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Report No: 22417

IMPLEMENTATION COMPLETION REPORT
(24670)

ON A

CREDIT

IN THE AMOUNT OF US\$80 MILLION

TO THE

GOVERNMENT OF GHANA/ECG/VRA

FOR A

NATIONAL ELECTRICIFICATION PROJECT (CREDIT 2467-GH)

June 29, 2001

**Energy Unit
Africa Region**

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CURRENCY EQUIVALENTS

(Exchange Rate Effective)

Currency Unit = Cedi

Cedi 1.00 = US\$.0001

US\$ 1.00 = Cedi 7200

FISCAL YEAR

January to December

ABBREVIATIONS AND ACRONYMS

CCCE (AFD)	Caisse Centrale de Cooperation Economique
DANIDA	Danish International Development Agency
ECG	Electricity Corporation of Ghana
GoG	Government of Ghana
IDA	International Development Association
MOE	Ministry of Energy
NED	Northern Electricity Department
NEF	Northern Electrification Fund
NEPS	Northern Electrification Planning Study
NES	National Electrification Scheme
PURC	Public Utilities Regulatory Commission
SAR	Staff Appraisal Report
VRA	Volta River Authority

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IMPLEMENTATION COMPLETION REPORT GHANA: NATIONAL ELECTRIFICATION PROJECT (CREDIT-2467-GH)

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<i>Project ID:</i> P000953	<i>Project Name:</i> NAT'L ELECTRIFICATION
<i>Team Leader:</i> Joel J. Maweni	<i>TL Unit:</i> AFTG1
<i>ICR Type:</i> Core ICR	<i>Report Date:</i> June 29, 2001

1. Project Data

Name: NAT'L ELECTRIFICATION *L/C/TF Number:* 24670
Country/Department: GHANA *Region:* Africa Regional Office
Sector/subsector: PD - Distribution & Transmission

KEY DATES

	<i>Original</i>	<i>Revised/Actual</i>
<i>PCD:</i> 02/22/91	<i>Effective:</i>	04/15/94
<i>Appraisal:</i> 08/05/92	<i>MTR:</i> 05/15/98	05/15/98
<i>Approval:</i> 03/04/93	<i>Closing:</i> 09/30/98	03/31/2000

Borrower/Implementing Agency: GOVT OF GHANA/ECG; VRA
Other Partners: DANIDA, AFD, Netherlands

STAFF	Current	At Appraisal
<i>Vice President:</i>	Callisto E. Madavo	Kim Jaycox
<i>Country Manager:</i>	Peter C. Harrold	Edwin Lim
<i>Sector Manager:</i>	Ananda Covindassamy	Mary Oakes Smith
<i>Team Leader at ICR:</i>	Joel Maweni	Jahangir Boroumand
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2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: S
Sustainability: UN
Institutional Development Impact: N
Bank Performance: S
Borrower Performance: U

QAG (if available) ICR
Quality at Entry: S
Project at Risk at Any Time: No

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

3.1.1 The project objectives as stated in the Staff Appraisal Report (SAR) were to: (a) enable the Government to provide electricity from the national grid to small urban centers, district capitals and rural areas through a systematic electrification program; (b) improve service reliability in the Electricity Company of Ghana's (ECG) existing network; and (c) improve ECG's operational efficiency by assisting it

to reform and strengthen its commercial operations.

Assessment of Objectives:

3.1.2 The development objectives were clear and realistic. They were also important for the power sector development of Ghana and responsive to the circumstances and development priorities of the country and the Country Assistance Strategy. Following the rehabilitation and improvement of Ghana's generation and distribution facilities, the National Electrification Project (NEP) was devised to develop a sound national electrification program and to extend the social and developmental benefits of power supply to more of the population.

3.2 Revised Objective:

N/A

3.3 Original Components:

3.3.1 The Project included the following components:

3.3.2 **National Electrification Component (Cost- US\$124.0 million):** This component comprised: (a) construction of about 2,200 km (1,000 km for VRA and 1200 km for ECG) of medium-voltage (33kV and 11kV) and low voltage (400 kV) lines, and installation of distribution transformers, circuit breakers, auto reclosers and other related electrical equipment; (b) construction of about 119,000 household connections (Service Drops); (c) construction of service centers required to operate and maintain the power system at the district level; (d) the supply of vehicles, tools, and specialized equipment for construction supervision, operation and maintenance of the distribution network in the new areas; and (e) consultants services for distribution engineering design, bid preparation and evaluation, and construction management (including stock management and construction supervision) and design and implementation of a pilot program for productive uses of electricity. These construction works and the accompanying consultants services were intended to connect about 434 communities located in all 10 regions of the country to the main grid, including connection of about 119,000 consumers.

3.3.3 **Distribution Reinforcement Component (Cost - US\$31.6 million):** This component implemented a time slice of approximately three years of distribution works needed to expand sub-stations, build or replace major links between sub-stations, and to continue the loss reduction program.

3.3.4 **Management Contract (Cost- US\$5.0 million):** This component was designed to meet the objective of improving ECG's operational efficiency by assisting it to reform and strengthen its commercial operations. As such, a performance-based management contract was to be entered between ECG and a utility/consulting firm under which the contractor assisted ECG to strengthen its commercial services, particularly line loss reduction and collection of revenues. Also, a Consumer Services Directorate was created to provide a central point for management of all customer services.

3.3.5 **Training and Studies (Cost-US\$5.6 million):** Training and studies were to be provided to support the utilities in the following areas: (a) staff development programs with special attention to the training requirements of staff to be responsible for the operation of the new systems; (b) a study to design, develop, and implement a pilot demonstration program for promoting productive uses of electricity; and (c) a study of the scheme of services of power sector utilities.

Assessment of Original Components:

3.3.6 Overall. All the project components were designed to fully align with the objectives of the project and were within the technical, financial and management implementation capacity of the executing agencies. The design of the components also incorporated the lessons learned from previous operations in the sector and from Bank-financed projects in other countries.

