

AFRICAN DEVELOPMENT FUND



GHANA

POWER SYSTEM REINFORCEMENT PROJECT (PRSP)

**PROJECT COMPLETION REPORT
(PCR)**

RDGW

July 2018

PROJECT COMPLETION REPORT FOR PUBLIC SECTOR OPERATIONS (PCR)



AFRICAN
DEVELOPMENT
BANK GROUP

I BASIC DATA

A Report data

Report date	Date of report:	30/11/2017	
	Mission date (<i>if field mission</i>)	From: 20/11/2017	To: 30/11/2017

B Bank staff in charge

Positions	At approval	At completion
Regional Director		Janvier Litse
Country Manager		Yero Baldeh
Sector Director	G. Mbeshherubusa	Baldeh Baatchi
Sector Manager	A.T. Diallo	Diallo Bassirou Amadou
Task Manager	H.R. Heeroo	Antony Karembu
Alternate Task Manager	D. Lekoetje	n/a
PCR Team Leader		Antony Karembu
PCR Team Members		Daniel Osei- Boakye; Jemima Tettey-Cofie; Philip Doghle

C Project data

Project name: POWER SYSTEM REINFORCEMENT PROJECT (PRSP)		
Project code: P-GH-F00-003	Instrument number(s): 2100150015548	
Project type: ADF Loan	Sector: Energy	
Country: Ghana	Environmental categorization (1-3): 2	
Processing milestones – Bank approved financing only (add/delete rows depending on the number of financing sources)	Key Events (Bank approved financing only)	Disbursement and closing dates (Bank approved financing only)
Financing source/ instrument 1:	Financing source/ instrument1:	Financing source/ instrument1:
Date approved: 28/11/2007	Cancelled amounts: UA 5.66 Million	Original disbursement deadline: 31/03/2013
Date signed: 04/03/2008	Supplementary financing:	Original closing date: 31/12/2013

Date of entry into force: 10/06/2010	Restructuring (<i>specify date & amount involved</i>):	Revised (<i>if applicable</i>) disbursement deadline: 31.03.2014		
Date effective for 1st disbursement: 22.07.2010	Extensions (<i>specify dates</i>): N/A	Revised (<i>if applicable</i>) closing date: 31.03.2016		
Date of actual 1st disbursement: 22.07.2010				
Financing source/ instrument 2:	Financing source/ instrument 2:	Financing source/ instrument 2:		
Date approved:	Cancelled amounts:	Original disbursement deadline:		
Date signed:	Supplementary financing:	Original closing date:		
Date of entry into force:	Restructuring (<i>specify date & amount involved</i>):	Revised (<i>if applicable</i>) disbursement deadline:		
Date effective for 1st disbursement:	Extensions (<i>specify dates</i>):	Revised (<i>if applicable</i>) closing date:		
Date of actual 1st disbursement:				
Financing source/instrument (add/delete rows depending on the number of financing sources):	Disbursed amount (amount, UA):	Percentage disbursed (%):	Undisbursed amount (UA):	Percentage undisbursed (%):
Financing source/ instrument1: ADF Loan 27,000,000	21,871,985	81.01%	5,128,015	18.99%
Government:				
Other (eg. co-financiers). Volta River Authority (VRA) UA 610,000 ; Electricity Company of Ghana (ECG) UA 3,360,000	3,360,000	100	Nil	Nil
TOTAL				

D Management review and comments

Report reviewed by	Name	Date reviewed	Comments
Country Manager	Baldeh Yero		
Sector Manager	Bassirou Diallo		
Regional Director (as chair of Country Team)	Janvier Litse		
Sector Director	Bladeh Batchi		

II Project performance assessment

A Relevance

1. Relevance of project development objective

Rating*	Narrative assessment (<i>max 250 words</i>)
3	The overarching goal was focused on reducing poverty by ensuring secure and reliable supply of high quality energy services for all Ghanaian homes, businesses and industries. Specifically, the project objective was to reduce electricity losses, improve reliability of power supply and increase the population access to electricity in Kumasi. The The project was well aligned to the framework Ghana poverty reduction strategy which builds on the Ghana

Joint Assistance Strategy (GJAS) focusing on Human Resource Development; Governance and Civic Responsibility and Private Sector Competitiveness. The latter pillar underscores the need for improved, upgraded and expanded energy infrastructure as a catalyst for future growth and the country’s objective of attaining Middle Income Country status. The project aligned to Ghana’s Country Strategy Paper (CSP) (2012-2016), the Ghana Shared Growth and Development Agenda (GSGDA), the Energy Strategy and Development Plan (ESDP); the Bank Group Ten Year Strategy and the Bank’s Light Up and Power Africa “New Deal for Energy” which recognizes access to energy as crucial not only for the attainment of health and education outcomes, but also for reducing the cost of doing business and for unlocking economic potential and creating jobs. To be Cognisant of the performance indicators which are both qualitative and quantitative as reflected in the Result Logic Framework (RLF), the means of verification (monitoring tools) were not incorporated to assess the achievement of these indicators. This important omission is taken into account in assessing the rating of relevance of the PDO as Satisfactory.

