



Power Utility Upgrade Program

**3238/OC-GY; 3239/BL-GY;
GRT/EX-14519-GY
(EDF/2014/346-960)**

Project Completion Report (PCR)

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Electronic Links

1. [Development Effectiveness Matrix \(DEM\) Summary](#)
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4. [Annex 1 PCR Checklist](#)

Optional Electronic Links

1. [Ex post Cost-Analysis report](#)
2. [Minutes of the Project Exit Workshop](#)
3. [Stakeholder Engagement Report](#)

Acronyms and Abbreviations

BIS	Business Information System
CDP	Corporate Development Plan
CIS	Customer Information System
D&E	Development and Expansion Program
EU	European Union
GOG	Government of Guyana
GPL	Guyana Power and Light Incorporated
IDB	Inter-American Development Bank
IT	Information Technology
LV	Low Voltage
MIS	Management Information System
MSP	Management Strengthening Program
MV	Medium Voltage
NPTAB	National Procurement and Tender Administration Board
O&M	Operation and Maintenance
PCR	Project Completion Report
PCU	Program Coordination Unit
PM	Project Management
PT	Procurement Training
PUUP	Power Utility Upgrade Program
SCADA	Supervisory Control and Data Acquisition
SMP	Social Management Plan
SMU	Social Management Unit
TC	Technical Corporation
UAEP	Un-served Areas Electrification Program

BASIC PROJECT INFORMATION

^GY-L1041 Power Utility Upgrade Program

Country Beneficiary Guyana	Loan Instrument Investment Loan	Borrower GY-GY - COOPERATIVE REPUBLIC OF GUYANA	Loan(s) 3238/OC-GY, 3239/BL-GY	Sector Energy	Sub-Sector Energy Sector Rehabilitation And Efficiency
Date of Board Approval Jun 25, 2014	Date of Eligibility for First Disbursement Dec 15, 2014	Date of Closure (CO) Feb 03, 2023	Loan Amount - Original 37,641,750.00	Loan Amount - Current 36,568,502.90	Pari Passu 50/50
Total Project Cost 37,641,750.00	Months In Execution from Approval 104	Months In Execution from First Disbursement 98	Original Date of Final Disbursement Oct 10, 2019	Actual Date of Final Disbursement Oct 10, 2022	Cumulative Extension(Months) 36
Total Amount Disbursed 36,568,502.90	Total Percentage of Disbursement 97%				

^ Ratings of project Performance in PMRs



Has This Project Received Funds from another Project? ☐ Yes ☒ No

Has This Project Sent Funds to Another Project? ☐ Yes ☒ No

Development Effectiveness Classification Satisfactory

No	PMR Date	PMR Stage	Classification	Disbursement Percentage (As of Dec 31)
1	Apr 14, 2016	Second period Jan-Dec 2015	Alert	1%
2	May 04, 2017	Second period Jan-Dec 2016	Problem	7%
3	Apr 24, 2018	Second period Jan-Dec 2017	Problem	22%
4	May 15, 2019	Second period Jan-Dec 2018	Satisfactory	53%
5	Apr 30, 2020	Second period Jan-Dec 2019	Satisfactory	69%
6	May 12, 2021	Second period Jan-Dec 2020	Satisfactory	82%
7	Apr 28, 2022	Second period Jan-Dec 2021	Satisfactory	96%
8	May 16, 2023	Second period Jan-Dec 2022	Satisfactory	97%

^ Bank Staff



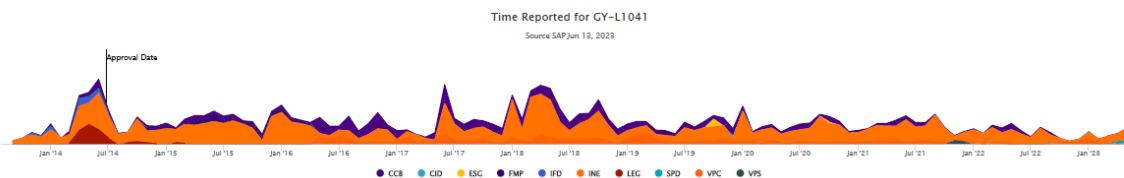
Positions	At PCR Feb 03, 2023	At Approval Jun 25, 2014
Vice-President VPS	Lopez, Benigno	Levy,Santiago
Vice-President VPC	Martinez, Richard	Vellutini,Roberto
Country Manager	Alli,Tariq (CCB/CCB)	Johnson, Gerard (CCB/CCB)
Sector Manager	Yepez-Garcia,Rigoberto Ariel (INE/INE)	Rosa,Alexandre Meira (INE/INE)
Division Chief	Madrigal Martínez, Marcelino (INE/ENE)	Leandro Alves (INE/ENE)
Country Rep	Solorzano Salazar, Lorena (CCB/C	Makonnen,Sophie (CCB/CGY)
Project Team Leader	Masson,Malaika Ebony Anietia (ENE/CGY)	Echeverría Echeverría,Carlos Bladimir (ENE/CGY)
PCR Team Leader	Masson,Malaika Ebony Anietia (E	

^ Staff Time and Cost



Stage Project Cycle	# of Staff Weeks	USD (including Travel and Consultant Costs)
Preparation	27.0	123,320.04
Supervision	251.8	1,076,367.68
Total	278.8	1,199,687.72

^ Time



I. INTRODUCTION

A. Summary

- 1.1 This document presents the Project Completion Report (PCR) for the Power Utility Upgrade Program to Guyana Power and Light Inc. (3238/OC-GY & 3239/BL-GY; GRT/EX-14519-GY project, approved by the Bank and signed by the Government of Guyana (GOG) on 25 June 2014. The program builds on approximately two decades of IDB support to the electricity sector in Guyana starting with hinterland electrification in the “Un-served Areas Electrification Program” (UAEP) in 2004 followed by “Power Sector Support Program” in 2008 which focused on strengthening the legal, regulatory, and institutional framework and energy sector policies. The focus then narrowed in 2011, to bring more support to the electricity losses with the “Sustainable Development of the Electricity Sector and Improved Quality of Service” program whilst two technical Cooperations (TC)¹ started a more holistic examination of losses, exploring GPL’s corporate functions and internal capacity to strengthen reliability in its provision of electricity in Guyana.
- 1.2 **The Power Utility Upgrade Program (PUUP)** aimed to broaden and deepen previous efforts, utilizing IDB loan resources to leverage additional resources that together provided a substantive co-financed program for the electric Utility, with an overall budget of US\$64,573,000. The program was co-financed with Bank resources and a non-reimbursable grant from the European Union’s Caribbean Investment Facility (CIF), through a Project Specific Grant (PSG). Bank resources were provided from the following sources of financing: (i) the biannual allocation for Guyana (document GN-2442-42) of the Ordinary Capital (OC) and the Fund for Special Operations (FSO) -“parallel loans”- under the DSF/EPBA Framework (document GN-2442); and (ii) the allocation of OC resources from the Bank’s regular lending program (OC loan), as set forth in the framework of the Grant Leverage Mechanism (GLM, document AB-2946). The EU contribution was €19,375,000 through a PSG administered by the Bank. Of the total EU contribution, up to the equivalent of US\$22,500,000 was to be used to match the portion of OC loan resources under the GLM and disbursed on a pari-passu basis with the OC resources.
- 1.3 The main objective of the co-financed PUUP operation (3238/OC-GY; 3239/BL-GY) was to enhance GPL’s operational efficiency and corporate performance, to prepare the organization to supply electricity in a sustainable manner in the future. The specific objectives were to improve the following: management and administration, system planning and design, information technology, infrastructure requirements, commercial operations, and infrastructure to allow for loss reduction, consistent with GPL’s D&E. The program was made up of 3 Components: (i) Management Strengthening Program (MSP); (ii) Operational Efficiency; and (iii) Infrastructure Investments for Loss-reduction.

¹ In 2012 the IDB approved two TC: (i) an Operational Support (OS) “Support to the preparation of Loan GY-L1038” (ATN/OC-13621-GY) which is currently supporting the preparation and will support the execution of GY-L1041; and (ii) “Strengthening Capacity in Energy Planning and Supervision” (ATN/OC-13602-GY).

- 1.4 The overall performance of the project is **satisfactory**. Its relevance at design, during implementation and at completion is rated as **excellent**. The project was aligned to the Bank's Institutional and Country Strategies and Update, and to the National Development Strategy (NDS) of Guyana, and the Low Carbon Development Strategy 2030. It is important to note however, that the vertical logic and therefore Results Matrix (RM) of the project originally designed in 2014 did not follow the current principles and logical framework. Therefore, the PCR team had to calibrate the findings of the final RM in accordance with the principles of the current logical framework (see figure 1). The relevance analysis shows that the vertical logic of the project was adequately established. All the output indicators were achieved with two output indicators recording 76% and 65% mainly due to the loss in euro currency equating to US\$6,039,119.20 resulting in a reduction in the km of LV/MV network infrastructure upgraded² and a reduction in the losses anticipated. Hence, the effectiveness and efficiency rating are **satisfactory**. The effectiveness score dropped mainly due to a forced reduction by 24% of the kilometres of transmission lines to be upgraded. As noted, this was a direct result of a reduced budget following the euro currency fluctuations, resulting in the loss reduction target falling short by 2.7%. The efficiency of the project is **satisfactory** as result of the prolonged time spent to implement the project. With regards to the non-core criteria, the Bank's performance and the Borrower's performance yielded a **satisfactory** rating.

B. Background

- 1.5 In 2002, the IDB funded the US\$28 million "Un-served Areas Electrification Program (UAEP)",³ executed in six years, and focusing on: (i) network expansion; (ii) commercial loss reduction;⁴ (iii) rural electrification; and (iv) institutional strengthening and capacity building. The UAEP facilitated connections to about 40,000 households across 7 regions in Guyana and contributed to the successful reduction of commercial losses by 8%. In 2010, at closure of the UAEP, the trend in the reduction of losses was undermined by an unexpected increase of 2.4% in technical losses, due to the lack of investments in network upgrades and operations and maintenance (O&M) activities.⁵
- 1.6 The IDB in 2008, funded the "Power Sector Support Program", a US\$12 million Policy-Based Loan (PBL) which contributed to strengthening the legal, regulatory, and institutional framework for the implementation of sector policies and reforms.

² This is considered an impact that was out of the control of the project.

³ The original approved amount for the loan was US\$34.4 million. The UAEP was amended in 2004 resulting in the adjusted amount of US\$28.2 million. Resulting in the adjusted amount of US\$28.2 million.

⁴ The UAEP included US\$6.3 million to partially finance GPL's Loss Reduction Strategy.

⁵ UAEP Project Completion Report, 2011.

