

**G U Y A N A P O W E R & L I G H T I N C .**

**D E V E L O P M E N T A N D E X P A N S I O N P R O G R A M M E**  
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## Executive Summary

The Company's Strategic Plan focuses on:

- Optimizing revenue.
- Minimizing cost of operations.
- Improving Customer Service (CS).
- Achieving a sustainable financial position.
- Enhancing Corporate Governance Framework and Practices.
- Enhancing Skills and Competencies of Employees and Contract workers.
- Achieving national objectives.

In this wide ranging focus, the Company recognizes that amendments to relevant legislation and its Licence makes it imperative that overall improvement in technical performance, quality of service, financial performance and the development of and retention of appropriate skills are achieved consistently so that Customer Service Standards and the Operating Standards & Performance Targets are achieved. This plan details developments and initiatives over the next five years which will ensure that the strategic objectives, Customer Service Standards and Operating Standards and Performance Targets are achieved consistently.

Amendments to ESRA have provided the Company with new and important tools to continue to fight the scourge of electricity theft. Changes to the Evidence Act to detail technical evidence which can be used to prosecute perpetrators, fixing amounts to be paid by those convicted, being able to refuse service to those convicted of electricity theft thrice and more severe custodial penalties will all contribute to helping to break the culture.

GPL's Licence has been amended to obligate the Company to deliver Customer Service to specific Standards and to confirm to a portfolio of Operating Standards & Performance Targets (OS & PT). The Customer Service Standards imposes a flat fee penalty on the Company, requiring it to credit a consumer's account with an amount where the Standard has not been met and allows the PUC to fine the Company up to 25% of the total value of dividends payable to Shareholder(s) for the calendar year if the OS & PT are not met.

Achievement of the Customer Service Standards (CSS) and the OS & PT consistently is enshrined in the Strategic Plan and this Development & Expansion Programme outlines the actions that would be taken to realize the targets set therein.

There is no doubt that the timely implementation of the sub-projects under the US\$33.9M Infrastructure Development Project financed by the China Exim Bank is critical to;

- Improve supply quality and reliability to meet the Operating Standards and Targets.
- Reduce technical losses which would result in a reduction in power demand, allowing GPL to meet its overall loss Standard, release feeder capacity and improve power quality.
- Reduce operating cost by implementing a optimized merit order system, reduce overall reserve requirements and prepare the network adequately for the advent of hydro.

While the 20.7MW added to the Demerara system in 2009 helped to strengthen the base-load generation capacity, the distribution network's poor performance resulted in an overall unacceptable level of service. Many of the problems experienced on the network relate to the fact that most feeders are loaded close to their thermal limit. Continuous rainfall has also had an impact on network performance as vegetation management is no longer a seasonal challenge.

In 2011, an expansion of the 20.7MW plant, with the addition of two Wartsila 18V32 units, rated at 7.8MW each, is planned. This US\$20M project is expected to achieve commercial operation by the end of August 2011. This addition would increase the Wartsila capacity in Demerara to 80.3MW but it should be recognized that 44MW installed between 1994 and 1997 have accumulated over 872,000 running hours in total and a combination of major electrical maintenance and elevated levels of mechanical forced outage should be expected. In fact, all four alternators at the GOE plant have been recommended for urgent major maintenance which would require downtime of approximately four (4) months in total.

This Development & Expansion Programme envisages that the alternator maintenance at GOE will be undertaken on a planned basis, i.e. no failure will occur prior to the equipment being released for the maintenance. While on paper GPL would have adequate generation capacity to meet peak demand for the duration of this five-year plan, the age of most of its generating fleet and untimely investments, may result in brief intervals of shortfall, particularly during the second and third year.

It should be noted that under the conditions specified by the International Monetary Fund (IMF) through the Poverty Reduction and Growth Facility (PRGF), the Government of Guyana is required to meet a minimum threshold of concessionality attached to any new loan. Specifically, the grant element of any new loan must be in excess of 35%. This has severely limited GPL's ability to secure loans since May 2003 when it became a public entity. Funding from debt in this Development & Expansion Programme is via loans to GPL from Government with resources coming from the China Exim Bank on highly concessional terms.

Completion of the Transmission, Sub-station and Control sub-projects will result in the integration of the West Demerara in the transmission system, provision of feeders to complete the Georgetown frequency standardization, the interconnection of the Demerara and Berbice grids, the installation of Sub-stations to off-load feeders operating above 80% of their thermal capacities in Demerara and Berbice (Serving the West Coast, East Bank, East Coast and Corentyne Coast) and are expected to be completed, realistically by the end of 2012. The Contractor (China National Machinery Import & Export Corporation) has indicated a thirty-month construction period starting in the third quarter of 2010.