* For all ratings in the PCR use the following scale: 4 (Highly satisfactory), 3 (Satisfactory), 2 (Unsatisfactory), 1 (Highly unsatisfactory)

2. Relevance of project design

Rating*	Narrative assessment (max 250 words)
3	<p>The project design was focused on reducing electricity losses, improve the reliability of supply and increase the population’s access to electricity in Kumasi, hence the construction of a Second Bulk Supply Point for the Kumasi Metropolis which had the second highest concentration of manufacturing industries after Accra-Tema and second highest number of customers (146,000) within the Electricity Corporation of Ghana (ECG) system. The project design incorporated the upgrade of the transmission and distribution system in Kumasi undertaken by Volta River Authority (VRA) and ECG respectively, however, during implementation, VRA was further unbundled to establish the Ghana Grid Company GRIDCOs.</p> <p>Under the transmission system component which entailed construction of a new 161/33Kv substation and refurbishment of the existing 161/33Kv substation both at Anwomaso. The project design was consistent and implemented as as planned. VRA undertook the front end engineering while the EPC contractor developed the detailed design and engineering and supervised on the basis of the front end engineering. The project design scope was adjusted to incorporat the provision of a Power System Simulator supplied and installed at the Kumasi Second Bulk Supply Point (K2BSP) site for the training of VRA, GRIDCo, ECG and engineering students from the Kwame Nkrumah University of Science and Technology (KNUST) on the management and operations of Ghana’s power system.</p> <p>Under the distribution component which entailed the constructions of two new 33/11 kV substations at Fawode and Achiase, 33 kV and 11 Kv distribution lines and installation of smaller transformers (10kVA – 100kVA), the project design was undertaken by separately by a detailed design and engineering firm unlike the VRA approach. The scope of the project design changed due to Right of Way (ROW) issues on foreseen potential compensation challenges that would have otherwise delayed project implementation. In this regard, 25km – 33Kv and 30km – 11kV distttribution lines were constructed as compared to the target 43km – 33kV and 52km - 11 kV initially designed. Subsequently, ECG’s zoning/survey on customer demand profile and actual load in locations earmarked for the replacement of existing 200kVA-500kVA with smaller transformers (10,25,50 and 100kVA) informed the sizing of transformers to incorporate a design criteria of aggregate load at 70% with the remaining 30% to meet suppressed demand within existing customers.</p>

3. Lessons learned related to relevance

Key issues (max 5, add rows as needed)	Lessons learned	Target audience
i). Unbundling of VRA	During implementation the VRA was unbundled to GRIDCo, however, the unbundling did not affect the implementation of the project because key personnel who undertook the front end engineering were retained until project completion. Therefore, subsequent unbundling of utilities should not affect committed projects due to transfer of staff already handling those projects.	Bank/GoG
ii) . Retaining of Key Staff after Unbundling	VRA retained key staff following unbundling that established GRIDCo as part of the project implementation unit which handles the NEPCO transmission projects. In this regard, stability and consistency of the project implementation unit is key to successful completion of project during a reform period to ensure successful completion of projects and achievement of developmental objectives.	Bank/GoG
iii) Ownership of Project Design (Front end engineering)	VRA undertook the front end engineering using in-house Engineers to ensure ownership from design stage and ensure close supervision of the implementation of the EPC contractor which includes detailed design as part of its scope. In this regard, utilities should be encouraged to define the respective design scope inhouse based on skills available and take the lead in supervision as part of skills transfer to undertake future projects of similar nature.	Bank/GoG

B Effectiveness

1. Progress towards the project's development objective (project purpose)

Comments
<p><i>Provide a brief description of the Project (components) and the context in which it was designed and implemented. State the project development objective (usually the project purpose as set out in the RLF) and assess progress. Unanticipated outcomes should also be accounted for, as well as specific reference of gender equality in the project . The consistency of the assumptions that link the different levels of the results chain in the RLF should also be considered. Indicative max length: 400 words.</i></p> <p>The overarching objective of the PRSP was to reduce electricity losses, improve reliability of power supply and increase the population access to electricity in Kumasi through four main components notably (A) Transmission System Upgrade (B) Distribution System (C) Environmental Mitigation and (D) Consultancy Services that related to Engineering supervision and Audit Services.</p> <p>Under Component A, Transmission System Upgrade</p> <p>A.1 - Kumasi Second BSP: VRA will erect a new BSP (161/33 kV substation) to tap power from an existing 161 kV transmission line which transports power to the existing BSP in Kumasi. The new substation will consist of a control building, two 66 MVA 161/33 kV transformers, 161 kV switchgear, as well as protection and control equipment to enable supply of power to ECG at 33 kV.</p> <p>A.2 - Upgrade of Existing Kumasi BSP: An additional 161 kV circuit breaker will be installed. Old capacitor banks and associated switchgear as well as outdated protection and control equipment will be renewed for improved operation and control of the substation.</p>

Under Component B, Distribution System Upgrade

B.1 - Extension to Kumasi Second BSP: To enable ECG to receive power from the second Kumasi BSP and convey the power to Kumasi and its outskirts, an extension to the BSP consisting of a control building, 33 kV switchgear and protection and control equipment will be built.

B.2 - 33/11 kV Substations: Two 33/11 kV substations will be erected in the Kumasi area. Each will have two 20 MVA transformers, 33 kV switchgear for Connection to incoming 33 kV transmission lines, 11 kV switchgear for feeding outgoing 11 kV distribution lines as well as protection and metering equipment.

B.3 - 33 kV and 11 kV Lines: Five new 33 kV transmission lines will be constructed to connect the Extension to Kumasi Second BSP (sub-component B.1) with three existing and the two new 33/11 kV substations (sub-component B.2) such that the 33 kV transmission network in the area can be supplied by either the existing or the new BSP. Distribution networks at 11 kV will be constructed to transfer power from the two new 33/11 Kv substations to 11 kV/low voltage transformers for onward distribution to domestic and other consumers.