- 1.7 In 2011, the IDB approved the US\$5 million loan “Sustainable Development of the Electricity Sector and Improved Quality of Service” (2567/BL-GY)⁶, to support the continuation of key actions that have shown positive impacts in the reduction of commercial losses and to finance, for the first time, specific actions to support GPL’s effort in the reduction of technical losses. Activities financed by the loan include the: (i) reduction of illegal connections by increasing protection to meters and to the system itself in high-risk areas; (ii) replacement of defective meters and meter upgrades; (iii) installation of additional pre-paid and remotely read meters to allow for use of handheld communicating sets (Itron meters); (iv) collection and analysis of field data to assist with the identification of customers per distribution transformer on the Customer Information System (CIS); and (v) the implementation of a Social Management Plan (SMP) associated with the rehabilitation of the distribution network. The 2567/BL-GY operation reached 62% disbursement of its resources in 2013. The first 90-km section of the distribution network was expected to be finalized in the second quarter of 2014. Meanwhile, in 2012, the IDB approved two Technical Cooperations (TC).⁷The Loss Reduction Unit of GPL reported 19.5% of commercial losses and 14% of technical losses in June 2010. This estimation then showed an increase in technical losses from 11.3% in 2006 to 14% in 2010. Weaknesses in the distribution network not only increased technical losses due to low capacity to manage the distributed energy but also hindered the implementation of focused efforts to reduce commercial losses.
- 1.8 To tackle losses effectively, it became necessary to upgrade the network and to improve its technical and social capacity to deliver energy. Upgrading the network was also expected to improve GPL’s ability to monitor energy usage in different sectors of the grid, therefore, allowing for better monitoring of overall losses.
- 1.9 Reducing overall electricity losses of GPL would also lead to improved financial performance while alleviating the government’s fiscal commitments about the energy sector. The Power Utility Upgrade Program was identified to assist with this through the rehabilitation of approximately 630 kilometres of GPL’s distribution network in selected communities in regions: 3, 4, 5 and 6.
- 1.10 The general objective of the program was to enhance the GPL’s operational efficiency and corporate performance, to prepare the organization to supply electricity in a sustainable manner over the long-term. The specific objectives were to improve GPL’s: (i) management and administration; (ii) system planning and design; (iii) information technology; (iv) infrastructure requirements; (v) commercial operations; and (vi) infrastructure to allow for loss reduction, consistent with GPL’s Development and Expansion (D&E) program. The PUUP operation was comprised three components: (i) Management Strengthening Program (MSP); (ii) Operational Efficiency; and (iii) Infrastructure Investments for Loss-reduction.

II. CORE CRITERIA. PROJECT PERFORMANCE

A. Relevance

a. Alignment with country development needs

- 2.1 The loan was granted in 2014 as the government, along with the Utility – GPL, sought to embark on a mission to reduce the losses and make the power utility profitable⁶. At that time, the National Development Strategy (NDS) of Guyana⁹ noted that the electric utility needed to establish systems and procedures that would see a reduction in electricity tariffs along with a higher, more reliable quality of power supply (measured by international standards) that would disincentivise self-generation. The overall aim was for GPL to produce and distribute electricity for every Guyanese, electricity that was affordable and reliable – in other words - a steady supply 24 hours a day, 365 days per year, and with no fluctuating voltages.
- 2.2 The NDS specified that to sustain the supply of electricity, GPL would need to: (i) reduce the dependency on imported petroleum products; (ii) increase the utilisation of new and renewable domestic energy resources; (iii) ensure that energy was used in an environmentally sound and sustainable manner; and (iv) encourage energy conservation practices.
- 2.3 The next important policy document was more recently published in 2023 - “Guyana’s Low Carbon Development Strategy (LCDS) 2030”¹⁰, and looks at a long-term development vision for Guyana. The LCDS identifies the following priorities: (i) 100% access to electricity; (ii) accelerating the transition to renewable energy resources; (iii) stabilising the electricity grid to transmit and distribute reliable electricity supply; (iv) implementing energy efficiency mechanisms; and (v) building human capital and institutional capacity.
- 2.4 At the time of the project completion for the PUUP operation, Guyana’s macroeconomic context has been one of a booming oil economy for its 785,000 citizens. With an estimated find of more than 11 billion recoverable oil barrels and production ramping up, the IMF 2022 Article IV report estimated Guyana's real gross domestic product (GDP) would grow 25.2% in 2023, this has been revised to 37.2%. The Government has renewed its focus on supporting the non-oil economy (agriculture and logistics) and on infrastructure upgrades for schools, hospitals, and transport routes. In keeping with the LCDS, the project specific goals remain consistent within GPL goals as part of a complementary plan to foster the envisaged increases in demand for electricity and the access to the indigenous new fuel supply option – natural gas¹¹. The critical planning targets remain consistent with those of the LCDS, and the electric utility is seeking to achieve in the next 5 years a platform for Self-Monitoring, Analysis, Reporting Technologies: and the strengthening of the Distribution network infrastructure.

⁶ 2567/BL-GY. Sustainable Development of the Electricity Sector and Improved Quality of Service.

⁷ ATN/OC-13621-GY “Support to the preparation of Loan PJ-GY-00023” which now is supporting 3238/OC-GY, 3239/BL-GY and ATN/OC-13602-GY “Strengthening Capacity in Energy Planning and Supervision”.

⁸ [GPL, Development and Expansion Programme, 2013 – 2017.](#)

⁹ [The National Development Strategy of Guyana.](#)

¹⁰ [Guyana’s Low Carbon Development Strategy 2030.](#)

¹¹ [GPL’s Development and Expansion Plan 2022 - 2026.](#)

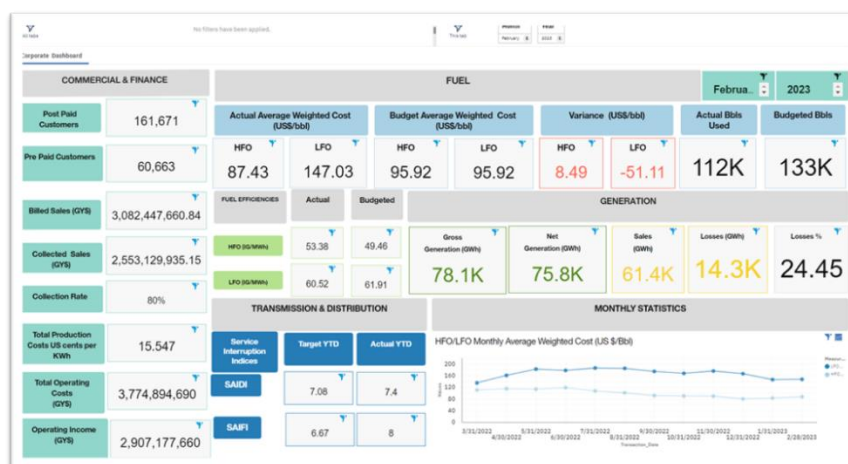
b. Strategic Alignment

- 2.5 The program has been consistently aligned with the IDB Guyana Country Strategy (2012-2016) (GN-2690) with respect to: (i) reduced overall electricity losses and improved quality of service, and (ii) enhanced institutional, legal, and regulatory measures and strengthened capabilities of GPL.
- 2.6 The program was also consistent with IDB's CS with Guyana (2017-2021) (GN-2905) as it supports the strategic areas of: (i) establishing a modern national strategy and planning framework; and (ii) delivering critical infrastructure to facilitate human and private sector development. As it relates to the IDB Country Strategy with Guyana 2012-2016, the program was also aligned with the priority area of implementing a low-carbon energy framework for reducing the cost of electricity and increased coverage.
- 2.7 The program has contributed to the lending program priorities of the Ninth General Increase in the Resources of the IDB (AB-2764) (GCI-9) through: (i) lending to Guyana, a small and vulnerable country; and (ii) promoting EE under the infrastructure for competitiveness and social welfare sector priority area. The program is consistent with the Update to the Institutional Strategy (UIS) 2010-2020 (AB-3008) and is aligned with the following development challenges: (i) social inclusion and equality by increasing the capacity of GPL to deliver quality services and meet energy demands; and (ii) productivity and innovation, by strengthening the capacity and capability of GPL to reduce electricity losses and operate in a more efficient and transparent manner. The program is aligned with the cross-cutting themes of: (i) institutional capacity and rule of law, contributing to the improvement of the quality of services provided by GPL (a state-owned enterprise) through the institutional strengthening activities of the program; and (ii) climate change and environmental sustainability, by contributing to the reduction of energy losses and energy consumption, which is relevant considering the oil-based energy mix of the country. Additionally, the program contributes to the Corporate Results Framework (2016-2019) (GN-2727-6) through the indicators of: (i) electricity lines installed or upgraded; (ii) reduction of emissions with support of IDB financing; and (iii) government agencies benefited by programs that strengthen technological and managerial tools to improve public service delivery.

c. Relevance of Design

- 2.8 The general objective of the program was to enhance GPL's operational efficiency and corporate performance, to prepare the organization to supply electricity in a sustainable manner over the long-term. The relevance of design examines the vertical logic and the adjustments of the initial results matrix. The vertical logic of the program is examined through an evaluation of the rational supporting the 6 specific objectives.
- 2.9 To achieve the program's objective described above, the program specific objectives were to improve GPL's: (i) management and administration; (ii) system planning and design; (iii) information technology; (iv) infrastructure requirements; (v) commercial operations; and (vi) infrastructure to allow for loss reduction, consistent with GPL's Development & Expansion plans.

- 2.10 The program is also comprised of three components: (i) Management Strengthening Program (MSP); (ii) Operational Efficiency; and (iii) Infrastructure Investments for Loss-reduction.
- 2.11 **Specific Objective (SO) 1: Strengthening GPL's corporate performance with enhanced external oversight.** The vertical logic of the results matrix that supports the management strengthening and administration services of GPL was robust. Two main areas of focus were: (i) executive management and strategic planning; and (ii) the monitoring of key performances. This program addressed the organization's limited capacity to perform its current obligations within minimum international standards, in a sustainable manner, and more importantly, within the context of the envisaged increase in electricity demand due to the forecasted economic growth. The attainment of this objective included the execution of the Management Strengthening Program (MSP) which enhanced GPL's corporate and operational capacity, including improving the performance and operation of: (i) system planning; (ii) project management; (iii) loss reduction; (iv) network design & operation; (v) quality of service; (vi) procurement; and (vii) human resources. The MSP provided "on-the-job" coaching and classroom-based training. Some of the initiatives that were successfully implemented include: (i) annual updates of the Corporate Strategic Plan (CSP) 2020-2024; (ii) the documentation and approval of annual Divisional Business Plans; and (iii) development and testing of a financial model to provide corporate financial projections. The Corporate Strategic Plan (CSP) 2020-2024 was submitted to the Office of the Prime Minister for approval. All of these are enabling options for GPL to improve and incorporate management best practices so that they can operate similarly to first tier utilities in the region. These trainings targeted the key areas of the operation of the company to enhance their service delivery.
- 2.12 Additionally, a M&E scan of GPL and a complete division survey was completed. An oversight mechanism was developed to help GPL improve, monitor, and evaluate its performance. Some of the main accomplishments are the compilation of KPI performance dashboard for division and customer centres, definition of targets for Customer Service Centre as well as for Transmission and Distribution monitoring, M&E coaching, and continued work on GPL 's KPI computerized dashboard linked to the Business Intelligence System (BIS) ¹² also supported by the program, see the figure below. With this intervention the company can readily access information from multiple data bases and generate on demand reports for prudent decision making.



GPL Dashboard with KPIs for Commercial and Finance

- 2.13 **SO2: Reinforcing of GPL's capabilities in planning, design, commercial operation, demand-side management, and power and network operations.** The vertical logic for the enhancement of the systems planning and design was **robust**. Several areas were addressed namely, SCADA Assessments, training of middle managers, creation of new divisions, procurement and inventory control, and CIS and MIS utility. It considered the training of staff in the areas of other system modelling and simulation from which system planning and design recommendations will be selected. Additionally, it considered the incorporation of new operational staff streams such as, SCADA team: consisting of 3 technicians; 2 Engineers; and a SCADA Senior Engineer, Demand Forecasting Team: consisting of a Demand Forecasting Economist and a Demand Forecast Engineer System Planning & Design Team: total of 5 engineers within the System Planning Unit have been appointed. The teams have been established as staff members in GPL and are capable of, improving the operation of the system with well-trained SCADA officers, and, capable of performing demand forecasting to conduct comprehensive electricity demand projections. The Demand forecasting unit was established under GPL's System Planning and Design Department and was the direct beneficiaries of the demand forecasting capacity building program. Hence, the planning team can generate econometric reports that support the D&E of not only GPL but also the nation. There was a small team performing system planning tasks, however, with this program the department is better focused and structured to provide reports of an international standard eradicating the need of outsourcing these studies to consultants.
- 2.14 This SO addressed the significant organizational challenges within the information technology systems that negatively impacted the capacity of management and technical staff to readily generate various system reports on demand within a short time and without the necessary interventions of the IT division to find and retrieve data from disjointed data bases. Moreover, this objective provided the much-needed platform to address operational issues. In addition, the actions are proving further support to the Corporate Governance Code (CGC) established in 2010, since the management and staff were not able to successfully incorporate all the reform measures stipulated. A Business Intelligence System (BIS) was implemented to provide timely and actionable information for GPL's management and to facilitate improved decision making. As a result, GPL Management can automatically access and generate divisional reports as well as allows for easy monitoring and management of KPIs and standardizing of reports by using consolidated data extracted from all of GPL's various databases. It also allows for the easy visualization and analysis of metrics and information via the creation of multiple customized dashboards and reports.
- 2.15 SO2 also sought to address the operation infrastructure related to reasons behind the unreliability and frequent failure of the power system network. Hence, a comprehensive assessment of GPL's existing power system control and monitoring – the SCADA system resulted in the preparation of a technical proposal for the establishment of a modern SCADA system which will be used for future SCADA upgrading procurements with due consideration given to future renewable energy integration and automatic generation control systems. The existing SCADA system was successfully upgraded with real time monitoring and better operation of the system. In addition, a SCADA department was established with 6 persons who are tasked with system monitoring and preliminary system

¹² The Management Information System referred in the program design, is the Business Information System, and the Customer information System and the Procurement and Inventory Control System.

analysis. The new team can now focus on the network and with the skills transferred from the consultancy under the program, establish reports on system operations that will feed into system planning using the early version SCADA that they have.

