**Strengthening the Energy Sector**

**(GY-L1067)**

**Analysis of Compliance with the Public Utilities Policy**

**(GN-2716-6)**

1. **OBJECTIVES**

This document presents an analysis of the operation Strengthening the Energy Sector regarding the objectives, principles and conditions of the Public Utilities Policy (GN-2716-6).

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| **Policy objectives****(GN-2716-6)** | **Description** | **Comments** |
| **Objective:** The promotion of access to and the increased efficiency and quality of public utilities will require that the Bank’s actions aim to:  |
| **Promote access to the service by the entire population** | Promote Access to the Service by the entire population, including the most disadvantaged communities and groups, in both urban and rural areas.  | The general objective of this operation is to support the strengthening and sustainability of the energy sector in Guyana by contributing to the development of the O&G sector and the development of cleaner energy sources for electricity generation. One of the specific objectives of the program seeks to foster sustainable access of energy: “(i) to contribute towards the development of a policy framework to ensure a sustainable electricity generation in Guyana.” To support the achievement of this specific objective Component III “Policies for sustainable electricity generation” will strengthen the electricity sector to achieve a more sustainable energy generation matrix in terms of economic, environmental, and technical aspects to satisfy the growing demand. The Component supports the design and implementation of policies and studies that foster and promote the development of new cleaner energy sources into the electricity generation matrix while Guyana optimizes the use of indigenous natural resources to develop alternative combinations of electricity generation technologies for new capacity additions and replacement of existing polluting turbines. The Component will also support the development and approval of a practical national grid code for a stronger and more reliable energy system.This operation is proposing policy commitments that also address electricity access:(i) Update of the study on the generation system expansion 2019-2035, for an integral development and diversification of the electricity generation matrix of the Demerara-Berbice Interconnected System (DBIS).(ii) Policy document for the Diversification of the Electricity Generation Matrix of the DBIS.(iii) National Grid Code for the electricity sector in Guyana that will include complementary or new technical, administrative and/or procedural actions in the areas of planning, interconnection, operations, minimum technical requirements and metering.  |
| **Deliver a reliable, quality Service** | Ensuring that the service provided to the user meets minimum quality and reliability standards that are viable and consistent with a cost-benefit or cost-efficiency analysis, in keeping with the nature of the service and the supply conditions. | The regulatory framework of the sector establishes that, through Paragraph 16 of the License to Supply Electricity for Public Purposes, granted to GPL (ESRA 1999) and the Amendment to the License of October 4, 2010, the utility is required to strive for, and maintain operating standards and performance targets in accordance with the Second Schedule of the License. The Public Utilities Commission (PUC) is the regulatory and enforcement body charged with ensuring compliance with the established regulatory framework.Reliability of an electricity system is an essential condition to the development of any country and is particularly relevant to those facing a growing demand. The establishment of system stability to respond to fluctuations in demand is a basic activity conducted by any Power Utility. The DBIS system requires immediate investments in new transmission infrastructure to mitigate the high operational risks of the system. Such investments will be critical to ensure reliable power flows from the main generation infrastructure to the main load centers. With electricity demand in Guyana expected to continue growing in the next decade, the reliability of the DBIS transmission infrastructure will be further stressed. The DBIS also requires the creation of a public policy that allows for an integral development and diversification of the electricity generation matrix including both the principles for the diversification of the electricity matrix and the national objectives of the electricity sector.Component 3 of the loan supports this with two specific policy commitments: (i) Update of the study on the generation system expansion 2019-2035; and (ii) policy document for the Diversification of the Electricity Generation Matrix of the DBIS. Both commitments represent an important development in preparing the system for integration of future generation infrastructure, whether is natural gas or renewables, and projected load growth, and will contribute to the improvement of reliability in the overall system.  |
| **Deliver a service efficiently**  | Deliver a service efficiently in terms of supply, while seeking to deliver the service at the least possible cost. | Component 3 will strengthen the electricity sector to achieve a more sustainable energy generation matrix in terms of economic, environmental, and technical aspects that will satisfy the growing demand. The Component will support the design and implementation of policies and studies that aim to foster and promote the development of new cleaner energy sources into the electricity generation matrix while Guyana optimizes the use of indigenous natural resources to develop alternative combinations of electricity generation technologies for new capacity additions. The Component will also support the development and approval of a practical national grid code for a stronger and more reliable energy system. This will improve the overall system reliability to help deliver the service efficiently and in a cost-effective manner. |
| **Create suitable incentives for service demand** | Create suitable incentives for service demand, so users make use of the services in a manner consistent with their economic, financial, and environmental sustainability  | In accordance with Chapter 7 of Guyana’s National Development Strategy (Energy), paragraph 7.III.2 the specific objectives of the sector include ensuring that energy is used in an environmentally sound and sustainable manner and in addition, encouraging, through public awareness programs and incentives, energy conservation practices.Component III “Policies for sustainable electricity generation” will strengthen the electricity sector to achieve a more sustainable energy generation matrix in terms of economic, environmental, and technical aspects to satisfy the growing demand. |
| **Objective:** The scope of the sustainability of the public utilities will be promoted based on three pillars:  |
| **Financial sustainability**  | Ensuring that there are sufficient revenues from provision of the service to the user, with the community contributions and direct contributions from the government, to cover the efficient costs of service delivery.  | The economic evaluation of the Program shows the viability of the investments due that the economic indicators under a Cost-Benefit analysis are positive. The benefits of the program are based mostly on the components of electricity service expansion: * Self-Generation: these are energy users that are expected to switch from generating their own electricity to GPL’s supply as electricity distribution is expected to potentially improve in reliability.
* Losses Converted to Sales: technical improvements in the distribution of electricity.
* Linden Connection: expansion of GPL’s grid covering Linden.