B.4 - Distribution Using Small Capacity Transformers: The 11 kV and low voltage networks in Kumasi shall be reconfigured through the replacement of existing big distribution transformers (200 kVA to 500 kVA) by 731 smaller capacity transformers (25, 50 and 100 kVA). Electricity at 11 kV will be brought nearer to consumers before it is stepped down to low voltage for domestic and other uses.

Under Component C. Environment and Resettlement

The acquisition of land and easements along the right of way, access roads and substations will require a compensation program for structures, crops and fruit tree.

Under Component D. Consultancy Services (Engineering Supervision & Audit)

Engineering Supervision - Services will be provided by VRA and ECG for the supervision of components A and B respectively. The services include bidding for the recruitment of the contractors; review of contractor's designs, calculations and drawings; supervision of the installation of equipment; monitoring of resettlement/compensation; overseeing the testing and commissioning of the project installations; and preparation of implementation progress reports.

Project Audit - An external auditor will be recruited to carry out annual audits of the project accounts

2. Outcome reporting

Outcome indicators (as per RLF; add more rows as needed)	Baseline value (2008) (A)	Most recent value (B)	End target (C) (expected value at project completion)	Progress towards target (% realized) [(B-A)/(C-A)]	Narrative assessment (indicative max length: 50 words per outcome)	Core Sector Indicator (Yes/No)
Outcome 1: Increase access to reliable supply of electricity and minimum losses						
Increased transmission capacity to Kumasi (MW)	149	345 (2016)	267 (2014)	166.10%	ACHIEVED: The transmission capacity in Kumasi was reinforced and expanded: 1 new HV/MV; 1 refurbished HV/MV substation; 2 new MV/LV substations; 25km MV network; 30km LV Network; 586 new transformers. The max peak demand network is 345MW (2016)	

Reduction of Technical Losses in (%)	29% (14.5%)	27.03% (13.5%)	25% (12.5%)	92%	NOT ACHIEVED: Improved over the baseline figure but actual target not achieved.
Reduction in number of outage hours in (hrs)	700	98 (2016)	100 (2016)	100%	ACHIEVED: Kumasi initially had one BSP and commissioning of the second BSP provided the option for ring network fed by more than one feeder . The 2 BSPs serves a total of (17) 33/11 kV exiting primary substations in Kumasi and its environs. Secondly, the sizing of the transformers (10, 25, 50, 100MVA) based a design criteria of aggregate load at 70% of its name plate ONAN rating with the remaining 30% to meet suppressed demand within existing customers
Increase in number of people having access to electricity (no. of connections)	146,000	168000	166,000		ACHIEVED: Residential customers 142000, Commercial customers 20000 and industrial customers 6000 were additional in 2016. The latter significantly created jobs in Kumasi due to predicatable and reliable power supply.
Rating* (see IPR methodology)	Narrative assessment				
3	Out of 4 indicator: 3 were achieved and 1 not achieved :. The overall rating is Satisfactory (3), taking into account the optimization of the transmission route, increased transmission capacity (345MW), creation of a ring network and relative reduction of baseline technical losses by 92.6% of target.				

3. Output reporting

Output indicators (as specified in the RLF; add more rows as needed)	Most recent value (A) (2008)	End target (B) (expected value at project completion)	Progress towards target (% realized) (A/B)	Narrative assessment (indicative max length: 50 words per output)	Core Sector Indicator (Yes/No)
Output 1 High Voltage Substation constructed	1	1	100%	ACHIEVED: Construction of new Bulk Supply Point -BSP (161/33 kV substation) completed in Kumasi. Electricity is supplied to the BSP at a voltage of 161kV. Transformers at the BSPs step down the voltage to 33kV and feed the ECG 33kV sub-transmission network.	
Output 2 High Voltage substation refurbished	1	1	100%	ACHIEVED: The refurbishment included a scada communication system and replacement of capacitor banks and circuit breakers at existing BSP and surge arrestors.	

Output 3 Medium Voltage Substations constructed	2	2	100%	ACHIEVED: Construction of two new 33/11Kv substations completed in Achiase and Fawoade. enhance the capacity and reliability of power supply to the communities in the eastern corridor of the Ashanti Region namely, KNUST, Ejisu, Fawode, Effiduase, Nsuta-Mampong, Kwabre, Ashanti-Mampong and Konongo.
Output 4 Construction of 33kV distribution lines (km)	43	25	72%	PARTIALLY ACHIEVED: At appraisal it was envisaged that 43km of 33kV distribution lines, however, upon detailed design resulting in transmission route optimization and avoidance of compensation challenges, 25 km of 33kV distribution lines was completed saving the project time and savings.
Output 5 Construction of 11kV distribution lines (km)	52	30	73%	PARTIALY ACHIEVED: At appraisal it was envisaged that 52km of 11kV distribution lines, however, upon detailed design resulting in transmission route optimization and avoidance of compensation challenges, 30 km of 11kV distribution lines was completed saving the project time and savings
Output 6 Installation of smaller capacity transformers (25, 50 and 100 kVA) and replacement of 200kVA to 500kVA	43 (13,275 kVA)	586 (25,425kVA)	190%	ACHIEVED: The transformer sizing based on a demand profile and space availability resulted to replacement of 200kVA – 500 kVA with smaller transformers ranging from 25kVA – 100kVA. The total transformer capacity increased from 13,275 kVA to 25,425kVA. Therefore this output was measured based on the transformer capacity
Rating* (see IPR methodology)	Narrative assessment			
4	Out of 6 indicator: 4 were achieved: and 2 were partially achieved . The overall rating is Highly Satisfactory (4), taking into account the innovative technical solutions that saved the project some foreseen challenges on the Right of Way (ROW) due to compensation to sizing of transformers based on availability of space and demand profile. The high percentage of results achieved is a consequence of the Government’s ownership from the onset at preparation stage through implementation to successful completion.			