- 2.16 SO2 catered to the low voltage concerns and poor power quality that negatively impacted the migration of self-generators to the grid and damaged the appliances of residential consumers. It also provided a mechanism to properly audit the energy use and monitor losses in the distribution network. The Upgrade of the CIS transformer module linked each customer to a transformer. A total of 1,642 transformers data was captured and relabelled, 93.5km of feeder backbone and 102.7km of feeder spurs were mapped, and a total of 34,285 customer mapping and transformer linkages were completed. The CIS system was upgraded and now it is capable of having a complete and automated data base of the network information (i.e., feeders, transformers, and energy meters) for a better operation and maintenance of the system. However, more work is needed to ensure that the CIS fully reflects the actual infrastructure upgrades. For example, an empirical measure of the energy consumption on the upgraded infrastructure should have been established along with a post measure to better capture the improvements gained in revenue collection and energy savings/usage.
- 2.17 **SO3: Achievement of a sustained trend in overall losses reduction.** The vertical logic for the loss reduction has been **robust**. Within the past decade, GPL has undertaken several actions to tackle electricity losses (See table below). Starting with its Loss Reduction Strategy that mainly targeted commercial losses, the project initially adopted practical measures such as upgrading and controlling metering of its largest customers and inspecting all zero-metered customers. Subsequently, GPL embarked on a campaign to inspect the service to all its customers, replace defective meters and change the existing weak interface arrangement for the low voltage users, that were extremely susceptible to fraud¹³. Despite these works conducted, the overall losses were 40.4% in 2005. With the installation of new meters and interfaces; (ii) replacement of defective meters and installation of pre-paid meters; (iii) investigation of zero and low-consumption patterns; and (iv) identification and removal of illegal connections and metering testing GPL realised a 6.5% overall loss reduction in 2007. However, several reasons accounted for the persistent single digits' reduction in losses. Due to an unexpected increase of 2.4% in technical losses, because of the lack of investments in network upgrade and O&M, there was still the need to upgrade the distribution network LV and MV lines. Hence, this objective was realised with the rehabilitation of sections of the network along with the further metering upgrades under this SO. Lot A and Lot B rehabilitated a total 629km of distribution network and installed 41,058 smart meters across 176 communities. The smart meters upgrade is representative of 24% of the customers on the DBIS where the project was conducted.

¹³ 5 billion is being lost annually because of electricity theft due to vandalism of traditional prepaid meters by employees and consumers along the distribution lines that stretch nearly 784km, ([2021, B. Dindyal](#)), ([2020, Indar](#)).

Achievement of a sustained trend in overall losses reduction		
Year	Losses ¹⁴ %	Reduction %
2005	40.4	
2006	37.7	2.7
2007	33.9	3.8
2012	32.1	1.8
2013	31.4	0.7
2022	26.5	4.9

- 2.18 Additionally, the program successfully implemented the Social Management Program (SMP), which in accordance with the special conditions of the Program, was carried out in tandem with the rehabilitation works. The SMP was implemented by the Social Management Unit (SMU) and created the needed awareness and sensitization within the customers about the Program goals, as well as the use of electricity, and the risk of illegal connections or electricity theft. These interventions were all done with the use of print and audio-visual materials as well as community outreach workshops in the Program supported areas (<https://gplinc.com/power-utility-upgrade-programme/puup-gallery/>). This comprehensive approach with social awareness and investment in robust infrastructure has contributed to the reduction of overall system losses from 31.4% in 2013 to 26.5% in 2022. Overall, considering that the PUUP was the most comprehensive investment Program of this magnitude in the country, the rehabilitation works herald the right steps by GPL for improvements to the power sector with concrete investments in the distribution network.

Changes in the Results Matrix

- 2.19 Only for the **SO3**, adjustments were made to the targets for the output indicator “Electricity transmission and distribution lines (km) 830”km to 629 km. Hence, given a 76% upgrade of the originally intended kilometres of medium and low voltage networks, the results matrix was adjusted. Therefore, the outcome indicator, ‘Percentage of overall electricity losses” was reduced by 2.7%, setting the new target for the loss reduction to 26.5 % by 2022.

Changes in the Output Matrix

- 2.20 **In Component I:** Strengthening GPL’s Management Capabilities and Component II: Operational Efficiency there were no modifications done to the output results.
- 2.21 **Component III:** Infrastructure investments for loss reduction experienced modifications associated with the output indicator included in the results matrix. Within component III a total of 830km (Lots: A, B and C) was originally targeted for rehabilitation employing a turnkey contracting modality. However, due to exchange rate losses (Euros/Dollars) and the high contract value of Lot A, the initial target for infrastructure rehabilitation had to be adjusted to 629km (Lots: A and B). All works involved an integral approach to tackling both commercial and technical losses and encompassed the rehabilitation of the medium and low voltage networks, replacement of existing meters, and reconfiguration of the meter

¹⁴ Overall losses within GPL’s network consisting of both technical and commercial losses.

interfaces. The balance of the originally planned Lot C (154km) was not executed and was removed from the PUUP. In total, the PUUP achieved the 629km target of the revised scope of the planned infrastructure upgrades of Component III, See Table 2.

Quality of Indicators

- 2.22 In general, the quality of the selected indicators, both in the result and product matrices, shows a substantive quality level and contributed towards a more efficient GPL in terms of operative performance and a more reliable power supply system. Nevertheless, the indicators under Component II: Operational efficiency could have been measured differently in support of the SO2.
- 2.23 The World Energy Council (2012)¹⁵ has pointed out that energy utilities started shifting their focus to IT techniques which were geared to bringing about efficiency in the distribution system. IT techniques also provide distribution systems with the reliable online monitoring, repair, and maintenance in advance and forcing unplanned power outages to zero, hence delivering the rated capacity with adequate security, utmost reliability, and high availability to the customers (Mohapatra & Mohanty, 2017).¹⁶ Hence, to better measure the utility's operational efficiency improvement, then a direct assessment in keeping with the technical definition of efficiency, $\eta = \frac{\text{Output}}{\text{Input}}$, must be implemented for the outputs and through a simple product or weighted average system be combined to better define the electric utility's operational efficiency. Nevertheless, to determine the process improvement characteristic, for each output identified, then the savings in the form of time, money, and other resources obtained with the automation added in comparison to the original analogy [business-as-usual] methods implemented can be established as well. In this sense, under the Specific object 2: GPL's staff teams trained in power systems operations – could be assessed by counting the number of graduates trained to independently generate models/simulations for the D&E planning of GPL, national planning for the government of Guyana, etc. and/or the number of trained graduates in the systems planning and research department. Also, a Management Information System (MIS) implemented – could have been assessed by the reduction in time it now takes to develop reports via the Management information system (MIS) and the Customer Information System (CIS). In addition, the automation implemented into the procurement system process and/or the number of persons trained to operate the new procurement system, MIS and BIS can be counted. Additionally, assessments for SCADA system expansion completed – an indicator that can be readily monitored and controlled via the SCADA system should be counted such as the number of trained personnel who can independently complete analysis and maintenance of the SCADA system. Finally, a Customer Information System (CIS) upgraded – this could be measured by combining the CIS and BIS system to determine the number of customers linked to each distribution transformer and to the determine the demand, consumption, and revenue generated per transformer, See Table 1.

¹⁵ World Energy Council. (2012). *Transmission and distribution in India*. World Energy Council.

¹⁶ Mohapatra, S. (2017). Improving operational efficiency in utility sector through technology intervention. *International Journal of Enterprise Network Management*, 291-316.

Table 1 Component II – Operational Efficiency Proposed Indicators

Specific Objectives 2 Output Indicators	Unit of measure	Base line	Target
GPL's staff teams trained in power systems operations.	No. of trained graduates in system planning, design, and demand forecasting	0	7
A Procurement and Inventory Control (PIC) system executed.	No. of trained personnel in MIS, CIS, and procurement systems	0	25
Assessments for SCADA system expansion completed.	No. of technical personnel trained in SCADA	0	6
A Customer Information System (CIS) upgraded.	No. of customers linked to the distribution transformers	0	41,058

- 2.24 Self-assessment: Overall, the Relevance of the project is **Excellent**. The project development objectives are aligned with the country development needs and challenges, as well as the Country Strategies for Guyana, at the time of approval and throughout the execution of the program. Also, the vertical logic of the intervention was adequate. In general, it shows a clear link between the causal chain of the intervention, the specific objectives of the operation, and the country's development needs. However, the vertical logic of SO2 indicators could have been more specific as the project team selected indicators that are general to the accomplishment of the outcomes.