Since most feeders in Demerara are approaching their thermal limit, a priority order for the implementation of the transmission and Sub-station sub-projects has been determined. This priority order places the completion of the Versailles and Edinburg Sub-stations and their transmission interconnection as most urgent.

The generation plan seeks to achieve GPL's strategic objective of ensuring that production in Demerara and Berbice from renewable or efficient HFO sources is optimized. The strategic transmission plan seeks the interconnection of all the load centers in the two Counties and the installation of sub-stations (where this is economically feasible) while the technical loss reduction plan embraces a number of strategies to reduce primary and secondary distribution losses while improving service quality.

With power being wheeled efficiently to load centers, investment in distribution becomes very important, to improve power / service quality and reduce technical losses as most of the low voltage (LV) network requires conductor upgrade and therefore accounts for most of the technical losses (6.6%). But while huge investments are being made in generation and T&D, the system must be operated optimally to further improve service quality, reliability and minimize operations cost and this requires a new Central Control Center with modern SCADA capability that is able to manage the national grid automatically.

The Company's financial viability depends heavily on sustained loss reduction, both technical and non-technical. The Programme therefore dedicates significant resources to reducing losses in each of the five years including the implementation of new initiatives to make the network more fraud-proof. All the critical areas of non-technical loss reduction are targeted for investment including metering, electricity theft and fraud proofing the network.

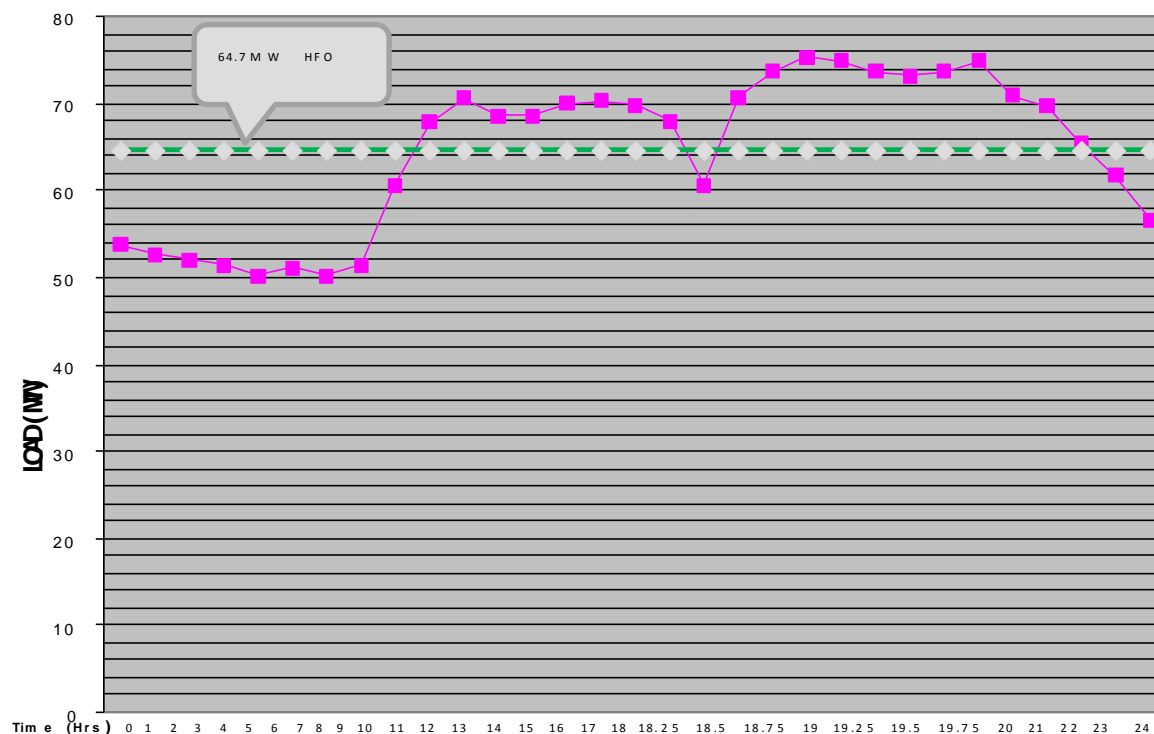
While most of the development focus is on addressing the infrastructural requirements to improve service while reducing cost, the benefits of Demand Side Management cannot be overstated as it can postpone or reduce the level of investment needed in both generation and T&D and also allow Consumers to reduce their power consumption without affecting their quality of life if they are equipped with the knowledge and equipment to use power more effectively and efficiently. Making energy efficient appliances affordable and accessible to the average customer is a challenge and this Programme details an approach that can make this possible. The Demand Side Management (DSM) plan is an annual one in this Programme but GPL expects that eventually it will be able to develop a multi-year one which is significantly wider in scope.