4. Development Objective (DO) rating

DO rating (derived from updated IPR)*	Narrative assessment (indicative max length: 250 words)
4	The rating derive from the outcomes and outputs ratings, to assess the progress of PRSP towards realizing its development objective. The overall result is highly satisfactory and provides a platform for a stable and reliable electric power supply system which is an inevitable pre-requisite for the technological and economic growth in Kumasi. For the past five years, i.e. from 2011-2015, the growth rates for peak demand and cumulative energy demand were 17.68% and 6.79.1% respectively.

5. Beneficiaries (add rows as needed)

Actual (A)	Planned (B)	Progress towards target (% realized) (A/B)	% of women	Category (eg. farmers, students)
Kwame Nkrumah University of Science and Technology (KNUST) students, Polytechnic students, Artisans, Residential, Industrial and commercial, customers	Kwame Nkrumah University of Science and Technology (KNUST) students, Polytechnic students, Artisans, Residential, Industrial and commercial, customers	100%	51% (similar to national average in census figures)	Industrial, Commercial, households, Government institutions, hospitals, students and telecommunication

6. Gender equality

Assessment on the performance of gender equality in the operation (indicative max length: 250 words)
VRA and ECG have under 5% of women in technical areas such us electrical engineering primarily due to limited number of women students enrolling for engineering courses at the Kwame Nkrumah University of Science and Technology (KNUST). However, to attract interest in engineering courses, the ECG and VRA management under individual membership in the Ghana Institution of Engineers (GhIE) and the Women in Engineering (WIE), promote Girls' participation in Science, Technology, Engineering, and Mathematics (STEM) subjects in primary and secondary schools. To increase girls' participation in STEM-related courses in primary. secondary schools and higher levels of education, STEM clinics are regularly held in selected selected districts.

7. Unanticipated or additional outcomes (add rows as needed)

Description	Type (eg. gender, climate change, social, other)	Positive or negative	Impact on project (High, Medium, Low)
The project design scope was adjusted to incorporate the provision of a Power System Simulator supplied and installed at the Kumasi Second Bulk Supply Point (K2BSP) site for the training of VRA, GRIDCo, ECG and engineering students from the Kwame Nkrumah University of Science and Technology (KNUST) on the management and operations of Ghana's power system	Social	Positive	High

8. Lessons learned related to effectiveness (add rows as needed)

Key issues (max 5, add rows as needed)	Lessons learned	Target audience
Design targets indicators for Gender and Job creation	Specific targets for gender inclusivity and job creation should be an intergral feature of all power system projects. Thiw will inform the level of Technical assistance geared toward enhacement of technical skills for women and youth with an interest in pursuing engineering.	Bank
Design gender mainstreaming program targeting technical skills enhancement for women.	Due to lack of women in the engineering field, the project should have incorporated a Technical Assistance component for the university and secondary schools such as the Science, Technology, Engineering, and Mathematics (STEM) program to encourage and create interests for future women engineers.	Bank/GoG

C Efficiency

1. Timeliness

Planned project duration – years (A) (as per PAR)	Actual implementation time – years (B) (from effectiveness for 1st disb.)	Ratio of planned and actual implementation time (A/B)	Rating*
20 Months	72Months	0.25	2
Narrative assessment (indicative max length: 250 words)			
<p>The grant and loan were approved by the Board on 28 November 2007, and the financing agreement was signed on 04 April 2008, but made effective only on 10 June 2010 due to delays in obtaining legal opinions. The original closing date was 30 December 2013. However, the project was finally closed on 31 March 2016. The project implementation schedule was significantly delayed collectively by the Bank and the Government of Ghana (GoG) due to (i) Delay in fulfillment of conditions precedent by the Cabinet and Parliament following Board Approval on 28 November 2007; (ii) delay in compensation of project affected persons due to stringent Land administration processes in determining the value of land and identifying the rightful land owners; (iii) Payment of compensation which was included as a Condition Precedent for the Loan; (iv) approval of first disbursement by the Bank which affected contracts package - P1 which involved the design and construction of the substation embankment as a result significantly impacted the commencement of the Package - P3 contract that involved the construction of a new 161/34.5kV Substation (v) delay in resolving claims by contractors due to project slow commencement as a result of compensation for project affected persons; (vi) change of sub-contractor initially contracted by the Main contractor due to non performance and appointment of three new replacement sub-contractors for the 33Kv/11Kv substations; (vii) delay in response to request for No Objections by the Bank significantly delayed awarding of contracts; (viii) sensitization and awareness was not carried before commencement of the project and this delayed the project due to small business owners refusing to give front access to the Main contractor during weekdays and latter resolving to work on Sundays and Public Holidays;(ix) delay occasioned by the bureaucratic process of submitting an invoice by the contractors that had long leadtimes before reaching the Bank for processing and payment; and (x) change of Task Managers by the Bank (6 Task Managers since project completed in March 2016).</p>			