Figure 2. Program's Vertical Logic

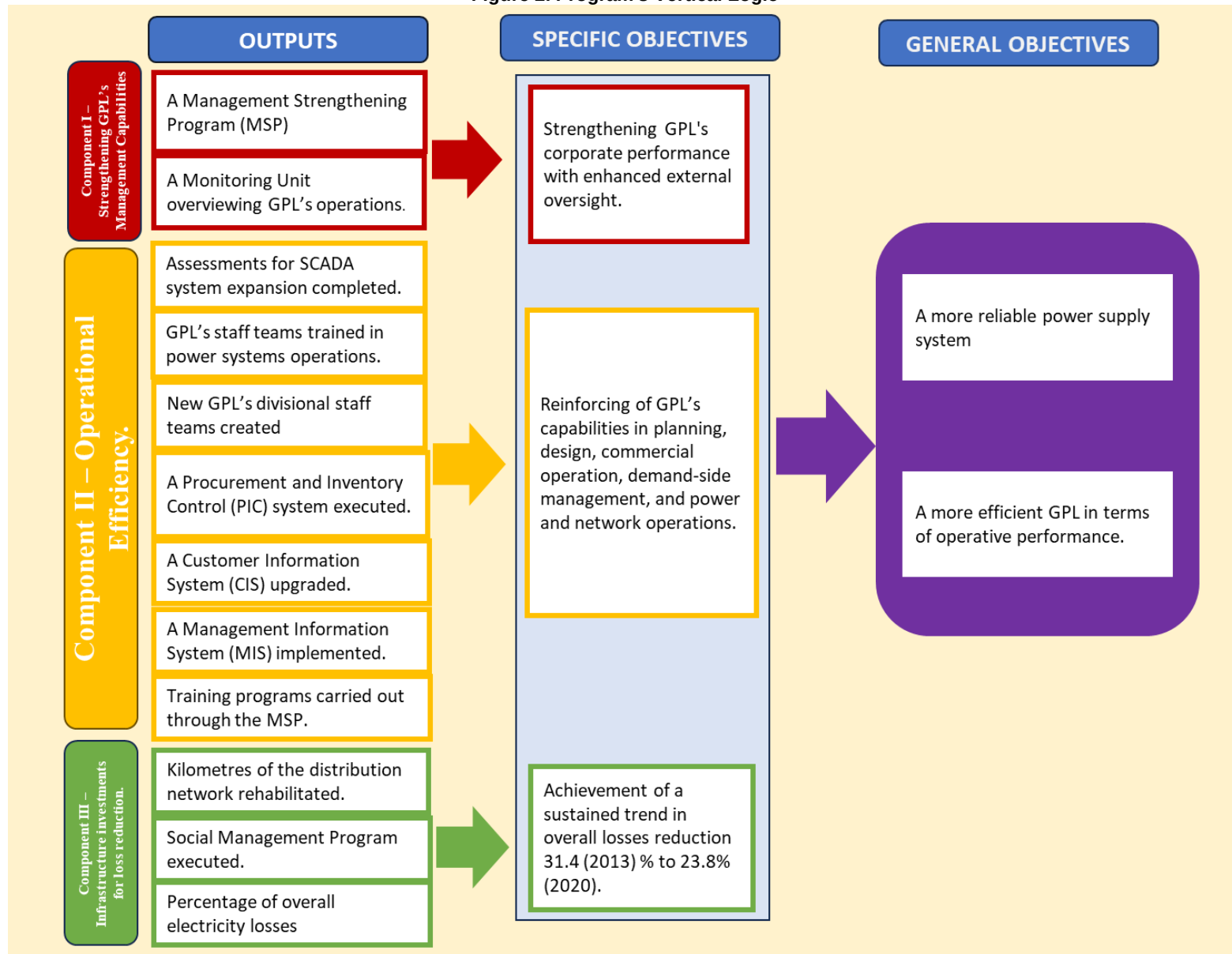


Table 2. Results Matrix (at approval¹⁷, Startup plan and at exit)

Indicators	At approval			Startup plan			At project completion (PCR)			Comments
	Unit of measure	Base line 2013	EOP (P)	Unit of measure	Base line 2013	EOP (P)	Unit of measure	Baseline 2013	EOP (A)	
SO1: Strengthening in GPL's corporate performance with enhanced external oversight.										
A Management Strengthening Program (MSP) executed.	No. of Programs	0	1	No. of Programs	0	1	No. of Programs	0	1	Verification: Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
A Monitoring Unit overseeing GPL's operations is established.	No. of units	0	1	No. of units	0	1	No. of units	0	1	Verification: Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
Training programs carried out through the MSP	No. of programs	0	3	No. of programs	0	3	No. of programs	0	5	Verification: System upgraded and operable. PUUP Semi Annual Report 2021.
SO2: Reinforcing of GPL's capabilities in planning, design, commercial operation, demand-side management, and power and network operations.										
GPL's staff teams trained in power systems operations	No. of staff teams trained	0	4	No. of staff teams trained	0	4	No. of staff teams trained	0	4	Verification: Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
New GPL's divisional staff teams created	No. of staff teams created	0	3	No. of staff teams created	0	3	No. of staff teams created	0	4	Verification: PUUP Semi-Annual Report.
A Management Information System (MIS) implemented: (Procurement and Inventory Control (PIC) system executed	No. of Systems	0	1	No. of Systems	0	1	No. of Systems	0	1	Verification: Systems are implemented and operable. PUUP Semi Annual Report 2021. CIS Final Report. The program has achieved both the MIS and the PIC
Assessments for SCADA system expansion completed.	No. of Assessments	0	4	No. of Assessments	0	4	No. of Assessments	0	4	Verification: Consultant's Final Reports reviewed and accepted by GPL.

¹⁷ It is noted that the results matrix as IDB Board approval, was not designed following the Specific Objective (CO) logic.

Indicators	At approval			Startup plan			At project completion (PCR)			Comments
	Unit of measure	Base line 2013	EOP (P)	Unit of measure	Base line 2013	EOP (P)	Unit of measure	Baseline 2013	EOP (A)	
										PUUP Semi Annual Report 2021.
A Management Information System (MIS) implemented: Customer Information System (CIS) upgraded	No. of Systems	0	1	No. of Systems	0	1	No. of Systems	0	1	Verification: Systems are implemented and operable. PUUP Semi Annual Report 2021. CIS Final Report. The program has achieved both the MIS and the PIC
SO3: Achievement of a sustained trend in overall losses reduction.										
Kilometers of the distribution network rehabilitated.	Electricity transmission and distribution lines (km)	0	830	Km	0	830	Km	0	629	Verification: Contractor's Reports. PUUP Semi Annual Report 2021.
Social Management Program executed.	No. of programs	0	1	No. of programs	0	1	No. of programs	0	1	Verification: Social Management Coordinator Reports. PUUP Semi Annual Report 2021. Consultant's Final Evaluation Report.
Percentage of overall electricity losses	Percentage	31.4	23.8	Percentage	31.4	23.8	Percentage	31.4	26.5	Verification: Social Management Coordinator Reports. PUUP Semi Annual Report 2021. Consultant's Final Evaluation Report.

B. Effectiveness

a. Statement of project development objectives

- 2.25 The general objective of the program was to enhance the GPL's operational efficiency and corporate performance, to prepare the organization to supply electricity in a sustainable manner over the long-term. The specific objectives are improving GPL's: (i) management and administration; (ii) system planning and design; (iii) information technology; (iv) infrastructure requirements; (v) commercial operations; and (vi) infrastructure to allow for loss reduction, consistent with GPL's D&E. The program is comprised of 3 components: (i) Management Strengthening Program (MSP); (ii) Operational Efficiency; and (iii) Infrastructure Investments for Loss-reduction.

b. Results Achieved

- 2.26 The effectiveness assessment was based on an evaluation of the extent to which the project achieved its intended objectives, outcomes, and outputs established at the beginning of the program. Table 3 summarizes the outcomes and outputs originally planned under each component (results matrix at start-up¹⁵), revised, and the actual results obtained.
- 2.27 **SO1: Strengthening in GPL's corporate performance with enhanced external oversight** – the results achieved for this specific objective were excellent, as 100% of the result indicator was met. A Management Strengthening Program (MSP) to support the senior management in the following areas:
- Operations and execution of projects.
 - Commercial services and information technology.
 - Finance and procurement.
 - Human resources; and
 - Loss reduction.
- 2.28 Under the MSP, GPL executive and senior management benefited from a coaching and mentoring program as well as classroom-based training focussed on the above-mentioned core business units. The consulting firm contracted to provide these services was Manitoba Hydro Inc. (MHI). Additional deliverables under the MSP included:
- Implementation of Critical Improvement Projects (CIP).
 - Implementation of Corporate Strategic Plan.
 - Training for Process Improvement Teams.
 - Implementation of Divisional Business Plans.
 - Development of a core group of Process Improvement Advisors (PIA's) & CIP teams.
- 2.29 The MHI final report submitted to GPL., includes a section on key recommendations and sustainability which, GPL has started to implement, and include:
- Restructuring of GPL's corporate structure.
 - The redesign of internal business processes.
 - Holding regular division and department performance review meetings.
 - Expanding the MIS division in view of the role it is expected to play in implementation of the Corporate Strategic Plan and the evolution of GPL in general.

- Supporting investment decisions by detailed business case analysis including rigorous examination of alternatives; and
 - Streamlining all commercial loss reduction activities under one division.
- 2.30 These recommendations serve to guide GPL's continuous improvement efforts and for building upon the positive outcomes of the MSP. GPL's organizational restructuring and the redesign of business process are ongoing based on MHI's recommendations. The other initiatives that have been successfully implemented include:
- Annual updates of the Corporate Strategic Plan (CSP) – the 2020-2024 version was submitted to the Office of the Prime Minister for approval.
 - The documentation and approval of annual Divisional Business Plans; and
 - Development and testing of a financial model to provide corporate financial projections.
- 2.31 The Oversight Mechanism was intended to complement the MSP, to help improve, monitor, and evaluate GPL's performance on a permanent basis. M&E consultant came on-board and worked closely with the GPL Executive and the Social Management Team (SMT). In this regard, the consultant conducted in-field working sessions, including visits to all power stations, customer service centres and transmission and distribution (T&D) areas in the various Regions. The consultant also conducted an M&E scan of GPL to ascertain the level of maturity and readiness for the Oversight Mechanism and completed the Divisional Survey and Findings Analysis and the Divisional Performance Analysis which was shared with GPL executive and senior management.
- 2.32 In, 2019 activities were aimed at emphasizing the M&E activities of the Oversight Mechanism at the Ministry of Finance (MOF) and GPL Board levels. The oversight mechanism was fully established in 2017 in fulfilment of Program objectives. Monitoring of GPL's performance, having been strengthened under the Program will continue through existing governance arrangements which includes GPL's Senior Management Team, GPL's Board of Directors, the Ministry of Public Works, and Ministry of Finance.
- 2.33 Some of the consultant's main accomplishments included:
- Establishment of targets for Transmission and Distribution Performance evaluation.
 - Compilation of KPI Performance Dashboard for Divisions and Customer centres.
 - Targets for Middle St. Customer Service Centre defined, approved, and monitoring initiated.
 - GPL KPI monitoring committee launched, as a forerunner to an M & E unit.
 - M & E coaching for Divisions, Power Stations, Customer Service and T&D Centres.
 - Divisional Survey, Findings and Performance Analysis shared with CEO & Divisional Directors.
 - Computerized KPI dashboard.
- 2.34 This procurement and implementation of the inventory control package was achieved in 2015 and contributed to improved and streamlined procurement processes across GPL's departments with the standardization and transparency offered by the new software.
- 2.35 **SO2: Reinforcing of GPL's capabilities in planning, design, commercial operation, demand-side management, and power and network operations** – the results achieved for this specific objective were excellent, as 100% of the result indicator was met. Both the

Customer Information System (CIS) and the Management Information System were upgraded and in implementation. GPL's staff teams were trained in several areas of power system operations including SCADA, System Planning and Design, and Demand Forecasting Trainings. New staff teams were also created for each of these specialised areas. The System Planning & Design Team also benefited from training under the SCADA/System Planning consultancy which will serve to strengthen the utility's technical capabilities to prepare quality engineering designs for new network infrastructure and provide critical inputs for the development of the utility's Development and Expansion Plans based on international best practice.

- 2.36 Demand forecasting training was delivered by international expert consultants (Electro Technical Services S.A.) and GPL's Demand Forecasting Unit now has the capacity to develop more precise electricity demand forecasts which are informed by rational scenario and modelling analysis. Improved demand forecasting also is expected to contribute to improved development and expansion planning and by extension improved operational efficiency. As part of the practical approach utilised in the training GPL staff collaborated with the consultants to develop an up-to-date demand forecasting model which is currently being utilised by GPL to inform expansion planning throughout its value chain. GPL staff also now have the capacity to update the model based on changes in the country's macroeconomic outlook, national policy, and other critical assumptions, which may evolve over time. Key government agencies consulted for the development of the forecasting model include the Ministry of Finance, the Bureau of Statistics, and the Guyana Energy Agency. The demand forecasting model and a related manual were presented to GPL's executive management team.
- 2.37 Advance Utility Systems (AUS) was contracted to update GPL's Customer Information System Transformer Module in collaboration with GPL staff and individual consultants. Twenty-two (22) field assistants were hired and equipped with the necessary tools to perform the data collection exercise. Data was captured from a total of 1,642 transformers and relabelled accordingly with the aim of matching all customers to transformers within the CIS system. Approximately 94km of feeder backbone, and 103km of feeder spurs were also mapped resulting in a total of 34,285 customer mapping and transformer linkages. Following the uploading of all field data GPL's CIS transformer module is now fully upgraded and operational. AUS made a presentation to GPL's Management. A final report was also prepared by the consultant and submitted to GPL.
- 2.38 With the completion of this output GPL is now able to better manage network assets and monitor energy consumption and losses within the system. Already GPL has reported increases in billing and cash intake in areas with updated customer information and LV/MV system upgrades.
- 2.39 Additionally, the BIS is meant to be a single platform that allows for easy monitoring and management of KPIs and standardizing of reports by using consolidated data extracted from all of GPL's various databases. It allows for the easy visualization and analysis of metrics and information via the creation of multiple customized dashboards and reports. This reduces information silos in the company and creates opportunities for increased collaboration. It is meant to be a strategic decision-making tool used by Executives and supervisory level staff but is not limited to them. A spin off benefit of the reporting feature is that it will significantly reduce the time taken to create reports as it pulls the relevant data directly from the databases. The first phase implemented under the PUUP focused on four (4) divisions including finance, commercial and operations loss reduction for which

reports, and sample dashboards were created. A Corporate dashboard which displays all the company's KPIs on a single window was completed. The BIS now hosts the M&E facility for informing management decisions and performance (see annex VII for screenshots of the BIS dashboard).