3.3.7 The National Electrification Component. Since the late 1980's a major development goal of the Ghanaian government was to provide electricity to most of the population, by extending the interconnected transmission grid to small towns and rural areas under a National Electrification Scheme (NES). In order to establish a sound framework for development of the NES, including appropriate policies and standards, and to identify priority programs for extension of the grid, a National Electrification Planning Study (NEPS) had been carried out with IDA financing under the Fifth Power Project (Cr. 2061-GH). The national electrification component was designed on the basis of the results of the NEPS and was considered as the first phase of the NES. The component targeted the connection to the interconnected system of all the district capitals that were not supplied from the grid, and other identified communities. The component was therefore designed to fully align with the Government's developmental goal of increasing the population's access to electricity so as to achieve balanced economic growth.

3.3.8 The design of the component envisaged that the project was to be implemented by the Volta River Authority (VRA) and ECG. In addition to generating and selling electricity to ECG and bulk consumers, VRA also distributes power in northern Ghana while ECG is a distributor in the southern part of the country. Institutionally both utilities were well placed to implement the project, having acquired expertise and experience in designing and implementing similar projects, and in managing consultants over a long period of time. At the time ECG was also trying to upgrade the skill-mix of its staff through better recruitment, training and human resource policies—hence the project reinforced the ongoing process of institutional strengthening in the utility. VRA had a finance department staffed with competent professionals and its financial performance was sound at the time of project preparation. While ECG's financial performance was less satisfactory, it had just completed documenting its accounting policies, system and procedures in an Accounting Manual in 1993, as part of the process of strengthening financial management.

3.3.9 The Distribution Reinforcement Component. Rehabilitation of the distribution system had been identified as a major priority for improving service reliability; and funding had been provided under the Fifth Power Project. However, because of larger than expected growth in demand, a distribution system reinforcement component was included in this project. The component included expansion of substations and building or replacing major links between substations. The component was implemented by the same project organization structure established for the execution of the Fifth Power Project which had worked satisfactorily under the supervision of ECG's Director of Engineering. The implementation arrangements included continuation of consultants' supervision support from the same consultants that were assisting ECG with implementation of the Fifth Power Project. In addition, also with support under the Fifth Power Project, ECG had improved its stores and materials management systems which were to be used for handling materials procured for this component. Thus, institutionally, administratively and technically, ECG had the requisite capacity to implement the project efficiently and to sustain the operations.

3.3.10 The Management Contract Component. At the time of project preparation it was recognized that one of the principal issues facing the power sector was the need to strengthen ECG's commercial operations (i.e. metering, billing and revenue collections). In line with the Government's policy then of commercializing the operations of ECG, it was decided to strengthen ECG's operations in these areas through the involvement of the private sector. The management contract component was designed to

implement this commercialization approach through: (i) creation of a new Consumer Services Directorate, to concentrate all the commercial and technical activities required to provide efficient services to all types of consumers, and (ii) contracting of a qualified utility and/or a utility consulting firm to manage ECG's new Consumer Services Directorate under a performance-based management contract for a period of three years. The design of the component was consistent with the commercialization policy and the specific project objectives of improving commercial operations. However, the project design, by giving the management contractor limited control over aspects of the company's operations, denied him the ability to affect important variables influencing the achievement of the contractual targets. In addition, given the difficulty of establishing the baseline level of system losses, an alternative could have been to base payments to the contractor on the amount of energy paid for.

3.3.11 The Training and Studies Component. The areas for training and studies were identified in light of the needs for ECG to improve organizational capacity, and the activities were directly aimed at improving ECG's operational efficiency by assisting ECG to reform and strengthen its commercial operations. The component was therefore complementary to the management contract component and reinforced ECG's capacity to implement the national electrification and distribution systems reinforcement components.

3.4 Revised Components:

N/A

3.5 Quality at Entry:

3.5.1 Overall, the project's Quality at Entry was satisfactory. The project objectives were consistent with both Government's developmental strategy for the sector and with the Bank's Country Assistance Strategy. The Government was committed to accelerated growth and poverty reduction and to the policy program needed to achieve it. Major elements of the developmental strategy included reform of public enterprises sector and investment in infrastructure to remove constraints to growth. The policy strategy for the energy sector had been articulated in a GoG document entitled " Energy and Ghana's Socio-Economic Development " and in the Energy Sector Review prepared by the Bank in 1992. These documents identified the following energy sector priorities: (i) reduce the cost of energy supplies to the economy through rehabilitation and proper maintenance of installations in the petroleum and electricity sub-sectors; (ii) reduce dependence on petroleum imports through promotion of more efficient energy use; (iii) improve forestry management to provide an adequate long-term supply of fuelwood; and (iv) strengthen sector institutions through a program of public enterprise reform focusing on commercialization. The project design addressed priorities (i) and (iv) through the national electrification and distribution reinforcement components; and the management contract and the training and studies components respectively. Thus, in terms of addressing the Government's developmental and sector strategies, the quality at entry was satisfactory.

3.5.2 The project was designed based on the investment program defined under an IDA-financed National Electrification Planning Study (NEPS) and past experiences in Ghana and other countries. The quality of the project design was satisfactory. One of the critical assumptions for the project was a sufficient level of demand to match the incremental electricity supply. Also, the project had identified inadequate and untimely tariff increases as one of the risks associated with the project implementation. Unfortunately, inadequate and untimely tariff increases were one of the reasons for the delay in project implementation. However, the assumptions about relevant external factors were adequate and reasonable.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

4.1.1 The outcome of the physical components was satisfactory while that of the institutional components was marginally satisfactory. Overall the outcome of the project is considered satisfactory. The ratings for the individual objectives are assessed as follows:

Objective 1: Enable the Government to provide electricity from the national grid to small urban centers and rural areas, district capitals and rural areas through a systematic electrification program--Satisfactory.

Objective 2: Improve service reliability in the existing ECG's network--Satisfactory.