2. Resource use efficiency

Median % physical implementation of RLF outputs financed by all financiers (A) (see II.B.3)	Commitment rate (%) (B) (See table 1.C – Total commitment rate of all financiers)	Ratio of the median percentage physical implementation and commitment rate (A/B)	Rating*
103	80	1.28	4
Narrative assessment (indicative max length: 250 words)			
<p>Total expenditures on the components shows that the overall total expenditure on the project was UA 21,961,436 against a budget of UA 27,600,000. This represents an under-run of expenditures of about 20.43% relative to the budget. However, the maximum peak demand of the Kumasi network (345MW) achieved is 10% over the appraisal target estimate (247MW). Subsequently, reduction of technical losses achieved is 92.6 %, primarily attributed to transformer sizing and regular maintenance of feeders taking into consideration the ring network established after the construction of the second Bulk Supply Point. Even though the target was not achieved, it should be noted that efficient use of resources under the project was substantially achieved. The amounts committed by the Bank, comprising the ADF Loan, 80% was disbursed and the remainder was cancelled following project saving due to transmission route optimization for the construction of the MV and LV distribution lines. The project further constructed Overall, resources for the project implementation were efficiently utilized.</p>			

3. Cost benefit analysis

Economic Rate of Return (at appraisal) (A)	Updated Economic Rate of Return (at completion) (B)	Ratio of the Economic Rate of Return at completion and at appraisal (B/A)	Rating*
28%	42%	1.5	4
Narrative assessment (indicative max length: 250 words)			
<p>At Appraisal stage, the PAR provided detailed discussion of the economic rate of return analysis, including the sensitivity analysis to confirm the robustness of the economic profitability of the project. However, the EIRR sensitivity was based on very limited parameters notably change in investment costs and expected benefits from the project. Under worst case scenario (investment costs), the project cost is still viable at 28% which is above the the long-term opportunity cost of capital of 12% to Ghana . However, the analysis did not provide the quantitative inputs to the stream of benefits estimation such as (i) incremental energy transmitted to ECG by VRA at the project Bulk Supply Points; and (ii) Energy saved in the distribution system at the precise distribution upgrade points. The EIRR has been re-evaluated for the PCR and reflects a favourable EIRR at 42% compared to the appraisal estimate. The achievement of favourable variance is as a result of (i) (ii) actual observed values of savings in line and transformer losses at 10% from 24%,(ii) reduction in forced outage rates from 700hrs to 98hrs; (iii) and reductions in forced outage rates; (iii) increased connection of commercial and industrial consumers which has an impact on job creation thus increased disposable income; and (iv) use of willingness to-pay as the measure of the benefits, as opposed to use tariffs as proxy. The analysis confirm the economic benefits to the Kumasi population is achieved.</p>			

4. Implementation Progress (IP)

IP Rating (derived from updated IPR) *	Narrative comments (commenting specifically on those IP items that were rated Unsatisfactory or Highly Unsatisfactory, as per last IPR). (indicative max length: 500 words)
3	<p>At appraisal, the project was estimated to be implemented over 20 months years from the date of loan effectiveness. However, reaching loan effectiveness became a challenge due to the condition precedent relating to compensation of project affected persons which delayed the project for over 3 years as well as the Bank's No Objection for first disbursement of site preparation contract significantly delayed subsequent works for the construction of a new 161/34.5kV Substation by 12 months. Furthermore the main contractor for the construction of the ECG MV/LV substations change his sub-contractors midway through implementation. However, implementation gained fast pace, and proceeded smoothly thereafter due to the strong implementation arrangement by the executing agencies ECG and VRA under the supervision of the project implementation unit – GEDAP. Disbursements from the Bank loan begun in July 2010 and reached 50% disbursement level by March 2012. Quarterly progress reports prepared by the GEDAP Secretariat and inputs from ECG and VRA as well as contractors were used by Government to monitor implementation progress. By December 2014 the project was 75% completed, and 100% at end-2015. The quality of the physical works at completion is high and of acceptable standard. Bank financing was 80% disbursed, and the remainder was cancelled due to project savings related to project re-design and transmission route optimization of the MV and LV distribution lines. Compliance with environmental and social safeguards was met.</p>

5. Lessons learned related to efficiency

Key issues (max 5, add rows as needed)	Lessons learned	Target audience
1. Compensation as a Condition Precedent to Loan Effectiveness	1. Complete payment of compensation which was included as a Condition Precedent for the Loan should have been managed as part of the project costs and not as a condition to loan effectiveness which in this case delayed the project by 3 years.	Bank/GoG
2. Approval of No Objections	2. The delay in No Objection could negatively impact significant components of a project. The No Objections should be included as part of the project implementation schedule.	Bank
3. Sensitization and Awareness of Project to Local Population	3. Several delays were occasioned by the general public not appreciating the impact of the project on their business as a result significant delays were occasioned by small business owners refusing to give front access to the Main contractor during weekdays and latter resolving to work on Sundays and Public Holidays. A sensitization program should have been published in the local dailies and consultations with persons in crowded areas like market places given priority to explain the benefits of the project	GoG
4. Project Savings Reallocated	Project should not be penalized for project savings by cancellation of amounts, however, the respective amounts should be identified upon 50 – 60% completion of project and application to re-allocate the same requested from the borrowing agency and Bank	Bank/GoG