- 2.40 In addition, the inventory control system was implemented in 2015 contributed to improved and streamlined procurement processes across GPL's departments with the standardization and transparency offered by the new software package. Hence, the results achieve for this specific objective were excellent, as on average 100% of the result indicators were met.

- 2.41 A comprehensive assessment of GPL's existing SCADA system was conducted by a team of international experts and the system was optimised and reconfigured to function in concert with SYS-OPS and CIS. For the system optimization work the SCADA consultant and GPL coordinated with the original equipment manufacturer/installer and a joint mission successfully facilitated to perform necessary system updates and reconfiguration to maximise the functionality of the current system. With the SYS-OPS/ SCADA link there is now greater capacity emphasis on maintaining power to the customers and reducing faults/outages.

- 2.42 The consultancy also prepared a technical proposal with estimated costs for the establishment of a modern SCADA system with due consideration given to the future integration of renewable energy and automatic generation control as part of GPL's Development and Expansion Plans. The technical proposal for the replacement SCADA system was submitted to Cabinet. As GPL continues to develop over the short to medium term resources will be required to replace the existing SCADA system. All SCADA and System planning consultancy services were provided by the international consultants.

- 2.43 The Customer Information System (CIS) – linking the existing CIS with the unused transformer module app, GIS and SCADA systems to compare movement of energy and the customer data, location and billing. The CIS was updated allowing location and monitoring of customer base. Functionality via the transformer module to link system consumption with groups of customers activated. The CIS currently supports the key Commercial function- "Customer to Cash". As the first line of interaction with the customer -it generates work orders – bills the consumption and finally facilitates receipt of cash. CIS now has input new data for 39,000 customers (mainly in Georgetown) but needs further investment to complete the rest of the system. Limited coverage of the customer base is due to the lateness of the start of this component.

- 2.44 **SO3: Achievement of a sustained trend in overall losses reduction** – The specific objective was satisfactory, as most but not all of the intended results were achieved. Lot A Project ultimately rehabilitated a total of 319km of distribution network across 89 communities and installed 22,373 smart meters. Meanwhile the Lot B rehabilitated a total of 310km of distribution network across 87 communities and installed a total of 18,685 meters. However, a total of 830km (Lot A, Lot B and Lot C) was originally targeted for rehabilitation employing a turnkey contracting modality. However, due to exchange rate losses (Euros/Dollars) and the high contract value of Lot A, the initial target for infrastructure rehabilitation had to be adjusted to 629 km (Lot A and Lot B). All works involved an integral approach to tackling both commercial and technical losses and encompass the rehabilitation of the medium and low voltage networks, replacement of existing meters, and reconfiguration of the meter interfaces. This project targeted a portion

of the network where loss reduction was high and the need for the improved infrastructure was vital. The balance of the originally planned Lot C (154km) was not executed and has been removed from the PUUP. In total, the PUUP achieved the 629km target of the revised scope of the planned in infrastructure upgrades.

- 2.45 **Social Management Program (SMP)** – In accordance with Section 4.07 of the Special Execution Conditions, the rehabilitation works were complemented by social management campaigns based on an approved social management plan (SMP). The Social Management Program (SMP) was a particularly novel and successful activity of the Loan Program and was executed by the Social Management Unit (SMU) staffed by a Coordinator and an Assistant Coordinator who were supported by external Social Sector Teams. The SMP outreach meetings key stakeholders included local government representatives, GPL supervisors and technical staff. Baseline surveys of the consumers carried out have yielded customer intelligence that improved systems design and facilitated a more agile meter installation. All the major communities under the program were visited and activities related to the awareness and sensitization objectives were undertaken. During the rehabilitation works the SMU regularly engage with community leaders and residents keeping them informed of planned works, status of execution and outages where required. The outreaches included explanations on the impact of newly installed transformers in reducing energy losses and improving quality of electricity supplied, and sensitization of beneficiaries on practical issues such as need for inspectors and contractors to visit their homes to review the existing connection.
- 2.46 The sole indicator measured the percentage reduction in losses over the period 2015 to 2021. The results achieved for this outcome is 65% of the targeted value which was because of the reduction in SO3 – km of MV/LV line upgraded. As a result of the reduction in the MV/LV network upgrade a new target for loss reduction in GPL was set at 26.5% which was achieved at the end of the project effecting 4.9% reduction in system losses from the 2013 baseline.
- 2.47 The effectiveness rating for this project is **Satisfactory**¹⁸. The project demonstrated that the specific development objectives and their expected development results were achieved as summarised in the Results Matrix, considering the coherence with the vertical logic.

¹⁸ PCR Checklist.

Table 3. Results Achieved Matrix

Table 3: Results Achieved Matrix							
Specific Objectives/Indicator	Unit of Measure	Baseline value	Baseline year	Targets and Actual achievement		% Achieved	Means of verification
SO1: Strengthening in GPL's corporate performance with enhanced external oversight.							
A Management Strengthening Program and Oversight Mechanism executed	Number of programs	0	2013	P	1	100%	Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
				P(a)	1		
				A	1		
SO2: Reinforcing of GPL's capabilities in planning, design, commercial operation, demand-side management, and power and network operations							
A Customer Information System (CIS) and a Management Information System (MIS) upgraded and in implementation	Number of Systems	0	2013	P	1	100%	System is implemented and operable.
				P(a)	1		PUUP Semi Annual Report 2021.
				A	1		
SO3: Improving infrastructure to allow for loss reduction							
Percentage of overall electricity losses	Percentage	31.4	2013	P	23.8	65%	Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
				P(a)	26.5		
				A	26.5		

Outputs	Unit of Measure	Baseline value	Baseline year	Targets and Actual achievement		% Achieved	Means of verification
Component 1: Strengthening in GPL's Management Capabilities							
A Management Strengthening Program and an Oversight Mechanism executed.	Number of programs	0	2013	P	1	100%	Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
				P(a)	1		
				A	1		
A Monitoring Unit over viewing GPL's operations is established	Number of units	0	2013	P	1	100%	Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
				P(a)	1		
				A	1		
Component 2: Operational Efficiency							
Assessment for SCADA system expansion completed	Number of Assessments	0	2013	P	4	100%	Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report
				P(a)	4		
				A	4		
GPL's staff teams trained in power systems operations	Number of staff teams trained	0	2013	P	4	100%	Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report
				P(a)	4		
				A	4		
New GPL's divisional staff teams created	Number of staff teams created	0	2013	P	3	100%	PUUP Semi-Annual Report
				P(a)	4		
				A	4		
Purchase and implement Inventory control package & link user locations	Number of Systems	0	2013	P	1	100%	Systems are implemented and operable. PUUP Semi Annual Report 2021.
				P(a)	1		
				A	1		
CIS to be updated, linking customers to their transformers.	Number of Systems	0	2013	P	1	100%	System is implemented and operable. PUUP Semi Annual Report 2021. CIS Final Report
				P(a)	1		
				A	1		
A Management Information System (MIS) implemented	Number of Systems	0	2013	P	1	100%	System is implemented and operable. PUUP Semi Annual Report 2021. BIS Final Report.
				P(a)	1		
				A	1		
Training programs carried out through the MSP	Number of staff teams created	0	2013	P	3	100%	System is implemented and operable. PUUP Semi Annual Report 2021. BIS Final Report.
				P(a)	5		
				A	5		
Component 3: Infrastructure investments for loss reduction							
Kilometres of the distribution network rehabilitated.	Electricity transmission and	0	2013	P	830	76%	Contractor's Reports. PUUP Semi Annual Report 2021.
				P(a)	629		
				A	629		

Outputs	Unit of Measure	Baseline value	Baseline year	Targets and Actual achievement		% Achieved	Means of verification
	distribution lines (km)						
Social Management Program executed	Number of Programs	0	2013	P	1	100%	PUUP Semi Annual Report 2021. Social Management Coordinator Reports. Comments: Activities are still ongoing and are expected to be completed by end of April 2022.
				P(a)	1		
				A	1		
Percentage of overall electricity losses	Percentage	31.4	2013	P	23.8	65%	Consultant's Final Reports reviewed and accepted by GPL. PUUP Semi Annual Report 2021.
				P(a)	26.5		
				A	26.5		

Where: P = Start-Up Plan; P (a) = Revised Annual Target; A = Actual.

c. Counterfactual Analysis

- 2.48 While the program did not consider conducting an impact evaluation, related literature suggests that the interventions implemented by the program are expected to lead to improvements in the outcomes of interest, as the evidence for other countries that have implemented similar policies has shown. The GPL Corporate Development Programme Design, Final Report¹⁹ presents the analysis of international and regional review of the literature that shows the relationship between the products generated in this program and the intended outcomes; this complements the robustness of the vertical logic of the operation described in the previous subsection.

d. Unanticipated outcomes

- 2.49 There were no unanticipated outcomes for the program.

C. Efficiency

- 2.50 A cost-benefit analysis (CBA) was performed on the 3 areas by the IDB at the time of the project's analysis and before the approval of the loan.²⁰ The benefits that were then quantified consisted of an economic evaluation of the following:
- Benefits associated with reducing technical losses.
 - Benefits associated with reduced commercial losses.
 - Benefits associated with reduced disconnections (SAIDI, SAIFI).
- 2.51 The benefits were selected because they are associated with distribution investments (reduced technical losses, reduced commercial losses, and improved reliability) which together were combined to determine the overall economic viability of the PUUP. The overall economic viability of the project and the economic viability under the 2 distinct loss reduction areas are shown in Table 4. All 3 evaluations were accompanied by appropriate sensitivity assessments.

Table 4. Economic Viability of the PUUP before Approval of the Loan

Benefit areas	IRR %	Discount Rate %	B/C ratio
Reduction in Technical losses	12	12	1
Reduction in Commercial losses	14	12	1.1
Overall Project economic viability	13	12	1.1

- 2.52 An ex-post CBA adopted the methodology of quantifying the actual benefits based on the savings from the loss reduction recorded annually during the project's implementation. The 2013 losses were identified as the baseline for the losses. During the first 3 years of

¹⁹ [PPA Energy. \(2013\). Guyana: GPL Corporate Development Programme Design - Draft Final Report Project No.: 20399. IADB.](#)

²⁰ Get link from IDB for: Lecaros, F. (2013). *Power Utility Upgrade Program Economic Analysis*. Georgetown: IDB.

the project's implementation the losses recorded were 2%, then they steadily increased by 1% from year 4 to year 6 to 5% and remained at 5% during year 7 when the project concluded. As a result, the average reduction in losses over the period was 3%. Therefore, the projections for continued losses were completed using the 3% loss reduction as the contribution from the project and 5% which was the losses experienced over years 6 and 7 of the project when it closed, see Table below.