**Financial Benefits:**The increment in electricity sales due to self-generation, losses converted to sales, and the Linden connection are quantified and included among the project benefits. These incremental GWh sales are converted to US dollars using the average selling price of electricity in Guyana, 0.3 US$/KWh. **Economic Benefits:**Two economic benefits are identified and monetized:* Reduction in C02 emissions: These are based on estimates of C02 emission savings from shifting power generation from fuel oil to natural gas and renewables. C02 emissions are valued at US$ 30/ton.
* Investment/Operating cost Savings of switching from fuel oil to natural gas/renewables: Shifting power generation from fuel oil to natural gas and renewables is expected to generate significant cost savings in terms of investment and operating costs.

**Present Value of Benefits:**After using a discount rate of 12%, the total PV of benefits is valued at US$ 982 million. |
| **Environmental sustainability**:  | Helping ensure that the selection, execution, operation, and maintenance of the service delivery projects comply with the Bank’s environmental safeguards and contribute to the development of resilient infrastructure, considering viable alternatives to mitigate climate change.  | In accordance with Directive B.13 of the Bank's Environment and Safeguards Compliance Policy (GN-2208-20 and OP-703), this operation does not require environmental classification. The proposed reforms do not generate negative environmental or social impacts and the operation does not finance studies or works of electricity generation or transmission; it also does not require a strategic environmental assessment.The policy commitments in Component III will support the GoG efforts on electricity access (further details in section “Principles / Supporting the countries to address basic access needs”) and the integration of renewable energy sources into the country’s electricity matrix as set out in Guyana’s Intended Nationally Determined Contribution so that Guyana can reach the goal of developing a 100% renewable power supply by 2025. |
| **Social sustainability**:  | Helping increase access to the service and providing mechanisms to consult with the community on pertinent aspects of service delivery.  |

1. **PRINCIPLES**

The Policy is based on the following principles that will guide the design and supervision of the Bank’s Operations.