Objective 3: Improve ECG's operational efficiency by assisting ECG to reform and strengthen its commercial operations-marginally satisfactory.

4.1.2 The physical outcome of the electrification program was satisfactory because the project was successful in providing electricity to small urban centers, district capitals and rural areas. The success was achieved despite the unanticipated shortage of construction materials which emerged during implementation of the program. The project also improved the service reliability in the existing ECG's network through rehabilitating the power system. The economic analysis for major components of the project showed a positive net present value when discounted at 10%. However, the improvement for ECG's operational efficiency was marginal because the performance targets for the management contract were not met and the moderate improvements in customer service started to reverse after the departure of the management contractor.

4.2 Outputs by components:

4.2.1 **National Electrification Component.** With the completion of the project, all the District capitals in the country have been connected to the grid. The number of towns connected and the number of new service connections developed under the project are summarized in the following table.

	Planned	Achieved
Number of communities electrified	434	432
Number of customers connected	119,000	89,382

4.2.2 The Project electrified more than 99% of the communities that were planned. However, the achievement in the number of customers that were connected was moderate, especially in the Northern region. This is due to the ethnic conflict which affected areas covering 20 towns out of 48 towns electrified in the region. The conflict resulted in relocation of people from the area, damage to houses, and disruption of economic activities. However, at the time of project completion, people were resettled and economic activities resumed. Thus, the number of connected customers and the consumption of electricity are increasing.

4.2.3 The district offices and service centers were constructed in the areas covered under the project in the ECG operational area. While none was constructed in the VRA operational area, rented facilities were

used for customer support. Vehicles and motorcycles that were required by VRA for the centers could not be obtained due to the delay in the commencement of the procurement process. Spare parts and communication equipment were provided for the maintenance and operation of the new networks.

4.2.4 The innovative technology of using the shieldwires of the 161 kV transmission lines to carry power was applied to serve 14 communities in the Brong Ahafo and Northern regions. The use of the shieldwires enabled reductions in investment cost of about 50 percent compared to conventional technology. Therefore, in the design of a rural energy strategy which is contemplated as part of the ongoing sector reform program, issues of technology and standards will be addressed, taking into account the experience gained from this operation.

4.2.5 **Distribution Reinforcement Component.** The work carried out under the component comprised network rehabilitation, network reinforcement and extension of LV networks and a small number of new lines supplied to some villages in order to improve reliability of ECG's network. Substation links, substation expansion and rehabilitation works involving 12 33/11kV substations of total capacity of 175 MVA (including associated equipment) were carried out in Accra, Tema, Kumasi, Takoradi, and other towns. A 161/34.5kV, 13.3 MVA sub-station with seven radial sub-transmission lines was constructed at Yendi in the Northern Region. The sub-station is equipped for a possible extension to central Togo. Some of the distribution construction work carried out under the component was executed using local installation contractors.

4.2.6 **Management Contract.** In order to achieve the improvement in the ECG's operational efficiency and strengthen its commercial operations, a performance-based management contract was executed. At the end of the contract the management contractor's evaluation report recorded the following achievements:

- Commercial loss reduced by 3%;
- Debtor/sales ratio decreased from 198 days to 109 days;
- An organizational structure for decentralized and efficient customer service was established. It is capable of serving an additional 200,000 - customers out of the ECG's customer base of about 700,000; and
- Accurate bills can be produced before the next month's meter reading is undertaken.

4.2.7 Despite the contractors' reported progress, the overall outcome of this assignment was marginally satisfactory because: (i) system losses were at 21 percent at the end of the contract period instead of the target level of 18 percent; (ii) the contract had been designed to be self-financing, but it was assessed that the productivity gains had been less than the cost of the commercial loan used to finance the contract; (iii) the infrastructure set up in the Consumer Services Department (including the human expertise, management procedures and incentives) has not been effective to maintain or improve commercial performance in the period after the management contract. With respect to system losses, the baseline percentage had been assessed at 21 percent, but during implementation several problems with metering were encountered which suggested that the actual *initial* losses may have been higher at about 24 percent—hence the consultant's estimate of a 3 percent reduction during the implementation period.

4.2.8 Other aspects of the institutional components were more successful. These were the pilot program for pre-payment metering and the training and studies. The pilot program to introduce a pre-payment metering system in the VRA/NED operational area was successfully executed in the four regional capitals of Sunyani, Tamale, Wa, and Bologatanga. Staff training in finance, audit system planning and utility management was partly completed. Some of ECG's senior management visited foreign utilities to become familiar with divestiture and utility management programs. Other ECG engineering staff were attached to

the international consultant who updated the electrification plan and ECG's technical specifications for distribution works. Although the design and implementation of a pilot program to promote productive uses of electricity was not implemented, it is being undertaken as an integral part of the implementation of the EC funded rural electrification for the Western Region, which commenced in June, 2000.

4.3 Net Present Value/Economic rate of return:

4.3.1 At appraisal, the economic internal rate of return (EIRR) was estimated for major sub-projects for VRA's and ECG's investment programs. Since the project encountered the unexpected shortage of construction materials and other factors, the implementation of the investment program was delayed substantially. Thus, the EIRRs were calculated based on the revised time-slice. In spite of the delay in project implementation, the actual EIRRs are higher than the appraisal estimates due to substantially lower costs and larger electricity consumption than originally anticipated.

The table compares the EIRRs at appraisal and completion for major sub-projects:

Region	EIRR at appraisal	EIRR at completion
Northern Region	5.5 %	8.3 %
Brong Ahafo Region	12.6 %	16.7 %
Eastern Region	12.7 %	29.7 %
Western Region	13.5 %	19.7 %

4.4 Financial rate of return:

N/A

4.5 Institutional development impact:

4.5.1 The project promoted substantial institutional development through all the four main components. However, as already noted above, the institutional development under the management contract component was less than expected, especially as the marginal improvements in key commercial performance indicators started to reverse after the departure of the contractor. The transfer of knowledge and expertise from the consultants for the national electrification and distribution reinforcement components had more beneficial impact on capacity building, especially in ECG's engineering function. In addition, some of the contracts under the Distribution Reinforcement Component were implemented using local contractors in all the regions, thus promoting the development of local capacity in distribution network construction. This capacity will enable the local contractors to contribute to the future development of the network.