The Savings as a Result of the Reduction in Losses Received by GPL from 2013 to 2022

YEAR	UNIT	2015	2016	2017	2018	2019	2020	2021	2022
BASELINE LOSSES AS AT YEAR END 2014	%	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
LOSSES AS AT END OF CURRENT YEAR	%	29.2	29.2	29.6	28.2	27.6	26.0	26.5	24.8
	%	2.2	2.2	1.8	3.2	3.8	5.4	4.9	6.6
FUEL COST	G\$m	12,635	10,135	13,437	16,935	16,842	15,350	24,400	34,792
SAVINGS	G\$m	278	223	242	542	640	829	1,196	2,296
SAVINGS	US\$m	1.3	1.0	1.1	2.5	3.0	3.9	5.6	10.7

- 2.53 All together the 3 components of the program, that is, Strengthening GPL's Management Capabilities (Component 1), Operational Efficiency (Component 2), and the Infrastructure Investments for Loss Reduction (component 3) utilized 89 % of the planned finances, see Table 5. Meanwhile each of the interventions would have provided a financial benefit and the costs for each output was measured, a mechanism to establish the segmentation of the benefits in a like manner is not possible. Hence, the certainty of the benefits is not possible at a component level and is approached via the program level throughout the company.
- 2.54 The program was executed with co-financing from the European Union. The total amount budgeted for the program was US\$64,573,000 (€19,375,000 from CIF grant and US\$37,641,750 from IDB Loan). During the implementation, the value of the EU contribution was reduced due to exchange rate fluctuations. The reduction of the EU contribution also further impacted the Project's financial arrangement resulting in the cancellations of a portion of the IDB-GLM(OC) that was disbursed using the pari-passu conditions.
- 2.55 Concomitantly, the scope of some activities including the rehabilitation works were reduced to accommodate the reductions in the budget, see Table 5. Hence, the total cost of the program amounted to US\$58,533,880.80 where the EU contribution was US\$21,965,377.90 and the Bank's full contribution was US\$36,568,502.90. Therefore, the project lost US\$ 6,039,119.19 of which US\$4,965,872.10 was due to currency fluctuation (EU contribution) and US\$1,073,247.10 was cancelled as a byproduct of the currency fluctuations based on the pre-established pari-passu financing mechanism from the IDB contribution.

- 2.56 A conservative approach was selected for the cost benefit calculations using the average benefit that the project will deliver as 5% being the percentage loss reduction from 2013 baseline as at end of 2021, the penultimate year of the PUUP implementation. Despite GPL recorded a loss reduction of 6.6% of the 2013 baseline in 2022 this reduction may not be fully attributed to the PUUP as the company completed another project which also contributed to loss reduction in 2022, when it commissioned a new generation station with capacity 46.6MW in 2021.
- 2.57 The economic results for the project done in 2013 and those completed in 2023 both have a benefit ratio of 1.1 and the discount ratio of 12%. The NPV is less in the later economic analysis due to the singular approach for the savings calculated and the reduction in costs and anticipated returns of the project, resulting in an IRR of 8% at project close compared to 13% anticipated prior to disbursement of the loan. An accurate assessment of savings might have been accomplished if the costs directly related to the component (Component 3) for loss reduction were used. Instead, the full cost of the program was applied.
- 2.58 Since the savings reaped from the projected resulted from the savings in fuel prices then a sensitivity analysis was completed to explore the opportunities for the savings to increase if fuel increased or to reduce should GPL commence using cheaper fuels such as natural gas or RE technologies. Hence, below shows the economic indicators for the project with an average savings of 5% reduction in losses from the 2013 base line throughout the life of the project, i.e., 25 years and the effects of an increase or decrease of fuel cost by 10%.

Economic analysis	Sensitivity		
	Av 5%	Av 5% @110%	Av 5% @ 90%
IRR:	8%	9%	7%
Discount Rate:	12%	12%	12%
NPV benefits (US\$m)	\$ 37.46	\$ 40.15	\$ 34.76
NPV costs: (US\$m)	\$ 34.18		
B/C ratio:	1.10	1.17	1.02

- 2.59 Hence, as per the PUUP program the average costs for upgrading of the LV/MV network along with the average cost of electricity loss reduction is shown below.

	Amount	Unit	Over all costs (US\$m)	Direct costs (US\$m)	Average (US\$m)
Cost per % Loss reduction LV/MV	4.9	%	\$ 11.95	\$ 8.49	\$ 10.22
Cost per km of LV/MV costs	629	km	\$ 0.09	\$ 0.07	\$ 0.08
Annual spend	7	years	\$ 8.36	\$ 5.95	\$ 7.15

D. Project Implementation Delays

- 2.60 The project experienced several delays during its implementation. Component 1 management strengthening program was delayed due to the following:
- Need to realign the TORS to more address current GPL/ energy sector developments.
 - Absence of key directors and management personnel in target group for the training.
 - Finalizing of the GPL corporate strategic plan.
 - Assignment and turnover of key management staff.
 - Building trust between the GPL management team and the consultants.
- 2.61 During the implementation of Component II there were also some delays. At the initial implementation of the Operational Efficiency component there were procurement and institutional capacity challenges related to lack of technical capacity to develop TORs and evaluate proposals, and conflicts between hiring modalities (in this case, consultant vs. staff), the contracting of quality experts to train the GPL staff was eventually achieved.
- 2.62 Lots A and B+ were essentially completed in April 2019 and August 2021 respectively. Lot B+ continued into the defect's liability period until August 2022 where any outstanding items of work, repairs, defects of workmanship or materials were to be remedied. The original contract period for lot A was 18 months which was later extended to 21 months to satisfy claims by the contractor for lost time.
- 2.63 Fifty kilometers of lines from the work programmed under Lot C were incorporated into the reformulated Lot B+. The balance of Lot C or 154km of system lines and associated meter installation were removed from the PUUP and were not executed. The PUUP therefore attempted and achieved 76% of the system upgrade and meter installations originally programmed under the Loan. The PUUP therefore achieved 99.7% of the revised scope of this component. Lot B+ was completed in 27.5 months as opposed to the planned 21 months. This extension would have included disruptions to the work schedule due to the COVID pandemic and civil unrest related to the General Elections of 2020.
- 2.64 Overall, the efficiency rating is **satisfactory** since the analysis revealed positive results following the ex-post CBA. Despite the delays in the execution and the reduction of the km of LV/MV line upgrade, considering the baseline values, the actions taken by the program obtained an IRR of 8% and net economic benefits to the NPV of US\$37.46 Million.

Table 5. Costs of the Project

Output Definition	Targets and Actual achievement	2015	2016	2017	2018	2019	2020	2021	2022	2023	Cost
Component: Component I – Strengthening GPL's Management Capabilities.											7,808,676.34
A Management Strengthening Program (MSP) executed	P	500,000.00	2,000,000.00	2,000,000.00	2,000,000.00	706,000.00					7,206,000.00
	P(a)	0.00	1,510,226.78	2,181,662.18	1,871,302.73	2,151,737.90	0.00	0.00			7,714,929.59
	A	0.00	1,510,226.78	2,181,662.18	1,871,302.73	2,151,737.90	0.00	0.00	0.00	0.00	7,714,929.59
A Monitoring Unit overseeing GPL's operations is established.	P	0.00	30,000.00	30,000.00	45,000.00	33,000.00					138,000.00
	P(a)	0.00	26,874.00	43,470.00	43,200.00	43,200.00	41,938.65	0.00			93,746.75
	A	0.00	1,408.62	4,320.00	42,480.00	33,335.25	12,202.88	0.00	0.00	0.00	93,746.75
Component: Component II - Operational Efficiency											2,559,486.85
Assessments for SCADA system expansion completed	P	216,000.00	324,000.00	0.00	0.00	0.00					540,000.00
	P(a)	100,000.00	25,000.00	169,840.00	424,600.00	357,749.00	304,490.00	229,700.00			689,392.67
	A	0.00	0.00	0.00	0.00	234,193.56	225,499.11	224,664.04	0.00	0.00	684,356.71
GPL's staff teams trained in power systems operations.	P	312,500.00	430,000.00	175,000.00	87,500.00	0.00					1,005,000.00
	P(a)	100,000.00	0.00	162,745.00	125,400.00	344,292.00	200,000.00	0.00			467,735.21
	A	0.00	0.00	0.00	2,486.63	216,258.71	248,989.87	0.00	0.00	0.00	467,735.21
New GPL's divisional staff teams created.	P	281,250.00	646,875.00	684,875.00	0.00	0.00					1,613,000.00
	P(a)	100,000.00	25,000.00	169,583.00	353,284.00	128,743.00	143,696.00	142,200.00			389,339.41
	A	1,714.94	0.00	5,998.56	23,017.86	63,301.16	153,106.89	142,710.50	0.00	0.00	389,849.91
A Procurement	P	123,000.00	0.00	0.00	0.00	0.00					123,000.00
	P(a)	0.00	28,367.95	78,335.00	0.00	0.00	0.00	0.00			151,413.20

Output Definition	Targets and Actual achievement	2015	2016	2017	2018	2019	2020	2021	2022	2023	Cost
and Inventory Control (PIC) system executed	A	94,632.05	0.00	35,080.00	21,701.15	0.00	0.00	0.00	0.00	0.00	151,413.20
A Customer Information System (CIS) upgraded	P	25,000.00	25,000.00	0.00	0.00	0.00					50,000.00
	P(a)	0.00	26,339.00	34,137.00	104,440.00	216,151.00	29,354.00	341,500.00			484,863.34
	A	1,895.98	18,764.35	29,903.15	27,567.79	33,155.63	32,076.44	180,017.00	0.00	0.00	323,380.34
A Management Information System (MIS) implemented	P	50,000.00	0.00	0.00	0.00	0.00					50,000.00
	P(a)	50,000.00	15,000.00	0.00	150,000.00	250,000.00	132,843.00	43,300.00			216,318.65
	A	0.00	0.00	0.00	809.38	98,982.47	73,226.80	40,899.28	0.00	0.00	213,917.93
Training programs carried out through the MSP.	P	55,000.00	261,714.00	261,714.00	261,714.00	130,858.00					971,000.00
	P(a)	55,000.00	10,000.00	51,810.00	345,000.00	155,257.00	0.00	0.00			160,424.37
	A	0.00	0.00	0.00	2,486.62	157,937.75	0.00	0.00	0.00	0.00	160,424.37
Component: Component III - Infrastructure investments for loss reduction											41,615,279.95
Kilometers of the distribution network rehabilitated.	P	1,875,000.00	5,625,000.00	15,600,000.00	13,025,000.00	5,375,000.00					41,500,000.00
	P(a)	1,875,000.00	3,994,010.00	12,663,832.00	9,485,339.00	14,696,603.00	5,127,326.00	8,343,700.00			41,064,708.95
	A	161,126.64	165,203.88	6,846,064.71	6,418,392.83	12,685,314.67	6,444,906.22	7,208,389.56	461,905.46	1,340,542.96	41,731,846.93
Social Management Program executed.	P	48,000.00	345,000.00	500,000.00	452,000.00	155,000.00					1,500,000.00
	P(a)	48,000.00	43,000.00	158,996.00	180,000.00	181,426.00	95,949.00	199,600.00		0.00	550,571.00
	A	5,382.57	42,980.26	109,308.08	101,298.53	83,237.67	76,103.58	122,779.55	9,480.76	0.00	550,571.00
Other Costs											