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| **Policy principles****(GN-2716-6)** | **Description** | **Comments** |
| **Supporting the countries to address basic access needs**  | The expansion of access to public utilities at affordable prices is necessary in the region, especially in less developed countries and rural areas in all countries. Access to public utilities is essential to contribute to poverty reduction and promote inclusive development. The Bank will support the development of sustainable systems that use the combination of cost-efficiency and the most appropriate technology solutions, given the characteristics of the demand and the public utility, to address the access needs of the population, both urban and rural.  | The electricity sector can be separated in two categories: First, off-grid systems in rural areas, better known as the Hinterland8; and, second, the GPL interconnected system or Demerara-Berbice Interconnected System (DBIS).The Hinterland are often geographically isolated and electricity generation is supplied by centralized, community-scale diesel generators using imported fuel, subject to variations in fuel availability.Over the last decade, the GoG has launched several initiatives to help increase electricity access to the rural population, as well as to improve energy security and affordability. From 2011-2014, 11,000 65-watt Solar Home PV-Systems (SHS) were installed under the Hinterland Electrification Program (HEP) and in 2016, another 6,000 SHS were installed with the support of the IDB. The years after, the GoG also introduced small PV systems for social infrastructure such as health and education facilities.In past years, the GoG commenced a plan and developed power generation projects to diversify the electricity matrix in the Hinterland envisaging extensive use of RE such as mini-hydro, biogas, wind and solar and displacing diesel generation power plants.The Government developed the Green Bartica Plan, which aims to create a climate resilient economy and establish a green pathway for reducing the carbon footprint in several parts of the townships economy including the electricity sector. In addition, the Guyana Energy Agency (GEA), in coordination with the Hinterland Electrification Company Inc. (HECI), started to develop plans for mini-hydro and micro-solar PV grid systems in many rural regions of the country, partly in collaboration with the IDB and other development partners.The other important category in the electricity sector is the DBIS, which is the principal system in the country - providing electricity to about 90% of the population that is concentrated in the coastal areas - and it is owned, operated and managed by GPL.The installed generating capacity of the DBIS is 172 (Megawatts) MW, of which 135.9 MW is considered effective and operative, and runs by liquid fossil fuels.Over the last six years, electricity demand has exhibited annual average growth rate of 4.3%, which is expected to continue to increase as a result of GDP growth due to the oil discoveries. As such, it is expected that the DBIS will experience a threefold increase in demand, from 762.2 GWh in 2017 to 2,173 GWh by 2035The program through Component 3 will improve the reliability of the DBIS that will also help preparing the grid for integrating future generation infrastructure, whether is natural gas or renewables. By doing this, de GoG can continue addressing the country’s basic access needs.  |
| **Promoting integrity, transparency, and accountability.** | Bank-financed operations will drive basic institutional arrangements, so the region’s countries adopt measures that promote integrity and increase transparency in the delivery of public utilities services, in order to improve accountability and strengthen the observance of users’ rights. To this end, the Bank will make greater efforts to have its operations contribute to the development of good governance systems among public and private stakeholders. Moreover, this Policy recognizes that the weakness of public statistical data and the scarcity of private statistical data are factors that often hinder adequate responses to basic questions on infrastructure investment needs, service provider performance, and rate structure and evolution. Therefore, the Bank will promote targeted transparency, considering users’ information needs, the most effective way in which information should be made available, and the best channels for its distribution.  | The Program will contribute to promote integrity, transparency and accountability by promoting policies for sustainable electricity generation with the execution of Component IIII.The mechanisms proposed to achieve the latter are:(i) Update of the study on the generation system expansion 2019-2035, for an integral development and diversification of the electricity generation matrix of the Demerara-Berbice Interconnected System (DBIS).(ii) Policy document for the Diversification of the Electricity Generation Matrix of the DBIS.(iii) National Grid Code for the electricity sector in Guyana that will include complementary or new technical, administrative and/or procedural actions in the areas of: planning, interconnection, operations, minimum technical requirements and metering. |
