

## **Executive Summary**

Ghana is one of the leading countries in democratization and rapid economic growth across Africa. In comparison to other neighboring countries in Africa, Ghana carries high growth potential for its greater political and economic stability. Nonetheless, the country's high level of reliance on key raw materials and lack of infrastructure for industrial development can be seen as Ghana's major vulnerability. Recently, Ghana sees a rather stagnant economic growth due to fluctuations in the raw material market, along with unstable economic conditions such as accelerating inflation and exacerbating fiscal imbalances.

While poverty has been greatly alleviated with continuous economic growth, Ghana still faces a severe economic disparity due to its imbalanced industrial growth that is heavily focused on certain regions and sectors. Such significant economic disparity has been identified especially in the north and south regions of Ghana; severe poverty is more prevalent in some parts of the north. In order to overcome such unstable socio-political conditions as well as income distribution inequality, Ghana maintains a proactive environment for economic growth aiming at a long-term stable economic recovery. Ghana established "Vision 2020" development policies at the highest level of the government with the aim of becoming a middle-income country.

Electricity, the principal source of energy and the fundamental of building infrastructure, has been a greater hindrance in Ghana because of its mediocre energy inaccessibility and instability caused by a significant inter-regional gap in power supply and obsolete transmitters and distributors. Significant improvement is needed for electricity distribution to achieve balanced economic development across the country. Under such circumstances, Ghana is seeking a proactive strategy in response to such situation at the national level: The country has selected energy and electricity for key sectors under the 2014-2017 step-by-step country development plan and also implemented responsive strategies, such as broadened participation of private sectors, supply expansion, operation improvement and human resources training.

In relation to modernization and improvement of electricity infrastructure, Ghana's interest and needs also revealed in the first level of South Korea's Country Partnership Strategy (CPS). As part of the efforts for promoting friendship and exchanges, alleviating poverty and supporting Ghana's development, South Korea's

Country Partnership Strategy has recognized modernization of Ghana's electricity infrastructure, along with improvement in healthcare system and basic education, as priority sectors. CPS proposed more than 70% of financial support to priority sectors from South Korea's allocated budget for international aid. However, South Korea's financial aid in the area of energy is the lowest as it only accounts for 2.43% of South Korea's total international development aid.

In terms of distribution efficiency, Northern Electricity Department Company (NEDCo) based in Ghana has focused on modernizing electricity infrastructure in the energy sector, which has been neglected so far in the African country. According to NEDCo's report, electricity infrastructure has been financed through EDCF's concessional loan program. Under the supervision of Ghana's Ministry of Energy, NEDCo which supplies electricity in the northern region will be charged with implementing this project.

Six cities in the north-central region with relatively low economic growth were identified as the target for the project. With the aim of reducing transmission loss and improving transmission stability, the project plans to install six substations, 65 condenser banks, the Distribution Management System (DMS), and two switching stations and voltage boosters. The project will be implemented in six cities: Techiman, Sunyani, Wa, Tumu, Tamale and Bimbilla. Representing each region of Ghana, these six cities hold major infrastructure facilities for a training and healthcare system. While users and supply sources have increased in the afore-mentioned cities through economic development, low quality electricity and frequent blackouts occur due to the unoptimized transmission system that triggers increasing electricity losses, voltage drops, flickerings, and a shortage of capacity of distribution transformers. Ghana has difficulty in maintaining electricity quality and making new access to electricity.

Electrical instability affects not only households but also social services of every kind; this will possibly cause simple discomfort to citizens and further serve as a hindrance to social development for a mid- to long-term. In particular, an inadequate supply of electricity to educational and medical institutions fail to meet the basic requirements for infrastructure and will thus have adverse effects on priority sectors, such as education and health & sanitation. In light of such circumstances, the project is aimed to 1) stabilize electricity supply for individuals and public services, 2) modernize the infrastructure for citizens' quality of life, 3) enable a better sanitation of water resources and environment, 4) reform the quality of education, 5) enhance

urbanization and 6) reduce income inequality and poverty among regions.

The performance management of the electricity distribution efficiency project is designed by the Ghanaian government and the project executing agency, NEDCo. The logical framework was established through the analysis of stakeholders, issues and objectives. The impact of the project is to increase electricity use and improve the collection rate of electricity bills. The expected outcomes include increased distribution efficiency, improved reliability service, and improved access to electricity. The relevant indicators are a transmission loss rate, SAIDI, SAIFI, a specified voltage hold rate, and the number of new consumers with access to electricity. Modernization of distribution facilities and improvement of DMS are defined as outputs and the number of installed substations, condenser banks, switches, DMS and voltage boosters compose output indicators. Activities include the formation of PIU and the Steering Committee, the installment of substations, condenser banks, switching stations, DMS and voltage boosters, and project management monitoring. The representativeness, reliability and collection of data were considered when defining performance indicators.

The logical framework of the project is shown as in the table below.

### Logical Framework

Classification		Indicator	Baseline	Performance Goal	Assumption/Risk
Impact	1. Increased Electricity Use	Electricity Use	323MWh	646-807 MWh	1. Electricity generation capacity increases. 2. Reinvestment is made to improve the panel board for consumers.
	2. Increased Collection Rate of Electricity Bills	Collection rate of Electricity Bills	69%	80-85%	
Outcome	1. Increased Distribution Efficiency 2. Improved Reliability in Electricity Service 3. Improved Access to Electricity	1. Transmission Loss (Sunyani)	3.27%	2.99-4.03%	Distribution line connection and electric circuit safety device (e.g. molded case circuit breaker and short circuit breaker) are installed for consumers.
		1. Transmission Loss (Techiman)	2.42%	3.54-4.44%	
		1. Transmission Loss (Wa)	2.40%	3.00-3.80%	
		2-1.SAIDI (Tumu)	82.7	40-35 hrs/yr	Installed distribution system is safely managed and maintained.
		2-1.SAIDI (Bimbilla)	126.4	63-58 hrs/yr	
		2-2.SAIFI (Tumu)	150	75-70 nos/yr	
		2-2.SAIFI (Bimbilla)	87.4	43.7-38 nos/yr	
3-1. Number of New Customers with Access to Electricity (Household)	4,822	8,500-8,900	Provided data is objective and reliable.		