Output Definition	Targets and Actual achievement	2015	2016	2017	2018	2019	2020	2021	2022	2023	Cost
Supervision Firm	P	200,000.00	400,000.00	533,330.00	533,330.00	333,340.00					2,000,000.00
	P(a)	100,000.00	535,000.00	836,597.00	792,566.00	924,073.00	300,000.00	541,300.00			2,578,448.54
	A	406.78	0.00	462,330.33	750,350.75	640,613.93	183,446.75	250,598.69	309,915.23	0.00	2,597,662.46
Financial and technical auditing, monitoring and evaluation	P	0.00	100,000.00	169,625.00	100,000.00	269,625.00					639,250.00
	P(a)	0.00	0.00	58,552.00	58,552.00	8,552.00	8,552.00	43,500.00			114,178.93
	A	0.00	11,999.64	8,552.05	33,152.45	8,470.02	8,504.77	16,524.29	32,379.78	0.00	119,583.00
Administration	P	500,000.00	400,000.00	400,000.00	400,000.00	300,000.00					2,000,000.00
	P(a)	100,000.00	371,871.00	330,692.00	310,926.00	330,552.00	427,700.00	375,600.00			2,378,741.64
	A	232,324.95	337,886.62	333,525.28	313,678.84	303,139.65	482,586.30	442,689.65	231,761.15	118,245.96	2,795,838.40
IDB Admin FEE	P	538,625.00	0.00	0.00	0.00	0.00					538,625.00
	P(a)	538,625.00	0.00	0.00	0.00	0.00	0.00				538,625.00
	A	538,625.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	538,625.00
Contingency	P	0.00	0.00	0.00	2,250,000.00	2,449,125.00					4,699,125.00
	P(a)	0.00	0.00	0.00	0.00	0.00	0.00	923,349.00			923,349.00
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Cost	P	4,724,375.00	10,587,589.00	20,354,544.00	19,154,544.00	9,751,948.00					64,573,000.00
	P(a)	3,316,625.00	6,541,661.95	16,877,071.00	14,554,707.00	19,819,126.00	6,811,848.65	11,183,749.00		0.00	58,516,786.25
	A	1,036,108.91	2,088,470.15	10,016,744.34	9,608,725.56	16,709,678.37	7,940,649.61	8,629,272.56	1,045,442.38	1,458,788.92	58,533,880.80

Source: Outputs - Financial Progress Operation Number: GY-L1041.

E. Sustainability

- 2.65 The sustainability of this program is evaluated as Excellent. The impacts of sustained decreasing overall losses might increase in the forthcoming years, therefore the risks of GPL discontinuing interventions in LV loss reduction and meter upgrades are low. The potential risks to the sustained decreasing of overall losses might increase in the forthcoming years. However, the risks of GPL discontinuing interventions in LV loss reduction and meter upgrades are low and are mitigated, either by activities financed by the project, or by the expressed commitment of the Executing Agency to ensure availability of the needed resources, and the GOG recognition and commitment to continue to support the sector.
- 2.66 With regards the social and environmental safeguards, the operation was classified as category C with minimal or no negative environmental and social impacts. ESG started supervising the project in 2019 as the Environmental and Social Risk Rating (ESRR) became substantial due to the capacity of the executing agency, geographical extent of project activities and impacts caused by inadequate environmental and social management. A Partially Unsatisfactory Safeguard Performance Rating (SPR) was granted for the operation for inadequate hazardous waste and health and safety management. Nonetheless, in 2020 the SPR improved to Partially Satisfactory and was maintained in the last supervision report prepared by ESG in November 2021. The ESRR was still substantial in the mission from October 2020, but decreased to moderate in 2021. A moderate ESRR translates into that an ESG specialist is no longer part of the project team and the team leader directly supervises the environmental and social performance of the project.

a. General Sustainability Aspects

- 2.67 The program sustainability evaluation was based on a review of institutional, financial, social, and environmental aspects, and considers potential obstacles or impediments for a proper operation of the new infrastructure, equipment, and other program investments. A review of the factors that contribute to or could potentially undermine the project's sustainability revealed that no significant or insurmountable risks exist that could erode long-term sustainability, nor that the identifiable risks could not be properly mitigated.
- 2.68 **SO1: Strengthening GPL's Corporate Performance with Enhanced External Oversight.** – The sustainability of the results achieved for SO1 depends heavily on the continued use of the recommendations that are presented to GPL by MHI and the continuity of the Oversight mechanism, this conditioned to the financial availability of resources to support such required activities and commitment of GPL management to continue pursuing excellence in the utility. The potential obstacles to sustainability of results are mitigated by the following considerations: (i) the activities under component one were considered to enhance the management practices to allow for the availability of information to inform better decision making at a given point in time, currently is following the MSP recommendations; (ii) Operations management capabilities have been enhanced to address, system planning, operations and execution of projects, commercial services and information technology, finance and procurement, human resources, loss reduction; (iii) the critical improvement projects implantation and corporate strategy plans provide a series of further opportunities that the utility would need to pursue; (iv) the in house process improvement teams who will continue to play an integral role in the on demand business process improvement conditions; (v) business development plans in each

division delineating clear KPI for each division to support the economic viability of the corporation; and (vi) the oversight mechanism which will further aid to improve, monitor and evaluate GPL's performance on a permanent basis.

- 2.69 **SO2: Reinforcing of GPL's capabilities in planning, design, commercial operation, demand-side management, and power and network operations** – The sustainability and further improvement of the results achieved for SO2 will depend on GPL's performance indicator for the new divisions System planning & design team and the demand forecasting team. Notwithstanding the ongoing continuity of actions, the sustainability of the system planning, and design need to be approached with careful consideration. Guyana suffers of high migration rate of qualified personnel thus specific risks include GPL's difficulties in recruiting suitably skilled staff, high staff turnover and the current low numbers of graduate engineers and other professional staff in the market. Additionally, with the development of the new oil and gas sector, trained and qualified personnel are subject to be attracted by oil companies offering better benefits. The 7 people who have been recruited in these departments would have received training in the SCADA/system planning and demand forecasting which will mitigate the sustainability risks in the following ways: (i) the system planning personnel are equipped with the technical capabilities to prepare quality engineering designs for new network infrastructure and provide critical inputs for the development of the Development and Expansion Plans based on international best practice; and (ii) members of the demand forecasting team receive a good set of benefits and continuity in the company. Also are trained and can better develop more precise electricity demand forecasts which are informed by rational scenario analysis. These improvements are expected to contribute to an improved development and expansion planning and by extension improved operational efficiency.
- 2.70 The sustainability and further improvement of the results achieved for SO2 will also depend on GPL's newly implemented BIS, and CIS, along with the capability capacity of the staff to continue implementing the systems. The potential obstacles to sustainability of results are mitigated by the following considerations: (i) the targeted capacity building activities within the BIS development included GPL's capacity enhancement in the various areas, specially IT, for having a single platform that allows for easy monitoring and management of KPIs and standardizing of reports by using consolidated data extracted from all of GPL's various databases.; (ii) GPL's strategic plan gives great emphasis to extending the CIS and BIS to other areas and making resources available to support further operational efficiencies. GPL's commitment to further incorporating information technology is well established. In the next 7 years, GPL has planned to implement the SMART initiative via the new control centre and the new SCADA system that would support remote, automated operation and generation management. Hence, it is safe to say that the utility's strategy to further advance the use of IT to ensure further operational efficiency is evident.
- 2.71 The sustainability of the results achieved under SO2 will rely on the adequate operation of the SCADA system that has been recently upgraded to support efficiency, reliability, and timely management decisions. The potential obstacles to sustainability of results are mitigated by the following considerations: (i) the program interventions for improved SCADA ensured the optimisation and reconfiguration of the old SCADA system to function in concert with SYS-OPS and CIS; (ii) The system upgrade was done in compliance with relevant standards, supervision support was made available through the program financing, the SCADA consultant further liaised/coordinated with the original equipment manufacturer/installer and a joint mission successfully facilitated to perform necessary

system updates and reconfiguration to maximise the functionality of the old SCADA system at GPL; (iii) during the upgrade of the system the staff seconded to work along with the SCADA consultant would have received on the job training and some vital transferrable skills and techniques; and (iv) while the current system continues to operate at optimum capacity the consultant furnished GPL with a technical proposal with estimated costs for the establishment of a modern SCADA system with due consideration given to the future integration of renewable energy and automatic generation control as part of GPL's Development and Expansion Plans. GPL has since submitted to Cabinet, the Technical Proposal for the replacement SCADA system and has been working with the consultant with the development of the ToR for the new SCADA system. Nevertheless, a small risk to the sustainability can be the inability of GPL to procure within the short to medium term a new SCADA system. GPL needs to secure the financing for such investment given the forecasted incorporation of renewables and natural gas generation into the grid and the growth in power demand.

- 2.72 The sustainability of results achieved under with SO2 also depends on GPL's continuation of improved operation and management practices, financial performance, and billing monitoring and management via the CIS. This risk is considered low, as GPL is currently fully working with the CIS, which is benefiting better, and more accurate information of their customers linked with the transformers and metering systems. The potential obstacles to sustainability of results are mitigated by the following considerations: (i) GPL now has the capacity to continue to update the CIS Transformer module via the 22 field assistants who were hired and equipped with the necessary tools to perform the data collection exercise; (ii) recommendations for further work to support the CIS has been presented to GPL via a presentation and a final report prepared by the consultant Advance Utility Systems (AUS) indicating areas for further work, which GPL will act on; and (iii) the system has registered increases in billing and cash intake in the locations where there are an updated customer information and LV/MV system upgrades. With the marked increase in revenue collection and system monitoring GPL is looking to finance similar programs in other areas of the network. In addition, GPL continues to procure and install AMI compatible meters for their customers. The nation's utility is has planned to implement a SMART Network system is to be completed within the next 10 years. The SMART Network system will consist of a distribution management system that would be able to connect with AMI meters to retrieve meter readings and monitor end-user consumption all done remotely.
- 2.73 **SO3: Achievement of a sustained trend in overall losses reduction** – The sustainability and further improvement of the results achieved for SO3 will depend on GPL's Loss Reduction Program, and financial resources. The risk of GPL not continuing investment in loss reduction is low. The potential obstacles to sustainability of results are mitigated by the following considerations: (i) GPL has received the spare materials from the project that would assist with the maintenance of the upgraded area in the short term, (ii) as a result of a contractor's inability to meet the contractual arrangements during the work validation GPL identified an interim team to complete the validation exercise consisting of a professional engineer and field clerks, this expertise is now locally available and can be developed so that it may be employed as needed; (iii) the Social Management Unit (SMU) and the SMP together are international best practices that resided now with the utility to address the loss reduction mandate going forward; (iv) GPL's distribution efficiency and revenue collection allows for improvements in Energy accounting and

auditing in ICAI (2012)²¹, a reliable and robust energy accounting and auditing approach will help in reducing the losses; (v) the Management strengthening program, monitoring oversight unit and the project management training have prepared GPL for the management of the new assets and ensure the long-term sustainability of the investments; (vi) GPL is thoroughly familiar with the infrastructure works completed, and the various trainings further enhances GPL's capacity for the operation and maintenance of the new infrastructure; (vii) GPL's strategic plan for 2023-2027 recognizes the need to further strengthen the network's operation and maintenance practices to ensure efficient operation of the utility and continued reduction in commercial and technical losses; and (viii) the BIS and CIS systems helps to address GPL's challenges with the auditing of energy supply and delivery at the distribution level.