| **Analyzing the characteristics and impacts of subsidies**.  | The operation and financing of the services addressed by this Policy should efficiently recover service delivery costs through rates charged to users. However, this Policy acknowledges that, occasionally, financial sustainability can be achieved by supplementing the revenues earned through rates charged to users for the service with contributions from the community and direct government contributions. Where subsidies are granted, the Bank will promote both their transparent allocation and use, subject to frequent, effective accountability mechanisms. Such mechanisms will include: (i) identification and analysis of sources and beneficiaries of the subsidies; (ii) analysis of the distributive incidence of the subsidies; and (iii) quantification of the subsidy relative to macroeconomic indicators (for example, gross domestic product, total public sector expenditures) used by the Bank or by the level of government granting the subsidies to report on their fiscal sustainability. In cases where rate subsidies are granted, the Bank will promote their targeting toward the most vulnerable and lowest-income groups. In addition, to the extent possible, the Bank will help countries replace rate subsidies for public utilities with income transfer mechanisms that are more direct and targeted toward the lowest-income population segments.  | The program does not contemplate actions that generate or modify the structure of the country's subsidies in the sector. The policy commitments of the program will facilitate the recovery of delivery costs under conditions of efficiency through user fees. |
| **Separating institutional roles to improve sector governance.** | Experience shows that the most effective organization for the sectors to achieve this Policy’s objective is the separation of the roles of policy-maker, regulator, and service provider. In this context, the sector authority retains responsibility for policy-making and planning, the public agencies determine and oversee compliance with the regulatory system, and public or private entities are assigned responsibility for providing the service. This Policy recognizes, nonetheless, that the institutional organization cannot follow a single model, but must be adapted to the specific features of each sector and country. In several of the region’s countries, responsibility for policy-making, regulation, and delivery of public utilities is based at the local (provincial or municipal) level. In these cases, where it is not necessarily optimal to separate the roles of policy-making and regulation, the Bank will promote homogeneous regulation, with adequate minimum quality parameters, rate-setting principles supervision and control mechanisms. It will also help develop institutional mechanisms that strengthen appropriate management in the framework of local legislation.  | The institutional framework in Guyana separates roles and responsibilities of sector agencies. The overall responsibility for administration and high-level policy formulation is assigned to the OPM, while the PUC has a regulatory and enforcement role. The GEA advises the OPM on the development and implementation of the national energy policy. It was established in 1997, under the purview of the Ministry of Public Infrastructure (MoPI) and is responsible for fostering harmonization, increased monitoring and enforcement of regulations. Currently GEA is developing a national energy policy and provides all policy support to the Ministry. GEA is also in charge of the development of the projects for the provision of sustainable energy in the interior and main townships in coordination with the Hinterland Electrification Company Inc. (HECI).GPL is the principal entity licensed to supply electricity for public purposes in Guyana. It is the state-owned vertically integrated utility whose operations comprise generation, transmission and distribution. More than 80% of the country’s population is in their operating areas.The laws governing the sector are (i.) The ESRA 1999, (ii) The PUC Act 1999 (PUCA) and (iii) The Guyana Energy agency Act 1997 (GEAA).The power sector in Guyana is governed by the Electricity Sector Reform Act (ESRA) of 1999, which assigns the overall responsibility for the sector to the Office of the Prime Minister (OPM). Other key stakeholder institutions within the electricity and energy sector are: (i) Guyana Power and Light, Inc. (GPL); (ii) the Public Utilities Commission (PUC); the Guyana Energy Agency (GEA); and (iii) the Government Electrical Inspectorate (GEI).The overall administration, high-level policymaking and regulatory functions of the electricity sector is assigned to the Ministry of Public Infrastructure (MoPI). The MoPI is the ministry with direct responsibility for the electricity sector, and as part of that mandate it also participates in the oversight of the operations of the state-owned utility GPL and other smaller public electricity operations in the hinterland under HECI. The MoPI also undertakes renewable energy projects related to improved energy access in hinterland areas through its Hinterland Electrification Company Inc. (HECI) with support from the GEA. The MoPI also has the oversight of Public Utilities Commission (PUC) and the Government Electrical Inspectorate (GEI).GPL is a state-owned utility which is also the principal public supplier of electricity in Guyana. Its license encompasses all three counties of Demerara, Berbice and Essequibo and its operations comprise generation, transmission and distribution. With an installed nominal generating capacity of 148-MegaWatt (MW) and approximately 666-GigaWatt-hour (GWh) of electricity delivered annually, GPL supplies electricity to roughly 176,000 customers, mainly in the coastal zone. The mandate of the GEA is outlined in the Guyana Energy Agency Act 1997, Guyana Energy Agency (Amendment) Act 2004, Guyana Energy Agency (Amendment) Act 2005 and the Petroleum and Petroleum Products Regulations 2004. The