1. Financial sustainability

Rating*	Narrative assessment (indicative max length: 250 words)
3	<p>Financial sustainability of the project cannot be conclusively assessed independently since it is an integral part of the utility network, however, the increased transmission capacity from 149MW to 345MW , reduced number of outages from 700hrs p.a. to 98 hrs p.a., increased the transformer capacity from 13275kVA to 25425 kVA, additional connections targeting commercial and industrial uses and significant reduction in technical losses from 29% to 10%, can only relate to increased revenues for ECG in Kumasi. Subsequently, the key factors are efficiency of operations, the adequacy of available financial resources, dependent on electricity tariffs, to adequately maintain the power system.</p> <p>ECG through its own Engineering Directorate has since 2016 performed the first realibility assessment of the Kumasi network conducted in house. This being an annual exercise going forward, will provide an overview of the operating status of the Kumasi network and assesses whether it meets industry-level minimum reliability standards; a reflection of its ability to reliably supply power to customers to meet annual forecasted peak load and energy requirements. This translates to monitoring of the performance of the network and subsequently implement network interventions aimed at providing quality and reliable power supply to customers which further ensures predictable and stable revenue stream for ECG and VRA.</p> <p>Furthermore, ECG has established a Revenue Protection Unit with support from the Ghana Police Service and the Attorney General’s Department to intensively work and arrest those people involved in illegal connection.</p> <p>With increased efforts to ensure increased revenue collection and addressing electricity theft, it can be noted that ECG has put in place robust mechanism for financial sustainability of the project that are very likely to ensure the continued flow of benefits associated with the project after completion</p>

2. Institutional sustainability and strengthening of capacities

Rating*	Narrative assessment (indicative max length: 250 words)
4	<p>There were no specific institutional capacity building components under the project. However, the capacity building component was undertaken by the World Bank, the Swiss Secretariat for Economic Affairs (SECO), Global Environment Fund (GEF), Africa Catalytic Growth Fund (ACGF) and the Global Partnership on Output Based Aid (GPOBA) as part of the Ghana Energy Development and Access Program (GEDAP).</p> <p>However, under the project, an additional outcome was the adjustment of the project design to incorporated the provision of a Power System Simulator supplied and installed at the Kumasi Second Bulk Supply Point (K2BSP) site. The PSS shall be used for the training of VRA, GRIDCo, ECG personnel and engineering students from the Kwame Nkrumah University of Science and Technology (KNUST) on the management and operations of Ghana’s power system.</p>

3. Ownership and sustainability of partnerships

Rating*	Narrative assessment (indicative max length: 250 words)
3	<p>Government was actively involved through Ministry of Finance, Ministry of Energy, VRA, ECG, PURC, civil society and community leaders in the project from identification, through design to implementation shows the participatory process followed by the Bank. Government showed its ownership of the project, by playing the leadership role on the schemes involving resettlement and compensation of project affected persons.</p> <p>VRA and ECG as project beneficiaries under the support of the GEDAP secretariat took the responsibility for the overall implementation and management of the project and contributed about 12.5% of the total financing for the project. Bank supervision missions conducted close consultations with Government and VRA, ECG and GEDAP Secretariat in resolving implementation issues to accelerate progress. Supervision missions also held consultations with other development partners co-financing the Ghana Energy Development and Access Program (GEDAP) notably the World Bank, the Swiss Secretariat for Economic Affairs (SECO), Global Environment Fund (GEF), Africa Catalytic Growth Fund (ACGF) and the Global Partnership on Output Based Aid (GPOBA). The project was catalytic in the subsequent support provided by the Bank for the identification of a follow-on project the Electricity Distribution System Reinforcement and Extension Project (EDSREP) in 2015, which incorporated the lessons from this project. Going forward, the partnership between Government and the Bank and with the other development partners has been further strengthened as a result of the project.</p>

4. Environmental and social sustainability

Rating*	Narrative assessment (indicative max length: 250 words)
3	<p>The project was classified as category (II) for environmental impacts. The Bank's Integrated Safeguards System was applied and based on its environmental policy requirements, an environmental and social management plan (ESMP) was prepared. Although the transmission line route was selected to minimize resettlement impacts, 82 persons were affected along the route, with 12 requiring resettlement. The lands expropriated for the substation sites covered approximately 7.3 ha and 31 farmers of various food crops such as plantain, cassava, sugar cane and vegetables as well as cash crops like oil palm and mangoes affected. ECG's and VRA's Environmental Officers were tasked to oversee and report all monitoring activities to the appropriate quarters of their institutions. However, the project faced significant challenges and delays in resettlement and compensation of affected persons due to issues in determining the value of land and identifying the rightful land owners. The expected support from the Land Administration office was not fully effective. Nonetheless, compensation in kind for the BSP in Kumasi which involved the KNUST benefiting from use of the Power System Simulator was a deal breaker for the go ahead of the construction.</p>

5. Lessons learned related to sustainability

Key issues (max 5, add rows as needed)	Lessons learned	Target audience
Lack of basis of assessing financial sustainability	It is necessary for this kind of project that a detailed financial analysis and projection of future financial performance for Bank appraisal team, combined with ECG/VRA's assessment of the potential for the financial sustainability of the utility and the implications for the project	GoG/Bank
No specific capacity building initiatives were proposed under the project	Cognisant that the project benefited from an additional outcome i.e. the Power System Simulator, specific capacity building components should be incorporated in continuous training of utility staff in new and innovative areas of technical operations and management.	GoG/Bank