4.5.2 In the financial arena, performance has been disappointing. At appraisal, financial performance targets had been set requiring VRA and ECG to achieve: (i) rates of return on revalued assets of at least 8% annually; and (ii) debt service coverage ratios of at least 1.5 times. In addition, ECG was expected to reduce and maintain its accounts receivable at no higher than 45 days sales revenue. Although several tariff increases were implemented during the project period, the increases were delayed and inadequate to compensate for the adverse impacts caused by devaluation and inflation. For a while the formulation and implementation of a financial recovery plan (FRP) in 1998 held the promise for the sector's return to financial viability. However, while the financial restructuring component of the recovery plan was partially implemented, the tariff component was not pursued after the initial increases in 1998, despite a depreciation of the Cedi amounting of about 300 percent in 1999 and 2000. The Public Utilities Regulatory

Commission (PURC) which had been established in 1997 and considered key to achieving cost-reflective tariffs was reluctant to adjust tariffs in the two years preceding the Presidential and Parliamentary elections at the end of 2000. Recently the PURC approved an average tariff increase of about 100 percent to take effect from May 1, 2001. It is expected that the PURC will soon finalize proposals for subsequent tariff increases to bring the average tariff to cost recovery levels.

4.5.3 Although the Project itself cannot be credited, GoG took various actions for overall sector reform during the project implementation period. Based on the President's document "Ghana -Vision 2020 (The First Step: 1996-2000)", GoG launched an economic development policy aimed at stabilizing the macro-economic environment and building a foundation for private sector led economic growth. GoG also announced the "Statement of Power Sector Development Policy" and initiated a power sector reform program. The implementation of the program including the divestiture of ECG and the unbundling of VRA has been delayed primarily because of the slow progress in adjusting tariffs to cost recovery levels and the muted commitment of the previous administration. The new administration had indicated its commitment to the privatization program, but intensive Bank support is required to facilitate the Government decisions and implementation of related sector reform issues, particularly tariff regulation, rules for market entry, and structural changes.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

5.1.1 The shortage of wood poles and other construction materials for distribution expansion work during the project implementation, which had a great impact on the delay of the project, was outside the control of government and the implementing agency. In fact, one of the reasons for the extension of the Credit was the shortage of wood poles for the project. The ethnic conflict in the Northern region significantly affected the project implementation. It first disrupted survey work in some towns and sections of the sub-transmission lines, which delayed the design work for the project. Due to the ethnic conflict, most people in the conflict area were not able to bear the cost of wiring their houses which was a pre-condition for the installation of services. However, the economic activities in the area resumed at the time of project completion and demand is increasing rapidly. There were no other significant factors affecting project implementation.

5.2 Factors generally subject to government control:

5.1.2 The main factor subject to GoG control which significantly impacted the project was the adjustment of tariffs. The Government was slow in increasing tariffs in response to the devaluation of the local currency and the resulting inflation. The Government's attempt to increase tariffs in early 1997 was met with public demonstrations. The increases were rescinded. Legislation to set up autonomous regulatory bodies was fast-tracked and the PURC and Energy Commission were established by the end of that year. The average tariff was increased by more than 200 percent in 1998. However, as noted above, the PURC did not approve new increases until April 2001, despite substantial devaluation and inflation in the intervening two years. As a result the financial position of the utilities had vastly deteriorated by early 2001. The weak financial position of the utilities caused substantial project implementation delays. The expiration date of the Credit was also extended by 18 months in order to compensate for the lost time due to the delay.

5.3 Factors generally subject to implementing agency control:

5.3.1 As noted earlier, ECG's management of commercial aspects was consider a major sector issue at the project appraisal stage--hence the inclusion of the management contract component in the project design. Nevertheless, the limited success of this contract meant that ECG continued to experience managerial weakness in customer services, especially the difficulties in bill collection and the high level of system losses. To date these and inadequate attention to financial management issues continue to be the main concerns regarding the management of ECG.

5.3.2 Although the project included support to strengthen ECG's technical and project management capacity, as the volume of the work load grew, capacity constraints in project contract management caused delays in some of the contracts leading to the need for an eighteen month extension.

5.3.3 While VRA implemented the bulk of works within the original project period, there were lapses in the procurement for vehicles, motorcycles and other materials necessary for project implementation, so that in the end these could not be completed within the extended credit closing date.

5.4 Costs and financing:

The total original cost and actual financing of the project can be summarized below **[TO BE RECONCILED WITH ANNEX 2]**.

	At Appraisal (US\$ mil.)	At Completion (US\$ mil.)
IDA	80.00	80.00
VRA	7.56	9.11
ECG	11.21	5.90
NEF	12.62	3.70
DANINA	19.52	30.59
CCCE (AFD)	5.00	11.86
Netherlands	25.10	28.65
Others	5.22	13.82
Total	166.23	183.62

6. Sustainability

6.1 Rationale for sustainability rating:

6.1.1 The overall project sustainability is rated as uncertain. Throughout project implementation, the economic viability of the rural electrification program was proven without giving negative environmental impacts and by applying a conventional technical approach. Significant transfer of knowledge took place under the Project and this should effectively support both implementation of future capacity expansion projects and the maintenance and operation of the system. In addition, the GoG is committed to the development of the rural electrification as a means of facilitating rural development and poverty reduction. However, while these factors are important, the prospect for project sustainability also depend critically on the sector's long-term financial viability, which in turn depends on the successful implementation of sector reforms in the areas of tariff regulation, privatization of distribution as noted earlier (para.4.5.2). In addition, it is worth noting that the financial problem for the sector will increase as the rural electrification program expands to areas with less customer density and demand, thus imposing higher costs relative to

revenues for the system. Relevant financing and tariff regulation policies will therefore need to be put in place to cope with these challenges. In addition, use of low-cost design standards to improve the economic and financial viability of rural schemes will need to be adopted more extensively based on the lessons learned under this project as well as experiences from other countries. Hence, intensive external support is critically needed to help the Government in addressing these issues. Because of these concerns, the long term sustainability of benefits obtained from the Project is, at this stage, assessed "uncertain".