GEA is responsible for energy policy development and the promotion of efficient management of energy while also promoting the development and utilization of alternative energy sources.In addition to supporting the OPM with the energy policy development the agency also provides the OPM with technical support for the implementation of hinterland electrification projects. Its mandate also extends to carrying out energy related research and to monitoring the performance of the local energy sector.The Public Utilities Commission was established through the Public Utilities Commission Act No. 26 of 1990 which was subsequently amended and at present is operating under Act No. 10 of 1999, the Commission presently consists of a Chairman, who is a full time official, and three other Commissioners, who are appointed and serve on a part-time basis. The general functions of the Commission are regulatory, investigatory, enforcement and such others as stipulated in the Act. It also has the power to initiate and conduct investigations into the operations and standards of service of any public utility under its purview. The Public Utilities Commission is not involved in policy matters but may be called upon to act in an advisory capacity to the Minister responsible for utilities on such matters concerning the utilities as are referred to it by the relevant Ministers. The recently established Department of Energy is a great effort to bring structure, discipline to Guyana’s electricity sector. Responsibility of the oil and gas sector has been transitioned from the Ministry of Natural Resources (MNR) to the recently created the Department of Energy (DE). The Department of Energy operates under the Ministry of the Presidency and it oversees the upstream activities of oil and gas. The detailed scope of work and mandate of the DE is currently under development and foresee that the activities previously under the MNR are now being planned to be transferred to the Department of Energy. |
| **Establishing the most appropriate sector structure given the characteristics of the Service and the objective of the Policy.** | Experience in reform processes and management changes in Latin America and the Caribbean shows that good or bad performance by public utilities providers is not necessarily explained by the type of ownership (public or private), or by the sector’s structure (monopoly or competitive). For that reason and considering the heterogeneity of markets and services in the region, this Policy does not promote a single sector industrial organization for the delivery of public utilities, and emphasizes that regardless of the management model used, there must be good governance practices and a clear, predictable, stable regulatory framework that encourages efficiency and investment.  |
| **The role of economic regulation in creating incentives for efficient, investment, and protection of users’ rights.**  | The adoption of an effective regulatory system tailored to the specific conditions of each sector in each country is a key factor for achieving the Policy’s objectives. A regulatory system should help reduce the capital cost of service providers, encourage investment, set service quality standards, and allow service providers to obtain sufficient revenues to be financially sustainable. The selection of the most appropriate institutional instrument for the specific conditions of the country and the service is of the utmost importance for the effectiveness and sustainability of the regulatory process. This instrument may take various forms, from regulation by contract to more complex methods that require the creation of a multisector regulatory body or even a specific one for each service. The probability that economic regulation will contribute to achieving the Policy’s objectives increases with the degree of independence, autonomy, and transparency of the regulatory institutions and processes. The promotion of users’ rights should be a core objective of the service regulation process. Thus, regulation should ensure that the efficiency gains achieved over time by the service providers are passed on to the users through rate reductions or improvements in service quality. For this to happen, it is essential to prevent the abuse of dominant market power by the provider and strictly apply the standards for quality of service. Regardless of the sector structure and institutional regulation model selected by each country, the Bank will provide assistance in developing information systems that show policy-makers and users the structure and cost and rate levels at all stages of service production.  | Part IV 25 (1) of the PUC Act (Service and Facilities) stipulates that public utilities are required to provide an efficient service of an adequate quality and standard. The rights of the customer to such service are also established under 25 (2). These requirements are clearly aligned with the Bank’s Policy. Components 3 of the program, through the policy commitments, is intended to improve the quality and reliability of electricity service to customers in keeping with the standards enforced by the PUC. |