III Performance of stakeholders

1. Bank performance

Rating*	Narrative assessment by the Borrower on the Bank's performance, as well as any other aspects of the project (both quantitative and qualitative). See guidance note on issues to cover. (indicative max length: 250 words)	
	<p>From project preparation to approval the Bank performance was considered satisfactory, supported by strong and consistent dialogue with authorities, beneficiaries and development partners. However, the Bank's condition precedent that all project affected persons are compensated before the loan is deemed effective, delayed the project commencement by two years from signature date March 2008 (effective date June 2010). The detailed requirements of the project were well established prior to start of procurement, however, the respective indicators stated in the Results Log Frame (RLF) for assessing progress towards the project outcomes should have incorporated gender and job creation as a sustainable measure on the projects beneficiaries. The detailed analysis of financial performance needed to be have a robust sensitivity analysis based on project risks and not just increase or decrease of "investment costs". Overall assessment during project implementation was Satisfactory.</p>	
	<p>Comments to be inserted by the Bank on its own performance (both quantitative and qualitative). See guidance note on issues to cover. (indicative max length: 250 words)</p>	
	<p>The approval of first disbursement by the Bank affected contracts package - P1 which involved the design and construction of the substation embankment as a result significantly impacted the commencement of the Package - P3 contract that involved the construction of a new 161/34.5kV Substation. Subsequently, delay in response to request for No Objections by the Bank significantly delayed implementation thus resulting at times to claims by contractors. Furthermore the change of Task Managers (3 Task Managers between 2015-2016) significantly impacted the project in terms of succession planning.</p>	
Key issues (related to Bank performance, max 5, add rows as needed)	Lessons learned	
1. Compensation as a Condition Precedent to Loan Effectiveness	1. Complete payment of compensation which was included as a Condition Precedent for the Loan should have been managed as part of the project costs and not as a condition to loan effectiveness which in this case delayed the project by 3 years.	
2. Change of Task Managers	Due to change of Task Managers (3 TMs between 2008-2014), backlog of No Objections delayed the project significantly, in this regard, Alternate TMs should be identified to ensure continuity incase the Lead TM moves departments.	

2. Borrower performance

Rating*	Narrative assessment on the Borrower performance to be inserted by the Bank (both quantitative and qualitative, depending on available information). See guidance note. (indicative max length: 250 words)	
3	<p>The Borrower and Beneficiary were committed to the project from the outset. Formalities on the part of Government for loan signing, was expeditiously completed, however, declaration of effectiveness was significantly delayed due to compensation issues and Land Administration office in valuation and pricing of the identified properties. ere significantly delayed.</p> <p>A GEDAP Steering Committee, chaired by the Minister of Energy, was established to ensure overall project coordination. The Steering Committee consisted of representatives of the Ministry of Energy, VRA, ECG, the Public Utilities Regulatory Commission, the Energy Commission, the Environmental Protection Agency (EPA) and the Ministry of Finance and Economic Planning. Expeditious action was taken on addressing issues, such</p>	

<p>as request for extensions, and mission recommendations that required Borrower and Beneficiary attention. Environmental and social management plan were complied with, project annual audits conducted.</p>	
<p>Comments to be inserted by the Borrower on its own performance (both quantitative and qualitative). See guidance note on issues to cover. (indicative max length: 250 words)</p>	
<p>The Borrower performance was generally satisfactory in terms of compliance with the reporting requirements under the project. Quarterly financial reports showing use of funds and the audit report with the audit carried out were submitted to the Bank though with some delays</p>	
<p>Key issues (related to Borrower performance, max 5, add rows as needed)</p>	<p>Lessons learned</p>
<p>1. Monitoring of project implementation</p>	<p>1. It should be established that the Borrower should continue to periodically inform the Bank with a summary M&E on progress of the agreed target indicators in the RBLF and clarify those off-track. This will ensure possible enhancements or additional works are undertaken where the project realises savings to avoid cancelation of unallocated amounts due to project completion.</p>

3. Performance of other stakeholders

<p>Rating*</p>	<p>Narrative assessment on the performance of other stakeholders, including co-financiers, contractors and service providers. See guidance note on issues to cover. (indicative max length: 250 words)</p>	
<p>3</p>	<p>No other co-financiers were involved in the project apart from the counterpart funding by VRA and ECG. However, delays from Land Valuation Authority in the release of valuation Reports for payment to Project Affected People affected the release of funds for payment of compensation. This subsequently delayed to achievement of Condition Precedent for Loan Effectiveness. The change of sub-contractor initially contracted by the Main contractor due to non performance and appointment of three new replacement sub-contractors for the 33Kv/11Kv substations further delayed implementation. However, the terms and conditions under the contracts were adhered to, and quality of work met accepted industry standards for the construction of substations and distribution lines.</p>	
<p>Key issues (related to performance of other stakeholders, max 5, add rows as needed)</p>	<p>Lessons learned (max 5)</p>	<p>Target audience (for lessons learned)</p>
<p>1. The BSP contractor change the sub-contractor during implementation due to non performance and had to recruit three other sub-contractors and divided the work in Lots to address the delays in project implementation schedule.</p>	<p>1. Contractors should not rely on one sub-contractor for major works, however, should ensure the respective implementation is divided in LOTS to avoid losing time incase of non-performance of the sub-contractors.</p>	<p>Bank/GoG</p>