6.2 Transition arrangement to regular operations:

6.2.1 The power systems developed under the project were transferred to the operations' directorates. The transition period from the construction and operation is already completed. Since ECG and VRA have established procedures and manuals for operation and maintenance of the distribution network, ECG and VRA have no difficulties in regular operations. In terms of expanding supply above the average access rate of about 35 percent (up from about 24 percent at the start of the NEP), a revised rural energy strategy needs to be developed to lay the basis for a modified approach which takes account of the regulatory and financing issues related to rural energy as well as the potential for low-cost design standards for faster expansion of the rural electrification program (para 6.1.1).

7. Bank and Borrower Performance

Bank

7.1 Lending:

7.1.1 Identification of the project concept and the design of the project component were satisfactory. During project preparation and appraisal, the detailed technical, economic, environmental and other issues were properly addressed and analyzed. The project preparation incorporated lessons of past similar projects in Ghana and other countries, especially with respect to rural electrification through grid expansion. The overall development objectives agreed upon during the appraisal were appropriate even though sector reform issues, with the exception of the commercialization of ECG, were not addressed in this project. The sector reform were to be more comprehensively dealt with under the Thermal Power Project (Cr. 2682-GH) whose preparation was already in progress.

7.2 Supervision:

7.2.1 With respect to the project supervision, the project is rated satisfactory. The project was supervised regularly by 13 missions. Issues were identified and recommendations were provided in a timely manner, especially for compliance with covenants. A comprehensive mid-term review was undertaken in April 1998, during which detailed proposals were developed for a financial recovery plan that was later adopted by the GoG during that year. Based on the FRP, the legal agreements of the Credit were amended to postpone the requirement for an 8% rate of return on assets to year 2000 and replace it with lower interim targets in 1998 and 1999. Implementation of the FRP was closely monitored, and although not fully implemented, the plan did help to provide some financial relief to VRA and ECG. The closing date was extended until March, 2000, which allowed ECG and VRA to complete most of the planned activities. However, whereas the Government did not consistently implement a tariff policy necessary for achieving and maintaining the sector's financial viability, the Bank followed an overoptimistic approach. This limited the possibilities for exercising the Bank's enormous leverage, deriving from its overall program and relationship with the Government.

7.3 Overall Bank performance:

7.3.1 Overall Bank performance is assessed as Satisfactory. It is recognized that the project had to be extended due to the delay in implementation and the deterioration of financial positions of the implementing agencies. The Bank maintained an intensive dialogue with the GoG, and its agencies on financial issues as well as on the commercialization activities in ECG. The resulting moderate (in real terms) tariff adjustments and the financial restructuring under the FRP helped to ensure that the implementing agencies had adequate resources to maintain their commitment to the Project.

Borrower

7.4 Preparation:

7.4.1 During the preparation phase the Borrower performance is considered Satisfactory. The result of the National Electrification Planning Study (NEPS) effectively reflected in the project design. Detailed project engineering was incorporated as one of the components of the Project.

7.5 Government implementation performance:

7.5.1 The GoG implementation performance is rated Unsatisfactory. This is because of its failure to ensure cost recovery tariffs during most of the project implementation period. It was responsible for non-implementation of some aspects of the financial restructuring measures agreed under the FRP.

7.6 Implementing Agency:

ECG:

7.6.1 **Satisfactory.** It is noted that significant improvement in reliability and efficiency in the distribution system was achieved. The physical components were completed later than projected at appraisal mainly due to the unavailability of woodpoles and the poor financial position of the utilities. The achievements under the management contract were limited. The overall system loss is high at about 27% and the accounts receivable is about 120 days. The failure to achieve the rate of return and debt service coverage ratios was due to the Government's tariff policy.

7.6.2 One of the sub-components in the Training and Studies Component was design and implementation of a pilot program for productive uses of electricity. Even though a study was carried out, the pilot program was not implemented. The study has, however, provided basic information to an EU-funded project in the western region.

VRA:

7.6.3 **Satisfactory.** With the exception of the lapses on the procurement of vehicles and motor cycles which in the end could not be completed within the extended credit period, VRA's implementation of its physical components was satisfactory. However, like ECG, VRA was unable to achieve its financial covenants during most of the project period. VRA's financial problems were outside of its control, as they arose from the GoG's non-adjustment of power tariffs and from the ECG's difficulties in effecting complete and timely payments for its power purchases from VRA. Therefore, VRA's overall performance is considered satisfactory.

7.7 Overall Borrower performance:

7.7.1 Unsatisfactory. The overall Borrower's performance is rated unsatisfactory because of the Government's unsatisfactory performance in tariff regulation and implementation of the financial restructuring measures agreed under the RFP.

8. Lessons Learned

8.1.1 The major lessons learned from the implementation of this project are in regard to: (i) financial viability; (ii) the use of contract management as an instrument for public sector reform; (iii) the design of procurement arrangements; and (iv) development of domestic contractor capacity.

8.1.2 Although being implemented in parallel with the ongoing Thermal Power Project which had a component that addressed a power sector reform, the Project itself was not expected to be a vehicle for power sector reforms. However, an important lesson is that such large utility expansion programs require financial viability to sustain operations and maintenance once the investment has been completed. The reforms under the Thermal Power Credit were to improve the prospects for the sector's financial viability. The reforms assumed that independent tariff regulation would be key to ensuring cost recovery tariffs which are also a must for the sector to attract private sector investment. However, Ghana and initial experience from other countries suggests that independent regulation takes a much longer time to take root and that a tariff regime that allows for automatic adjustments of those tariff components (e.g. fuel) affected by factors outside the control of the utilities, helps to alleviate the overall problem. The PURC has included this principle in its tariff setting guidelines, although it has yet to allow the utilities to implement automatic adjustments.