| **Creating the proper conditions so private participation in public utilities service delivery is a viable option.** | This Policy recognizes that competition has the potential to increase productive efficiency and quality of service. In markets where production technology does not exhibit characteristics specific to natural monopolies, market competition can be generated by allowing several companies to offer services simultaneously. When the markets are natural monopolies, competition for market can produce the same results as competition in the market, as long as the process of selection and regulation of the company providing the service is open and effective. The Policy also recognizes that private participation (in any of its manifestations, including management contracts, concessions, or mixed-ownership enterprises) is a key tool for closing gaps in the quantity and quality of utilities in the region. Attracting private participation to the services covered under this Policy and maximizing its impact on efficiency gains in service management depends on the existence of a macroeconomic context that favors investment and credit, a clear, stable institutional and regulatory framework, and economic conditions that reduce capital cost and allow for reasonable returns on investment. In those cases where the countries consider that competition and implementation of public-private partnerships are suitable mechanisms for promoting the expansion of the supply and enhancing the quality and efficiency of public utilities services, the Bank will provide assistance in strengthening the institutional and legal framework and in developing rules and mechanisms that encourage the participation of enterprises under equal conditions.  | Paragraph 7.IV.1 of The National Development Strategy alludes to fiscal incentives, to encourage investment in the energy sector, particularly in locations away from the coast.Power Purchase Agreements with private renewable energy generators form part of GoG’s policy to address GPL projected generation short falls given the growth in electricity demand.The latter will be complemented by the elaboration of a National Grid Code for the electricity sector in Guyana by Guyana Power & Light Inc. The Code shall incorporate complementary or new technical, administrative and/or procedural actions in the areas of: planning, interconnection, operations, minimum technical requirements and metering. |
| **Strengthening the management of infrastructure used for public utilities service delivery**  | Increasing the supply of infrastructure is not always the most efficient solution in response to growing demand for public utilities. Diagnostics often encourage building more infrastructure over promoting optimal use and management of existing assets, in order to increase the supply and quality of public utilities services, thus avoiding sub-optimal investments. The most pertinent spheres of action for optimizing infrastructure management are: (i) encouraging efficiency in business management; (ii) developing and implementing appropriate, stable asset maintenance policies; and (iii) optimizing the use of the infrastructure through incentives for demand. Policies to drive demand through the setting of standards or the establishment of price incentives (including congestion charges and peak and off-peak rates) have the potential to change consumption patterns while increasing the availability of infrastructure services. Optimization of infrastructure use through price mechanisms not only allows cost savings but can also contribute to environmental sustainability by creating incentives to conserve, and therefore reduce emissions and adverse impacts on ecosystems. When establishing price incentives and changing rates, it is highly advisable to rigorously analyze their distributive incidence among the various types of users, in order to report on possible impacts on social inclusion.  | Component III of the operation will contribute to strengthen the management of infrastructure of the electricity sector through the policy commitments associated with: * The integral development and diversification of the electricity generation matrix of the Demerara-Berbice.
* The incorporation of complementary or new technical, administrative and/or procedural actions in the areas of planning, interconnection, operations, minimum technical requirements and metering.
* The development of policies for the development of sustainable electricity generation.
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| **Promoting innovation to foster efficiency, access, and environmental sustainability** | Technological advances make it increasingly possible to design targeted solutions to meet the demand for infrastructure services. Photovoltaic power generation, micro-hydroelectric generators, and waste separation plants for recycling are examples where technology fulfills the dual role of increasing the supply of services and contributing to environmental sustainability through the development of a lower-emissions offering. The adoption of the latest technologies can also help reduce service delivery costs, for example, through technical and nontechnical loss detection in water and power distribution. Moreover, technological innovations such as smart meters, have the potential to reduce utilities consumption during periods of high demand. This Policy highlights the role of technology for increasing access with cost-effective solutions, reducing maintenance costs, and managing consumption, while avoiding unnecessary investments in increased capacity. The Policy recognizes that the Bank will help disseminate information on the adoption, financing, and systems for management of the most appropriate technology solutions for each particular combination of public utility and demand characteristics. . | Component III considers the development of policies for sustainable electricity generation that will foster the promotion of modern, sustainable and more efficient technologies such as electricity generation from renewable energy sources and distributed generation in the public and residential sectors. |