IV Summary of key lessons learned and recommendations

1. Key lessons learned

Key issues (max 5, add rows as needed)	Key lessons learned	Target audience
Compensation as a Condition Precedent to Loan Effectiveness	1. Complete payment of compensation which was included as a Condition Precedent for the Loan should have been managed as part of the project costs and not as a condition to loan effectiveness which in this case delayed the project by 3 years.	Bank
Approval of No Objections	2. The delay in No Objection could negatively impact significant components of a project. The No Objections should be included as part of the project implementation schedule.	Bank
Sensitization and Awareness of Project to Local Population	3. Several delays were occasioned by the general public not appreciating the impact of the project on their business as a result significant delays were occasioned by small business owners refusing to give front access to the Main contractor during weekdays and latter resolving to work on Sundays and Public Holidays. A sensitization program should have been published in the local dailies and consultations with persons in crowded areas like market places given priority to explain the benefits of the project	Bank/GoG
4.Project Savings Reallocated	Project should not be penalized for project savings by cancellation of amounts, however, the respective amounts should be identified upon 50 – 60% completion of project and application to re-allocate the same requested from the borrowing agency and Bank	GoG
2. Change of Task Managers	Due to change of Task Managers (3 TMs between 2008-2014), backlog of No Objections delayed the project significantly, in this regard, Alternate TMs should be identified to ensure continuity incase the Lead TM moves departments.	Bank
Design targets indicators for Gender and Job creation	Specific targets for gender inclusivity and job creation should be an intergral feature of all power system projects. Thiw will inform the level of Technical assistance geared toward enhacement of technical skills for women and youth with an interest in pursuing engineering.	Bank
Design gender mainstreaming program targeting technical skills enhancement for women.	Due to lack of women in the engineering field, the project should have incorporated a Technical Assistance component for the university and secondary schools such as the Science, Technology, Engineering, and Mathematics (STEM) program to encourage and create interests for future women engineers.	Bank/GoG

Unbundling of VRA	During implementation the VRA was unbundled to Gridco, however, the unbundling did not affect the implementation of the project because key personnel who undertook the front end engineering were retained until project completion. Therefore, subsequent unbundling of utilities should not affect committed projects due to transfer of staff already handling those projects.	Bank/GoG
Retaining of Key Staff after Unbundling	VRA retained key staff following unbundling that established GRIDCo as part of the project implementation unit which handles the NEPCO transmission projects. In this regard, stability and consistency of the project implementation unit is key to successful completion of project during a reform period to ensure successful completion of projects and achievement of developmental objectives.	Bank/GoG
Ownership of Project Design (Front end engineering)	VRA undertook the front end engineering using in-house engineers to ensure ownership from design stage and ensure close supervision of the implementation of the EPC contractor which includes detailed design as part of its scope. In this regard, utilities should be encouraged to define the respective design scope inhouse based on skills available and take the lead in supervision as part of skills transfer to undertake future projects of similar nature.	Bank/GoG

2. Key recommendations (with particular emphasis on ensuring sustainability of project benefits)

Key issue (max 10, add rows as needed)	Key recommendation	Responsible	Deadline
Lack of basis of assessing financial sustainability	It is necessary for this kind of project that a detailed financial analysis and projection of future financial performance for Bank appraisal team, combined with ECG/VRA's assessment of the potential for the financial sustainability of the utility and the implications for the project	GoG/Bank	N/A
No specific capacity building initiatives were proposed under the project	Cognisant that the project benefited from an additional outcome i.e. the Power System Simulator, specific capacity building components should be incorporated in continuous training of utility staff in new and innovative areas of technical operations and management.	GoG/Bank	N/A

V Overall PCR rating

Dimensions and criteria	Rating*
DIMENSION A: RELEVANCE	
Relevance of project development objective (II.A.1)	3
Relevance of project design (II.A.2)	3
DIMENSION B: EFFECTIVENESS	
Development Objective (DO) (II.B.4)	4
DIMENSION C: EFFICIENCY	
Timeliness (II.C.1)	2
Resource use efficiency (II.C.2)	4
Cost-benefit analysis (II.C.3)	4
Implementation Progress (IP) (II.C.4)	3
DIMENSION D: SUSTAINABILITY	
Financial sustainability (II.D.1)	3
Institutional sustainability and strengthening of capacities (II.D.2)	4
Ownership and sustainability of partnerships (II.D.3)	3
Environmental and social sustainability (II.D.4)	3
AVERAGE OF THE DIMENSION RATINGS	3.27
OVERALL PROJECT COMPLETION RATING	3

VI Acronyms and abbreviations

Acronym (add rows as needed)	Full name
ADF	African Development Fund
ACGF	Africa Catalytic Growth Fund
BSP	Bulk Supply Point
CSP	Country Strategy Paper
ECG	Electricity Company of Ghana
EDSREP	Electricity Distribution System Reinforcement and Extension Project
EIRR	Economic Internal Rate of Return
EPA	Environmental Protection Agency
ESDP	Energy Strategy and Development Plan
ESMP	Environmental and Social Management Plan
GEDAP	Ghana Energy Development and Access Program
GEF	Global Environment Fund
GhIE	Ghana Institution of Engineers
GJAS	Ghana Joint Assistance Strategy
GoG	Government of Ghana
GPOBA	Global Partnership on Output Based Aid
GRIDCO	Ghana Grid Company
GSGDA	Ghana Shared Growth and Development Agenda
KNUST	Kwame Nkrumah University of Science and Technology
LV	Low Voltage
MV	Medium Voltage
PRSP	Power System Reinforcement Project
VRA	Volta River Authority
WIE	Women in Engineering
UA	Unit of Account
USD	United States Dollar
RLF	Result Logic Framework
ROW	Right of Way
SECO	Swiss Secretariat for Economic Affairs
STEM	Science, Technology, Engineering, and Mathematics