

PROJECT INFORMATION DOCUMENT (PID) CONCEPT STAGE

Report No.: PIDC779

Project Name	WAPP APL1 (Phase 3) Adjarala Hydroelectric Project (P115063)
Region	AFRICA
Country	Africa
Sector(s)	Hydropower (100%)
Theme(s)	Regional integration (67%), Infrastructure services for private sector development (33%)
Lending Instrument	Specific Investment Loan
Project ID	P115063
Borrower(s)	Ministry of Energy, Ministry of Energy
Implementing Agency	Communaute Electrique du Benin (CEB)
Environmental Category	A-Full Assessment
Date PID Prepared/ Updated	15-Apr-2013
Date PID Approved/ Disclosed	29-May-2013
Estimated Date of Appraisal Completion	31-Jan-2014
Estimated Date of Board Approval	27-Mar-2014
Concept Review Decision	Track II - The review did authorize the preparation to continue

I. Introduction and Context

Country Context

Regional Overview: The 15 member states of the Economic Community of West African States (ECOWAS) occupy some five million square kilometers and are currently home to about 250 million people. Half of the present population lives in poverty, with per capita income barely above US\$300 per year. The population is unequally distributed and the growth rate of the urban population (3.8%/year) is higher than the global population of the area.

Togo and Benin both have relatively small population and high levels of poverty. Togo covers an area of 57,000 km², and Benin 112,600 km². They both need reliable energy to sustain their development and growing economies. Togo has a population of 6.1 million, a GDP per capita of \$584 and 38.5% of the population lives below the poverty line. Benin has a population of 9.1 million, a GDP per capital of \$780 and 33.3% of the population lives below the poverty line.

Sectoral and Institutional Context

The main energy resources available in ECOWAS region are hydro, oil, natural gas, coal and renewable sources. These resources are unequally distributed throughout the geographic zone. Despite the region's large energy endowment, the per capita consumption of electricity is among the lowest in the world at approximately 160 kWh per capita. Faced with this power system expansion challenge, ECOWAS Member States have acknowledged that past efforts to achieve national self-sufficiency in electricity supply have been uneconomical due to the high cost of establishing power generation and transmission infrastructure. To address these challenges, ECOWAS has formed the West Africa Power Pool (WAPP) – a cooperative power pooling mechanism for integrating national power system operations into a unified regional electricity market – with the expectation that such mechanism would, over the medium to long term, assure their citizens' a stable and reliable electricity supply at affordable costs. The WAPP Secretariat, a specialized institution of ECOWAS, is in charge of overseeing WAPP strategy.

The electricity sector in Togo and Benin is characterized by high costs; recurrent load shedding; limited penetration particularly in rural areas; insufficient investments; and insufficient diversification in sources of production. Demand growth is about eight percent per year due to high population growth in urban areas. The Communauté Electrique du Bénin (CEB), the single buyer of electricity in Benin and Togo, imports over 70 percent of its electricity from Nigeria and Ghana. The hydroelectric dam of Nangbéto in Togo and thermal power plants, sometimes supplied in gas by the West African Gas Pipeline (WAGP), provide the remaining generation. Since 2010, a 100 MW HFO IPP is in operation in Togo, while in Benin a Government owned 80MW thermal generation plant is under construction. Nevertheless, CEB is sometimes unable to meet domestic demand. In addition, gas supply in the sub-region and imports are both unpredictable and IPPs running on HFO (or jet fuel in the future) have a high cost. To strengthen the supply side, the Bank therefore plans to finance a hydropower project located in Adjarala, on the frontier between Benin and Togo.

The Member States of ECOWAS prepared a Master Plan as the blueprint for the integration of their electricity networks, which was revised in 2011. This revision focuses on (i) the optimal development plan and analysis of transmission network performance and stability, and (ii) the priority investment program for generation and transmission.

CEB is a bi-national (covering Togo and Benin) utility created in 1969. It is in charge of generation, power imports, and transmission for the two countries. Almost 85 % of the CEB's electricity is imported from Ghana, Cote d'Ivoire and Nigeria. CEB's own generation capacity consists of the Nangbéto hydro power plant (65 MW) and two open cycle gas turbines plants of 2x25MW.

The Adjarala Hydropower Project was included as priority project into the WAPP program in June 2008, though the project has a long history. The first studies on the development of the hydro potential of the Mono river downstream of Nangbéto (65 MW) were finalized in June 1987. The studies identified the Adjarala site, located approximately 100 km downstream of Nangbéto, as the most attractive one. The feasibility study was completed in September 1988, the detailed design in 1990 and the bidding document in February 1992. Since then the project has seen almost continuous updating. Original installed capacity was set at 2 x 49 MW and energy production was estimated at 326 GWh. The overall design of the hydropower plant appeared adequate. However in 2004, the project design was refined taking into account new hydrological data and integrating power market conditions in the two countries. In 2011, a technical study demonstrated the important regional

contribution made by the project. The study showed that Adjarala will help to stabilize the regional power network by contributing to the ancillary services such as (i) voltage and frequency control of the regional WAPP system, (ii) defense plan against propagation of major disturbances from one subsystem to the others, (iii) inter-area electromechanical oscillation damping, and (iv) black-start capacity of some generating stations for system restoration after a blackout.