8.1.3 The performance targets specified in the management contract were not achieved for a number of reasons specified in para. 4.27. The lesson from this experience is that the design of management contracts needs to pay special attention to the following aspects: (i) that the contractor is given autonomy to make key decisions and implement his proposed measures for improving performance; (ii) the payments to the contractor should be linked to specific measurable outcomes consistent with the contract objectives; (iii) baseline performance indicators should be verified unambiguously to facilitate evaluation of performance and performance-based payments to contractors; and (iv) in line with item (ii) the contract should preferably be self-financing. In addition, the management contract should be seen as part of a transition to a longer term efficient management arrangement for the utility, such as privatization. In the case of ECG, the contractor's limited authority and the absence of a longer term strategy for maintaining the moderate benefits secured by the contractor are significant factors in the modest outcome of this project component.

8.1.4 Ghana has achieved a substantial rate of access to electricity (about 35%) relative to the average for Sub-Saharan Africa (about 10%), almost exclusively through conventional grid connection. Rapid expansion is now constrained by high costs compared to potential revenues as distant areas from the grid, with low population densities and lower incomes, are targeted. A new rural energy strategy needs to be developed which provides an enabling policy framework and low-cost design standards for the sub-transmission and distribution works. On the policy framework, the key issues are cost reflective tariffs (non-uniform); subsidization scheme for investment costs (but not operational costs); light regulation for rural and small schemes in a competitive market structure to allow for independent grids. External support in formulating a revised rural energy strategy would help the Government to incorporate the lessons of international experience in the strategy design.

8.1.5 Coordination and consultation with local communities is important for successful implementation of projects and achievement of the project's objectives. The involvement of local contractors, especially in rural electrification projects, would also assist in addressing potential problems associated with local communities.

9. Partner Comments

(a) Borrower/implementing agency:

No comments were received from the Borrower. However, the Borrower prepared an ICR which is available in the Project Files.

(b) Cofinanciers:

(c) Other partners (NGOs/private sector):

10. Additional Information

Annex 1. Key Performance Indicators/Log Frame Matrix

Outcome / Impact Indicators:

Indicator/Matrix	Projected in last PSR ¹	Actual/Latest Estimate
1. Reduction in system losses	by 1% of each year's sales	1% of sales
2. Reduction in outage of distribution system	by 0.25 % of sales	0.25%

Output Indicators:

Indicator/Matrix	Projected in last PSR ¹	Actual/Latest Estimate
1. Connection to the main grid	434 communities in all 10 regions	465 communities and 23 district capitals
2. Connection of new customers to the grid	119,000 customers	89,382 customers
3. Construction of service centers	10 service centers	9 service centers
4. Reinforcement of sub-stations	N/A	12 power transformers
5. Management contract for ECG operation	4 years	4 years
6. Pilot demonstration program for promoting productive uses of electricity	Planned	Not implemented
7. Study of the scheme of services of power sector utilities	Planned	Not implemented
8. Pilot program for pre-payment metering system (Additional indicator)	N/A	4 regional capitals

¹ End of project

Annex 2. Project Costs and Financing

Project Cost by Component (in US\$ million equivalent)

Project Cost By Component	Appraisal Estimate US\$ million	Actual/Latest Estimate US\$ million	Percentage of Appraisal
ECG - Sub-Stations, Sub-Transmission, Distribution Equipment (supply and erection)	68.30	78.57	146
Engineering - Tech. Assistance (R)	5.98	1.03	0.17
ECG Equipment, Spare Parts and Dist Material (Goods)	21.18	24.82	117
ECG Civil Works (Distribution, Service Centers)	1.26	0.41	33
VRA - Sub-Stations, Sub-Transmission, Distribution (Equipment supply and erection)	50.65	61.76	122
VRA Engineering	4.50	0.84	0.19
VRA Equipment	1.56	0.66	0.42
VRA Civil Works (Distribution, Service Centers)	0.83		
VRA Training and Studies	0.80	1.04	130
ECG Engineering - Tech. Assistance (U)	1.37	2.21	1.61
ECG Management Contract	5.00	11.86	2.37
ECG Training and Studies	4.00	0.42	0.11
Total Baseline Cost	165.43	183.62	
Total Project Costs	165.43	183.62	
Total Financing Required	165.43	183.62	

Project Costs by Procurement Arrangements (Appraisal Estimate) (US\$ million equivalent)

Expenditure Category	Procurement Method¹			N.B.F.	Total Cost
	ICB	NCB	Other²		
1. Works	0.00 (0.00)	2.09 (0.83)	0.00 (0.00)	0.00 (0.00)	2.09 (0.83)
2. Goods	3.89 (3.89)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.89 (3.89)
3. Services	0.00 (0.00)	0.00 (0.00)	16.65 (9.39)	5.00 (0.00)	21.65 (9.39)
4. Supply and installation	84.61 (63.70)	0.00 (0.00)	1.39 (1.39)	51.74 (0.00)	137.74 (65.09)
PPF	0.00 (0.00)	0.00 (0.00)	0.80 (0.80)	0.00 (0.00)	0.80 (0.80)
Total	88.50 (67.59)	2.09 (0.83)	18.84 (11.58)	56.74 (0.00)	166.17 (80.00)

Project cost for ECG

Project Costs by Procurement Arrangements (Actual/Latest Estimate) (US\$ million equivalent)

Expenditure Category	Procurement Method ¹			N.B.F.	Total Cost
	ICB	NCB	Other ²		
1. Works	38.63 (38.63)	0.81 (0.19)	2.19 (0.00)	17.86 (0.00)	59.49 (38.82)
2. Goods	19.10 (18.34)	1.96 (1.96)	4.83 (2.64)	0.00 (0.00)	25.89 (22.94)
3. Services	0.00 (0.00)	0.00 (0.00)	7.81 (6.35)	11.86 (0.00)	19.67 (6.35)
4. Supply and installation	19.34 (11.89)	0.00 (0.00)	0.20 (ERROR: Cannot convert text to a number)	59.03 (0.00)	78.57 (11.89)
PPF	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Total	77.07 (68.86)	2.77 (2.15)	15.03 (8.99)	88.75 (0.00)	183.62 (80.00)

^{1/} Figures in parenthesis are the amounts to be financed by the Bank Loan. All costs include contingencies.

