the discharge outflow from Lake Lanao due to potential flooding in the Balo-i flood plain upstream of the Agus 4 reservoir.

Environmental and Social Standards Relevance

E. Relevant Standards

ESS Standards

ESS 1

Assessment and Management of Environmental and Social

Relevance

Relevant



Risks and Impacts		
ESS 10	Stakeholder Engagement and Information Disclosure	Relevant
ESS 2	Labor and Working Conditions	Relevant
ESS 3	Resource Efficiency and Pollution Prevention and Management	Relevant
ESS 4	Community Health and Safety	Relevant
ESS 5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
ESS 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
ESS 7	Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Relevant
ESS 8	Cultural Heritage	Relevant
ESS 9	Financial Intermediaries	Not Currently Relevant

Legal Operational Policies

Safeguard Policies	Triggered	Explanation (Optional)
Projects on International Waterways OP 7.50	No	not relevant
Projects in Disputed Areas OP 7.60	No	not relevant

Summary of Screening of Environmental and Social Risks and Impacts

The impacts considered in this ESRS are related to the limited activities (technical assistance) to be funded under this project. The TA activities do not themselves have direct adverse environmental or social impacts. Nevertheless, the outcomes of this TA support, in the form of future investments, may have important environmental and social implications going forward, if subsequently implemented by the government. An Environmental and Social Impact Assessment (ESIA) will be carried out simultaneous with the Feasibility Study.

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Borrower/Client/Recipient

Borrower : National Power Corporation

Implementing Agencies

Implementing Agency : National Power Corporation

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