Relationship to CAS

Togo's Interim Strategy Note (ISN) for the period FY12-FY13 sets the framework for World Bank assistance to the country. The ISN highlights that electricity rates are well below the regional average and US\$20 million is earmarked for an energy project in 2013.

In Benin, the FY13-FY17 Country Partnership Strategy (CPS) in preparation clearly specifies support to the energy sector and resolving the shortage of electricity generation through financing of the Adjarala hydropower project.

On June 30, 2005, the Bank's Executive Board of Directors endorsed the application of the adjustable program lending (APL) instrument, within the framework of the World Bank's Regional Integration Assistance Strategy for West Africa, as the vehicle for providing IDA credit support to the WAPP initiative. The Bank has put in place a multi-year programmatic framework to help close the financing gap and thereby ensure timely implementation of priority WAPP investments and technical assistance activities of the ECOWAS Master Plan. The APL instrument enables IDA credit support to be provided in a flexible manner – when borrowers have satisfied the policy trigger (signing the ECOWAS Energy Protocol – which both Togo and Benin have done) and when individual WAPP priority investments are ready to receive IDA credit support.

II. Proposed Development Objective(s)

Key Results (From PCN)

The project's key results will be the following:

- Annual power produced under the project (GWh)
- Decrease in CEB's marginal cost of production (USc/kWh)
- Direct project beneficiaries (number) of which female (percentage)

III. Preliminary Description

Concept Description

The proposed revised design now includes 3 x 49 MW for an estimated 366 GWh energy production per annum. Project design will contribute to the mitigation of the floods downstream and allow for the future development of a large irrigation perimeter. A 2012 independent review confirmed the economic and financial viability of the project with the revised design (economic internal rate of return – IRR – of 16.2% and financial IRR of 18.7%). The team will validate these results during project preparation. The review took into account the latest economic and social costs.

The duration of the construction is estimated at 3 years. The annual average energy, estimated at 366 GWh, includes 314 GWh of firm energy (at 5% deficiency). The indicative line route for the proposed transmission line (about 50km long) will be parallel to the existing power line. This

routing has been chosen to minimize environmental and social impacts.

The WAPP Adjarala Hydropower Project (APL 1, Phase 3) will finance the following components: Component 1: Adjarala dam, hydropower plant, transmission line, and associated infrastructure.

This component involves the construction of the hydropower scheme and its interconnection with the Momé Hagou substation. Expected results from this component are an increase in hydropower generation capacity constructed under the project, transmission lines constructed under the project, and improvement in quality of service thanks to less average interruption frequency per year in the project area. The component includes the following elements:

- A 48m high and 3,700 m long dam creating a 680 hm³ and 95 km² reservoir;
- A hydropower station equipped with 3 x 49 MW units (315 m³/s, 54 m head);
- Construction of about 50 km of 161 kV transmission line between the power plant and the substation of Momé Hagou where the transmission line joins the WAPP Coastal Transmission Backbone;
- Construction of access roads, a new 150 m bridge across the Mono river at Tetetou (road Tohoun-Notse), repositioning of part of the Nangbéto /Momé Hagou transmission line located in the land submerged by the reservoir and other minor infrastructures;
- A transmission interconnection line
- Consulting services for Project and Construction Management.

Component 2: Environmental and social measures. This component will finance activities related to the implementation of all measures outlined in the Environmental and Social Management Plan (ESMP) and Resettlement Action Plan (RAP), related to activities financed in Component 1. In addition, the component may support the design and implementation of a limited Local Development Program that will address immediate social and development needs of affected local communities beyond those prescribed in the ESMP and RAP.

Component 3: Technical assistance and project management. This component will finance technical assistance activities related to preparation and implementation of the project such as:

- Study to minimize the occurrence and extent of floods downstream of Adjarala by setting up a flood routing management system coordinated with Nangbéto,
- Analytic studies related to the potential development of the 40,000 hectare irrigation perimeter downstream of Adjarala,
- Development of coordinated operation system between Nangbéto and Adjarala power station with a view to optimize the sharing of data and ultimately the benefits of the schemes.

It will also support comprehensive communication program to help achieve the project development objectives. The project will support overall project management, including consultants, equipment, trainings, and monitoring and evaluation for the project.

IV. Safeguard Policies that might apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
Environmental Assessment OP/BP 4.01	x		
Natural Habitats OP/BP 4.04	x		
Forests OP/BP 4.36	x		
Pest Management OP 4.09		x	

Physical Cultural Resources OP/BP 4.11	x		
Indigenous Peoples OP/BP 4.10		x	
Involuntary Resettlement OP/BP 4.12	x		
Safety of Dams OP/BP 4.37	x		
Projects on International Waterways OP/BP 7.50	x		
Projects in Disputed Areas OP/BP 7.60		x	

V. Financing (in USD Million)

Total Project Cost:	435.00	Total Bank Financing:	120.00
Total Cofinancing:		Financing Gap:	0.00
Financing Source			Amount
BORROWER/RECIPIENT			50.00
International Development Association (IDA)			120.00
Bilateral Agencies (unidentified)			165.00
Foreign Multilateral Institutions (unidentified)			100.00
Total			435.00

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