1. **CONDITIONS**

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| **Policy conditions****(GN-2716-6)** | **Description** | **Comments** |
| **Financial sustainability** | For each operation, it will be verified that the relevant service will generate or receive sufficient funds to meet its financial commitments and cover the operating and maintenance costs of the systems related to the operation. When a Bank operation involves contributions of budgetary funds to subsidize the provision of a public utility service, it will be verified that: 1. the budgetary allocation of such contributions is transparent; and
2. its purpose corresponds with one of the following objectives: i. Expansion of capacity to provide greater access; ii. Increase in the quality of the existing services; iii. Improvement in process administration and adoption of technology for the services to contribute to climate change mitigation or to the management of natural disaster risks.

When the budgetary funds represent rate subsidies, it will be confirmed that progress is made on the design and implementation of the subsidy targeting instruments that grant priority to the most vulnerable and lowest-income groups. | The operation constitutes a Programmatic Loan to Support Policy Reforms, which seeks to cover 2.2% of the country's annual financing needs (deficit plus debt repayments) and does not finance specific investment projects.The program does not contemplate actions that generate or modify the subsidies of the country in the sector. |
| **Economic evaluation** | Public utilities projects will be economically viable in accordance with the cost-benefit and cost-effectiveness evaluation methodologies used and accepted by the Bank.  | The Program has an [economic evaluation](https://idbg.sharepoint.com/teams/EZ-GY-LON/GY-L1067/_layouts/15/DocIdRedir.aspx?ID=EZSHARE-577981847-32), following the bank’s procedures that shows that it is viable, from an economic point of view. The analysis considers the benefits of expanding and technically improving the distribution of electricity versus no expansion or improvement based on the most favorable generation program. The generation programs discussed the current scheme of power generation based on fuel oil and an alternative scheme based mostly on natural gas but also include renewable sources. The economic evaluation is based on a Cost Benefit Analysis (CBA) which delivers a Net Present Value (NPV) of the most favorable generation program as well as an Internal Rate of Return (IRR). The NPV calculation considers present and future flows of costs and benefits where future flows are discounted at a rate of 12%. The IRR evaluates net flows of costs and benefits. The potential costs of implementing these measures were estimated and do not correspond to the Bank's financing for this program.Electricity sales projections consider greater electricity demand due to increased economic growth in both the expansion scenario and the non-expansion scenario, such that any net benefits between the two is only attributable to electricity distribution expansion. Consequently, the two dimensions of the (CBA) are: (i) the incremental electricity sales due to expansion and efficiency improvements and (ii) economic considerations of transitioning power generation from fuel oil to natural gas and renewable energy.The time horizon of the analysis is from 2018 – 2035. Fuel price projections in the 2018 Update Study are based on the US Energy Information Administration (EIA). Table 3 summarizes the results of the of the CBA. NG 50 Case shows a positive Net Present Value of US$ 132 million with an internal rate of return of 17%. Although the financial benefits of expansion are significant, totaling US$ 416 million between Self-Generation, Loss Converted to Sales, and the Linden Connection, the greatest contributor to benefits are the cost-savings of shifting the energy matrix from fuel oil to natural gas/renewables. These benefits represent US$ 498 Million in PV terms. The benefits of C02 emissions reductions are small by comparison US$ 68 million. **Summary of Results in US$ Millions**

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| **Benefits** | **NG 50** | **NG 30** |
| Financial |  |  |
|  Self-Generation | 186 | 186 |
|  Loss Converted to Sales |  39 |  39 |
|  Linden Connection | 192 | 192 |
| Economic |  |  |
|  |  |  |
|  C02 Benefits Savings |  68 | 81 |
|  Investment/Operating Cost Savings | 498 | 447 |
| **Benefits Present Value** | 982.9 | 944.7 |
|  |  |  |
| **Cost Present Value** | **851** | **902** |
| **Net Present Value** | **132** | **42** |
| **Internal Rate of Return** | 17% | 15% |

 Source: own calculations based on 2018 Update StudyNG 30 Case shows a positive Net Present Value of US$ 42 million with an internal rate of return of 15%. The financial benefits of the NG 30 are equal to NG 50, but the operating cost and CO2 emission savings a lower, contributing to a lower net present value and internal rate of return.  |