The Programme projects investment of US\$119.3M over five years (it should be noted that US\$10.8M would have been disbursed on the generation and transmission sub-projects in 2010 making the overall investment US\$130M) with financing mainly from debt, undistributed dividends and retained earnings. US\$55.3M is being financed by debt on concessional terms while US\$55M is being financed from undistributed dividends and retained earnings. The investments are as follows:

- 1) US\$29.27M in generation to expand the 20.7MW Wartsila plant at Kingston by 15.6MW, convert the 22MW Wartsila 50Hz plant at Kingston to 60Hz and procure, convert (to HFO) and install two used 3MW Wartsila 9R32 units at Versailles in addition to reinforcing operations in Essequibo by adding a used 3MW HFO unit at Anna Regina, a used 2MW HFO unit at Bartica and two new 500kVA gensets to Leguan on one similar set to Wakenaam. The increased generation capacity on both Leguan and Wakenaam is intended to position GPL to commence a 24-hour service in 2011.

It is projected that generation from renewable or HFO sources will increase to 91% in 2011 from 87% in 2010. Production from HFO fired capacity cost approximately 28% less than from diesel fired Units. The increase in HFO fired capacity and ultimately a complete reliance on renewable sources of power is the company's strategic generation plan for this Programme, in an environment of volatile fuel prices.

Typical Daily Load Curve in Demerara showing periods when diesel fired capacity was used



2) US\$22.163M in transmission lines to integrate all the load centers in Demerara, Berbice and also interconnect the islands of Leguan, Wakenaam and the Essequibo Coast. This would allow :

- Bulk power to be wheeled efficiently.
- Use of HFO or renewable capacity as prime sources of power.
- Reserve capacity to be consolidated (reduced by 15.25M W ).
- Closure of small dispersed diesel fired generating capacity.
- Sub-stations to be installed strategically to provide distribution outlets to off-load feeders.
- Expansion of the grid to Essequibo to allow access to more efficient and cost effective generation and eventually green power from hydro.

3) US\$27.5M in substations to provide outlets at thirteen (13) new locations through 69/13.8KV substations. This would:

- Result in the length and load of most major circuits in Demerara, Berbice and Essequibo Coast being reduced by up to 65% .
- Provide automatic means of regulating primary distribution voltage.
- Improve the quality of supply by improved voltage management, reducing the frequency of outages due to tripping of the feeder, reducing planned maintenance outages and improved dispatch management.

- 4) US\$9.285M will be expended on non-technical loss reduction over the next five years. This includes;
- Installation of 54,000 pre-paid meters to replace post-paid meters, using the split meter technology.
  - Redesign of the distribution network in high risk areas to HV distribution.
  - Use of co-axial service lines.
- 5) US\$18.087M will be spent on technical loss reduction activities, specifically targeting reduction of the 6.6% losses in the LV network. This is in addition to the US\$49.6 mentioned above for transmission and sub-stations which are also technical loss reduction initiatives. This investment will help to:
- Improve voltage regulation.
  - Reduce the number of consumers affected due to feeder trips and planned maintenance activities.
  - Improve system management when restoring service.
  - Increase capacity to meet growing demand.
  - Improve network design to reduce access to illegal connections.
- 6) US\$2.491M will be spent to connect 17,500 new consumers. This increase in customers is more conservative than previous estimates as the take-up rate in recently served areas continues to be disappointing. The projection however caters for a new rural electrification programme to serve 4,000 consumers in 2013.
- 7) US\$2.381M is projected to be spent on the electrification programme in 2013. The advent of hydropower in 2014, the addition of Linden to the National Grid and the continuous expansion of housing schemes will result in the need for another electrification programme.
- 8) US\$1.69M will be spent on capacity building, specifically the acquisition of articulated utility vehicles This will:
- Provide tools and equipment to T&D to improve their capability and capacity.
- 9) US\$2.74M will be spent on buildings in Demerara and Berbice to:
- Provide accommodation to reduce the dependence on rented facilities.
  - To improve working conditions for staff and improve customer service facilities.

While sustained loss reduction is critical to GPL's financial viability this Programme also focuses on:

- 1) Customer Service - New Customer Service Standards will take effect from January 2011 and failure to achieve these will result in the Customer's account being credited with a specific amount. While some Standards have a specific penalty, most have a daily rate upon a breach but there is a cap. In addition to the Customer Service Standards, the PUC is mandated to review the Company's performance every March in respect of the Operating Standards and Performance Targets (OS&PT). If the OS&PT are not achieved then the PUC can penalize the Company up to 25% of dividends payable to shareholders.