b. Environmental and Social Safeguards

- 2.74 Overall, the social and environmental safeguards for the operation were adequate and in line with its initial categorization. The performance of the safeguards ended up being satisfactory. However, there were some challenges during execution that had to be addressed to ensure an adequate environmental and social performance. During program implementation the main environmental and social impacts expected were those related to the LV/MV distribution lines upgrade, excavation, dirt removal, noise, dust, pole and equipment installation, and other potentially electrical distribution activities.
- 2.75 In 2019 the Environmental and Social Risk Rating (ESRR) became substantial due to the low capacity of the executing agency, geographical extent of project activities and impacts caused by inadequate environmental and social management, particularly hazardous waste management. Consequently, ESG started supervising the project. A Partially Unsatisfactory Safeguard Performance Rating (SPR) was granted for the operation for inadequate hazardous waste and health and safety management. Hazardous wastes were not properly stored at any of the GPL or contractor facilities creating unsafe work conditions. Poor storage of hazardous materials including oils, fuels and lubricants. There were inadequate storage/improper maintenance areas especially for inspection and refurbishment of transformers. Environmental and Social Assessments have been completed for all the projects and respective management plans were implemented properly (with the exception of hazardous materials).
- 2.76 Nonetheless, in October 2020 the SPR improved to Partially Satisfactory and was maintained in the last supervision report prepared by ESG in November 2021. GPL took the relevant steps to ensure construction of fenced, locked, covered, bunded facilities with non-permeable floors for most. GPL made significant progress in the proper storage of equipment containing hazardous materials through: (i) the development of a hazardous material quick reference guide to be implemented across all GPL activities; and (ii) the construction of proper storage facilities at GPL substation and contractor facilities. Unsafe work conditions due to poor waste management have been rectified due to general clean-up of previously poorly maintained areas. Health and safety requirements had been consistently enforced. Improvements had been made in procedures to ensure the Bank is notified in the event of serious incidents. Overall, new hires had improved the frequency and quality of supervision of works.
- 2.77 The ESRR was still substantial in the mission from October 2020, but decreased to moderate in 2021. GPL hired and trained key environment/social/health/safety staff to help

²¹ ICAI. (2012). *Technical Guide on Internal Audit of Power Industry*. Mumbai.

manage projects. This resulted in significant improvements in organizational procedures and hazardous materials storage. Despite outstanding waste management for one site linked to activities not funded under project which EA would require to follow-up prior to end of project, overall ESRR was reduced to moderate based on enhanced capacity and demonstrated proactiveness. Follow-up was needed for the Garden of Eden location where the lubricant storage bond and some transformers had not been able to be relocated due to construction of the new Wartsila plant – some areas still required clean-up/organization of solid waste (November 2021).

- 2.78 During the implementation of Component III, some residential users were not completely satisfied with the installation of electrical meters. Many never had an electrical meter attached to their home and had access to either free electricity via illegal connections, or simply paid a flat fee without any measured usage. GPL under the project developed an established and robust Social Management Program responsible for community outreach and engagement. This practice demonstrates a significant improvement in GPL's approach to E&S management and community engagement for their projects.
- 2.79 The location of the construction sites for the upgrade of the LV/MV significantly reduced the possibility of complaints from surrounding households. The temporary negative impacts were addressed in a generally satisfactory manner through the social management plan. The SMU regularly engage with community leaders and residents keeping them informed of planned works, status of execution and outages where required. The outreaches included explanations on the impact of newly installed transformers and metering devices in reducing energy losses and improving quality of electricity supplied, and sensitization of beneficiaries on practical issues such as need for inspectors and contractors to visit their homes to review the existing connections.

III. NON-CORE CRITERIA

A. Bank Performance

- 3.1 The Bank's performance assessment considered two stages in the program's preparation and execution process: (i) Bank performance in ensuring quality at entry and (ii) quality of Bank supervision during execution.
- 3.2 Despite some weaknesses in the diagnostic and pre-design of the project, quality at entry is considered Satisfactory based on the following observations: (i) the Bank secured the co-financing arrangement for the program from the EU. This generated the opportunity for the GOG to finance priority capital investments for the optimization of the power utility upgrade system in priority areas, allowing also for the strengthening of the utility's management structure, enhancing the operational efficiencies and the reducing of technical losses in the distribution network priority areas, which it is expected to have an impact in the quality of life and general welfare of the population in targeted areas; (ii) the Bank facilitated the preparation of this operation through a Technical Cooperation "Power utility upgraded Program" (ATN/OC-13621-GY)²² in 2014 to strengthen the senior

²² The SMLRA was designed for GPL using TC resources (ATN/OC-13621-GY) and is based on international best practices to prioritize the selection of the areas for intervention that facilitate the greatest reduction in losses. The SMLRA was prepared considering the availability and quality of information currently owned by GPL. "GPL's Distribution Network Assessment", 2013.

management capabilities, operational efficiency and reduce losses of the power utility; (iii) the risk assessment conducted adequately identified most of the obstacles later encountered and were monitored during execution. Nevertheless, the critical risk of exchange rate fluctuations and the high impact it placed on the operation required the budget to be reviewed and caused overall losses due to exchange rate fluctuation accounted for US\$6M. While some activities were still impacted because of budget limitations, influences mainly by the increased cost of the electrical materials, the impact could have been greater if contingency resources were limited during the design stage; and (iv) the fiduciary arrangements, monitoring and evaluation plan, Operations Manual, Annual Operations Plan (AOP), PMR, etc., although standard in IDB operations, were adequate for this operation.

- 3.3 Quality of supervision during execution is considered **Satisfactory**. One of the major challenges encountered during execution was related to procurement processes for the implementation of power infrastructure. The Bank team provided valuable support to the Executing Unit to ensure a successful process as well as having a good coordination and support received from the EU. Other shortcomings during execution are due to the budget limitations because of the increased cost of the electrical devices and the loss of value of the Euro contribution.

B. Borrower Performance

- 3.4 The borrower's performance is considered **Satisfactory**. The borrower designated GPL as the Executing Agency, and the execution arrangements were in place and maintained throughout the execution of the program. Overall, the EA complied with all fiduciary responsibilities. From the execution team there was a good coordination to resolve implementation issues. It is noted that the Monitoring Committee meetings were not held every quarter, especially due to the restriction during the pandemic period.

Table 6.
Findings and Recommendations

Findings	Recommendations
Technical - sectorial dimensions	
1. The use of IT assistance in verification, such as digital recording, was very useful for the project because of the ease of use and accuracy it provided for upgrading the CIS. 2. The reporting and execution parameters were well defined. The good quality of reporting from contractors and subcontractors helped to keep project stakeholders informed about the project's progress and any pressing issues it would have been facing. 3. The Social Management activities were well implemented via the number of media outreached programs held in the local districts and in the schools to sensitize people about the PUUP program and energy efficiency practices. 4. The absence of a system design at the beginning of the program resulted in delays in the project's implementation. 5. Supervisions were done at different times when the contractors/subcontractors had completed the work. Hence it was challenging to adequately identify the corrective actions and have them immediately remedied. 6. The knowledge transfer achieved during the training was beneficial for the technicians and engineers assigned to the SCADA department since personnel did not have direct SCADA exposure in their training or at the company. 7. The indicators identified for the efficiency component need to be more specific and better measures should have been identified considering the portion of work to be completed in relation to the overall system of GPL.	1. The use of IT and Digital solutions are recommended to be part of all programs of loss reduction. This optimizes and provides transparency to the Customer Information while improving reporting and monitoring. 2. Integrating project management reporting and execution parameters that are well defined among project contractors, subcontractors, and projected stakeholders is strongly recommended, since it aids in the timely and accurate update of the projects progress and a trigger/reminder to mitigate/correct any concerns or delays. 3. It is recommended to have sufficient and well-trained specialists on E&S as part of the PEU. This is to enable the PEU to carry out regular supervision works of the contractor and subcontractors and to identify in a timely manner any non-compliance issues and propose corrective actions. 4. It is recommended that Social Management Program be developed to accompany all loss reduction programs since it utilizes all traditional and contemporary media channels to sensitize customers about the benefits of the program and to alert them of disruptions in their area. 5. . The involvement of the partnering institutions (EU) in the design process will aid in reducing project implementation time. It is recommended that the design department be further enabled with capacity, expertise, and resources to complete, and have on retainers, standard system designs for duration the of the program and to identify/support future financing opportunities. 6. Simultaneous supervision of works must be done to allow for cross referencing and better tracking of implementation progress and corrective actions. 7. For the introduction of new and customized technology systems it is strongly recommended to have a knowledge management system instituted and technology transfer/capacity building across sectors, e.g., SCADA, etc. Additionally, the knowledge management program should allow for a community of practice to be created among regional utilities, and of such a special unit like the Social Management Unit should be in place. 8. During the project scoping and prior to implementation it is recommended that together the Bank and GPL establish sound technical and financial baselines and a means for a systematic update of the changes and their effects so that loss reduction savings can be accurately accounted for prior, during and after implementation.
Organizational and Managerial dimensions	

Findings	Recommendations
1. Roles and structure were not well defined and executed; and an integrated communication system was lacking. The communication between the PUUP PEU was not well established. The PUUP failed to communicate with stakeholders in GPL to ensure everyone understands the end goal/see the bigger picture. Hence, when there was a need for the departments to lend support and provide input into the project implementation process, the departments were not forthcoming with the needed assistance that would enhance the implementation of the PUUP. 2. During the project there were limited Human Resources to support project implementation. 3. Due to the high deployment of technology some reluctance to the change were noted.	1. It is recommended that a well-formulated and documented management structure be in place that clearly delineates the roles and responsibilities of each person involved with the project. Additionally, a communication plan should be established prior to the PEU coming on board and then further ratified when the PEU is onboarded. This communication plan must include the entire scope of the program and the direct overseers and staff of the departments where the upgrades will be done. Hence, the departments will be a part of the scoping exercise to establish the communication plans and when the PEU is in place they will jointly review and validate the mode of communication and support. 2. Capacity building required to support the utility sector in the use of technology to be incorporated into the project management processes that will encourage timely updating and reporting. 3. Change Management should be a larger focus for GPL as they prepare stakeholders for transitions, especially for the change related to IT systems. Hence, recommendation is also being made to incorporate a change management plan prior to the project's implementation.
Public Processes/ actors dimensions	
1. The engagement with customers at the community, local government, and regional level was critical and frequent communication was a necessity. This was complemented with the existing strategies such as technology and social media tools. In some instances, the reality on the ground and what the officers involved in the SMP though it would have been were not aligned. It was the direct involvement with the local stakeholders that helped to close the gap between perception and reality.	1. A structured way of communication, including digital form, for real time updates should be established and implemented with programs of this magnitude. Also, the use of social media platforms for greater public awareness such be sustained/maximized. 2. A mechanism that encourages and sustains close coordination between GPL and PUUP, especially with the PR, IT, Networking and Customer Service departments should be in place prior to program implementation.
Fiduciary dimensions	
1. Since 2 currencies were used in the project escaping the rate fluctuations throughout the life of the project was unavoidable. Since it was the IDB and the EU financing the project, both US dollars and Euros were used, which resulted in conversion fees and loss of value when exchanging and inflation. Therefore, the project lost more than USD 6 Million that could have been used to upgrade approximately 86 km of LV/MV line and further provide approximately 0.7% reduction in losses.²³ 2. There was a good team of financial and institutional financial experts, and because of most of the personnel having prior experience with IDB projects. The finance team working on the project had the qualifications and experience to track the financial progress of the program and this contributed to the overall efficiency of the program. Since team members had previous experience working with or on IDB projects, they were familiar with requirements for implementation. 3. There were some disparities in the budget and contract award phase. The length of time between contract signing to when the contract is awarded was affected by inflation and other factors.	1. At implementation of the program, the funds identified for disbursement should be transferred to a project account, at which time the monies will be converted to one currency and remain in that dedicated project account for disbursement. A dedicated grant funding to support specific components of the project such as, but not limited to project design stages, and cases where currency fluctuations could negatively impact the Program funds could also be established. 2. It is critical to comprehend the cycles and techniques related to the financing stage so that agreements are appropriately managed. This will help to avoid delays, overspending on costs, and potential questions that could ultimately hinder efforts to achieve the project's goals. 3. The timely execution of projects within disbursement cycle/implementation phase to eliminate/reduce the payment of fees by the government should be strongly encouraged and planned for. The need for better coordination among internal teams, departments, and contractors to facilitate better financial planning will be beneficial to the program or similar programs.

²³ Ex-Post Cost Benefit Analysis.

Findings	Recommendations
4. The need for a design to be readily available prior to the disbursement of funds impeded the disbursement cycle.	