^{2/} Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government units.

Project Financing by Component (in US\$ million equivalent)

Component	Appraisal Estimate			Actual			Percentage of Appraisal		
	Bank	Govt.	CoF	Bank	Govt	CoF	Bank	Govt	CoF
<u>National Electrification</u>									
ECG									
Substations, subtransmission ..	17.36	5.58	45.66	17.51	7.23	43.76	100.9	129.6	95.8
Engineering	2.57	3.41	0.00	1.01	0.04	0.00	39.3	1.2	na
Equipment, spare parts ...	21.18	0.00	0.00	19.24	5.28	0.00	90.8	na	
Civil works	0.50	0.76	0.00	0.17	0.24	0.00	34.0	31.6	
VRA									
Substations, subtransmission ...	32.65	11.92	6.08	41.68	4.75	21.08	127.7	39.8	346.7
Engineering	1.94	2.56	0.00	0.34	0.18	0.00	17.5	7.0	na
Equipment	1.56	0.00	0.00	0.50	0.06	0.00	32.1		na
Civil works	0.33	0.50	0.00						
<u>Distribution Reinforcement</u>									
ECG engineering	0.88	0.49	0.00	2.19	0.04	0.00	248.9	8.2	na
<u>ECG Management Contract</u>	0.00	0.00	5.00	0.00	0.00	11.86	na	na	237.2
<u>ECG Training and Studies</u>	4.00	0.80	0.00	0.42	0.00	0.00	10.5	0.0	na

Annex 3. Economic Costs and Benefits

ECONOMIC ANALYSIS																
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NORTHERN REGION																
SUBPROJECT NR02																
BENEFITS (000\$)																
Incremental Demand Served (MWh)				34639	53389	55925	57246	60065	62498	64984	67594	70236	73067	75989	79029	82190
Value of Inc. Demand Served				69278	106778	111049	115491	120111	124915	129912	135108	140513	146133	151978	158058	164380
Avoided Capital Costs				6928	10678	11106	11549	12011	12492	12991	13511	14051	14613	15198	15806	16438
COSTS (000\$)																
Investment & Eng.	66918	320826	157772	9124												
O&M as % of Investment			10900	12083	12083	12083	12083	12083	12083	12083	12083	12083	12083	12083	12083	12083
Wiring & Appliance		4126	9628	14084	14422	14769	15123	15486	15857	16238	16628	17027	17435	17854	18282	
Bulk Supply (incl. losses) at LRMC			16949	26114	27159	28245	29375	30550	31772	33043	34364	35739	37169	38655	40202	
Offices and Equipments	2288	2288	2288	2288												
NET BENEFITS (000\$)	66906	326740	(121326)	3763	68490	77944	75541	79288	83191	87256	91489	95896	100490	105271	110251	
NPV	6478739															
ERR	83%															
TRONGHARO																
SUBPROJECT BA01																
BENEFITS (000\$)																
Incremental Demand Served (MWh)				09280	28766	30060	31413	32827	34304	35848	37461	39147	40908	42749	44673	46683
Value of Inc. Demand Served				18560	57532	60121	62826	65654	68608	71695	74922	78299	81816	85498	89345	93366
Avoided Capital Costs				1856	37536	012	6283	65656	861	71707	492	78298	182	8550	8935	9337
COSTS (000\$)																
Investment & Eng.	33128	81847	25652													
O&M as % of Investment			2813	28132	813	2813	28132	813	28132	813	28132	813	2813	2813	2813	2813
Wiring & Appliance		3845	13637	19716	19952	20192	20434	20679	20927	21179	21433	21690	21950	22214	22480	
Bulk Supply (incl. losses) at LRMC			4539	14070	14703	15365	16057	16779	17524	18323	19188	20092	20940	21851	22834	
Offices and Equipments	1159	1159	1159													
NET BENEFITS (000\$)	(34287)	69850	27384	26687	28666	30740	32916	35198	37591	40099	42729	45486	48375	51408	54576	
NPV	363000															
ERR	167%															

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle		No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating	
Month/Year	Count	Specialty	Implementation Progress	Development Objective	
Identification/Preparation December 1991	2	1PE, 1FA			
Appraisal/Negotiation May 1992	4	1EE, 2PE, 1FA			
August 1992	6	1EE, 1PE,			
October 1992	3	1EE, FA, 1PE			
Supervision July 1993	2	1EE, 1PE			
October 1993	3	1EE, 1PE, 1FA	S		S
March 1995	2	1FA, 1PE	U		S
March 1996	3	1EE, 1FA, 1PE	U		S
February 1997	6	1EE, 1ES, 1FA, 1PE, 1OO	S		S
December 1997	2	2FA	U		U
May 1998	5	2FA, 1OO, 1PE, 1PS,	U		U
October 1998	4	2FA, 1OO, 1PE			
March 1999	4	2FA, 1OO, 1PE	S		S
October 1999	4	2FA, 1OO, 1PE	S		S
ICR April 2000	3	2FA, 1PE			
May 2001	3	1FA			

EE = Energy Economist, ES = Energy Specialist, FA = Financial Analyst, OO = Operations Officer, PE = Power Engineer