		3-2. Number of New Customers with Access to Electricity (Institution)	281,856	507,000-521,000	
<b>Output</b>	<ol style="list-style-type: none"> <li>1. Modernized Distribution Facilities and Equipment</li> <li>2. Enhancement of DMS</li> </ol>	<ol style="list-style-type: none"> <li>1. Number of Installed Substations</li> <li>2. Number of Installed Condenser Banks</li> <li>3. Number of Installed Switches</li> <li>4. Number of Installed DMS</li> <li>5. Number of Installed Voltage Boosters</li> </ol>			<ul style="list-style-type: none"> <li>- Timely decision-making is realized by maintaining collaborative communication between the project executing agency and other institutions.</li> <li>- Relevant agencies based in the project area proactively cooperate with the project.</li> <li>- Provided data is objective and reliable.</li> <li>- Disasters and political conflicts do not occur.</li> </ul>
<p>Objectives: Reduction of transmission loss in the area power supply; and improvement in energy reliability  Beneficiaries: Citizens of the target region</p>					

However, various risk factors are expected in carrying out the project. Firstly, in terms of politics and governance, corruption is deemed to be a risk factor. Corrupt practices among public service agencies may possibly become a hindrance to a process of decision-making and communication in the project. Also, there are concerns over risk management and smooth project implementation since NEDCo lacks experience in carrying out concessional loan projects. Furthermore, environmental risk factors may be considered as the project is on a grand scale and mainly consists of construction of basic infrastructure across the city. Therefore, sufficient investigation into Ghana's environmental evaluation policy is needed prior to implementing the project.

Also, some issues are expected to arise at the working level. In the nature of concessional loans, donor countries proactively respond to and intervene in certain risk factors, including recipient countries' lack of competence and implementing ability and beneficiary institutions' limited efforts, willingness and competence for development. As such, accurate division of duties under a specific monitoring plan and a consultative group and then examination the degree of enforcement thereof are required. If donor and recipient countries fail to timely fulfill their respective duties agreed at the beginning of the project, additional risk factors can become an obstacle to performance management. In particular, in light of a similar project that was stopped halfway through the process, it is important to thoroughly review land compensation and civil complaints prior to project commencement. Therefore, donor and recipient countries are required to prepare countermeasures against the failure to fulfill their collaborative efforts and duties and close collaborative relations with the Ghanaian government and NEDCo should be established for effortless project implementation.

## **Conclusion**

While the importance of energy efficiency has been emphasized in Ghana and other countries, energy efficiency has been neglected in terms of concessional loan as well as grant for the country. Especially, continuous needs for more efficient energy at both national and regional levels have been seen in the middle and northern regions of Ghana that were selected for the project site. From MDGs to SDGs, the importance of electricity and energy has been broadly discussed in the international community. As a middle-income country, it is Ghana's best interest to be equipped

with basic infrastructure such as a stable, modernized distribution of electricity.

The project carries a great significance for international cooperation with South Korea. Whereas the modernization of electricity infrastructure is one of the priority sectors in South Korea's Country Partnership Strategy, this field has received minimal support.

The project is expected to 1) attain the original purpose and objectives set under South Korea's Country Partnership Strategy, 2) contribute to Ghana's advancement and poverty reduction, and 3) build friendly relations and various exchanges between the two countries.

At the same time, the project has the aim of stabilizing electricity distribution with more electricity accessibility in the northern region that experiences significantly low levels of economic development. Therefore, the project has a considerable significance for a more balanced national development as it will pave the way for economic growth across the northern region and narrow the growth gap with the southern region.

Moreover, six principal cities in the north-central region were selected based on NEDCo's examination of technical, economic, and financial feasibility. Indeed, these six cities have seen much more remarkable economic development than other areas, with more energy sources and users. Therefore, the high needs of stable electricity provision are seen in these cities. The supply of electricity to the 6 principal cities will promote an improved quality of life for individual households and a stable operation of public institutions, thereby contributing to social development and public interests as a whole.

In conclusion, the six cities in the north-central region selected for the project site are deemed to be appropriate in light of the Ghana government's willingness to reduce the vulnerabilities of infrastructure development and the regional imbalance in economic growth, along with the regional demands to resolve low electricity quality and frequent power outages attributable to an unoptimized distribution system and an expansion of sources and users. Consistent with Ghana's development policy and South Korea's Country Partnership Strategy (CPS), the project lists education and health institutions for its first beneficiaries.

Nevertheless, there are concerns over risk factors in project management and risk management as NEDCo lacks experience in implementing concessional loan projects. In light of the lack of timely response towards immediate risks and natural disasters,

as well as the ineffectiveness of responsive strategies, in Ghana and other African countries, it is important to consider the possibility that the project could be suspended without appropriate intervention and measures.

In general, the project plays a significant role in contributing not only to international development initiatives and collaboration between Ghana and South Korea, but also to Ghana's interest in development and poverty eradication. The successful fulfillment of the project and the effective achievement of targeted goals rely on an in-depth, thorough examination of risk factors and countermeasures.