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US\$ ('000)
Identification/Preparation	187.8	60.6
Appraisal/Negotiation	64.7	202.1
Supervision	219.66	684.3
ICR	11.90	42.3
Total	484.06	989.3

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	<i>Rating</i>
<input checked="" type="checkbox"/> <i>Macro policies</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Sector Policies</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input checked="" type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Physical</i>	<input checked="" type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Financial</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input checked="" type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Institutional Development</i>	<input type="radio"/> H <input type="radio"/> SU <input checked="" type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Environmental</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<i>Social</i>	
<input checked="" type="checkbox"/> <i>Poverty Reduction</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input checked="" type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Gender</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Private sector development</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Public sector management</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input checked="" type="radio"/> N <input type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6.1 Bank performance

Rating

Lending

HS S U HU

Supervision

HS S U HU

Overall

HS S U HU

6.2 Borrower performance

Rating

Preparation

HS S U HU

Government implementation performance

HS S U HU

Implementation agency performance

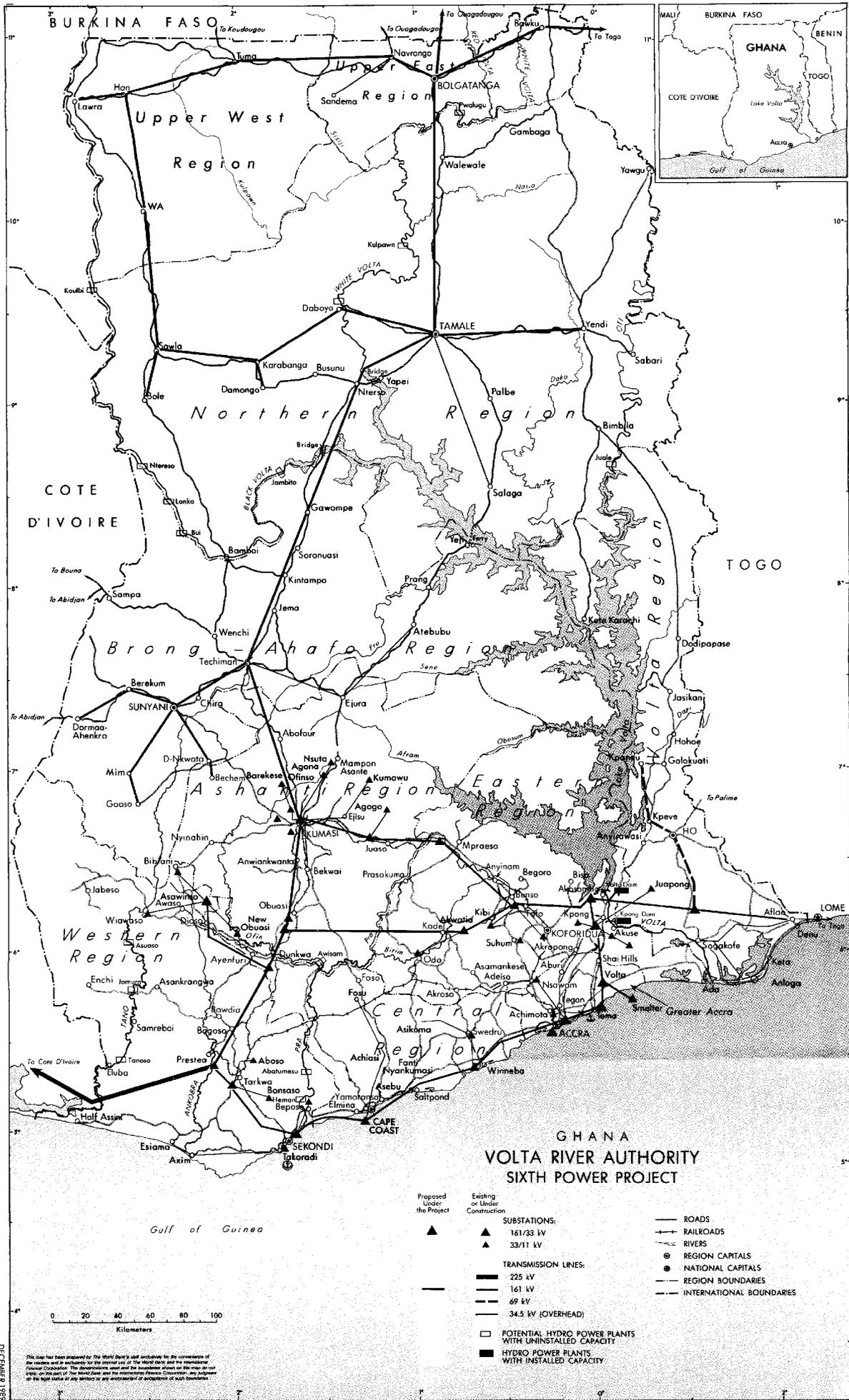
HS S U HU

Overall

HS S U HU

Annex 7. List of Supporting Documents

1. List of Studies for the Project
2. Aide Memoire
3. Borrower's ICR



GHANA
VOLTA RIVER AUTHORITY
SIXTH POWER PROJECT

- | | | | |
|----------------------------|--------------------------------|--|--------------------------------|
| Proposed Under the Project | Existing or Under Construction | | ROADS |
| ▲ | ▲ | SUBSTATIONS: | RAILROADS |
| | ▲ | 161/33 kV | RIVERS |
| | ▲ | 33/11 kV | ● REGION CAPITALS |
| | — | TRANSMISSION LINES: | ● NATIONAL CAPITALS |
| | — | 225 kV | — REGION BOUNDARIES |
| | — | 161 kV | - - - INTERNATIONAL BOUNDARIES |
| | — | 69 kV | |
| | — | 34.5 kV (OVERHEAD) | |
| | □ | POTENTIAL HYDRO POWER PLANTS WITH UNINSTALLED CAPACITY | |
| | ■ | HYDRO POWER PLANTS WITH INSTALLED CAPACITY | |

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