The amended Schedule 2 of GPL's Licence includes the Customer Service Standards (CSS) while the OS&PT (an annual and five-year forecast) is included in this Development & Expansion Programme. The amendment to GPL's Licence to effect these changes took effect from October 4<sup>th</sup>, 2010.

The obligation now imposed on GPL to meet CSS and the OS&PT have informed wide-ranging changes across the Company to ensure internal processes are in place to track performance. But while the Licence changes are informing internal process improvements, access to customer services continues to be a challenge for many Customers. While GPL's network has been expanded by over 20% over the past six years and continues to expand, the number of Commercial Offices has not changed since 1997 when the Leguan office was opened.

The Company therefore proposes over the next five years to:

- Appointment of more community based Customer Service Representatives. These individuals will allow Consumers to access a number of the services provided at GPL's Commercial Offices.
- Providing more information on energy efficiency by assisting Consumers to calculate the benefits of using energy efficient lights and appliances. Fostering a relationship between Consumers and the Private Sector to ensure energy efficient appliances are more available, affordable and accessible.
- Expanding the initiatives to foster behavioral change to impact DSM through debating competitions.
- Improving communication with customers and expanding customer care training for Staff and Contractor's personnel.
- Achieving ISO 9001 – 2008 certification in 2011.

2) Financial Management – Installation of three additional modules, procurement and inventory and Human Resources which will:

- Allow for the efficient management of procurement and inventory activities.
- Maintenance of adequate stock levels to sustain maintenance activities.
- Provide a modern HR application that would meet the Company's needs for management information.

3) Market Development – There is no doubt that market development becomes critical when one considers that in Q4 2014 GPL will commit to 140MW from the Amaila Falls Hydro project. The demand forecast of 1,006.6 GWH for 2015 assumes that 210 GWH will come from current off-grid demand. The forecasted growth of almost 32% from 2014 seems optimistic but GPL expects that the projected reductions in tariff in 2015 (and rebalancing) coupled with supply reliability will serve as

growth catalysts. It should be noted that GPL will have to guarantee an annual cash flow for the guaranteed 140MW from Amaila, which implies that the lowest tariff will be derived if all the energy is used.

4) Internal Efficiencies - The following initiatives are included in this programme:

- US\$1,690,000 investment in specialized equipment and tools coupled with advanced training to improve T & D maintenance capability.
- Implementation of a Demand Side Management initiative to reduce wastage of power.
- Completion of a benchmarking exercise to ensure an acceptable level of productivity.
- ISO 9001 – 2008 certification. This would ensure written procedures are available for all activities and those are complied with.
- Expanded use of electronic documentation to reduce use of paper.
- Completing the implementation of the procurement & inventory modules to optimize inventory levels and reduce acquisition cost.
- Expanded use of the KRONOS time and attendance system to manage overtime.

The Programme, as mentioned before, projects expenditure of US\$119.3M over the next five years. Major sources of financing will include 46% from debt and 49% from undistributed dividends. The Programme is heavily front-loaded, for obvious reasons, with 86% of the expenditure occurring within the first three years.

US\$77 M will be spent on loss reduction with a total reduction in losses of 7% projected over the next five years. Non-technical losses are projected to reduce from 17% at the end of 2010 to 10.7% at the end of 2015 while technical losses are projected to increase from 14.3% in 2010 to 15.2% in 2012 before being reduced to 13.6% at the end of 2015. The non-technical loss reduction plan includes all activities which have yielded results to date and the projections are considered conservative.

Overall supply quality including voltage and frequency regulation, SAIFI and SAIDI would see significant improvements over the life of this programme when the transmission and substation facilities are completed and maintenance activities are optimized. The West Coast of Demerara would benefit earlier as the priority facilities are completed. The improvements can be seen in the SAIFI and SAIDI projections.

## **1. METHODOLOGY TO PLAN**

The Guyana Power and Light Inc. (GPL) current five-year Development and Expansion Programme (2011 – 2015 D & E Programme) and Annual Programme (2011) have been prepared in accordance with the requirements of the company's Licence (Amended October 4<sup>th</sup>, 2010), the Public Utilities Commission Act 1999, the Electricity Sector (Technical Standards) Regulations 2008 and the Electricity Sector Reform Act (ESRA) 1999 and Amendment 2010.

Section 38 (2) of the ESRA and its 2010 amendment sets out the details that ought to be captured in the GPL's sustainability programme. Specifically, the Act states:

“The sustainability programmes developed and maintained by a public supplier shall contain detailed descriptions of and data on –

- (a) the plans and projections through which the public supplier will achieve and sustain the customer service, engineering and technical standards necessary for the public supplier's efficient, coordinated and economical supply of electricity under the terms of its licence (see page 12);
- (b) the benefits to be accrued to consumers of the service rendered, and the engineering and technical standards to be achieved and maintained, by the public utility as a result of the implementation of the programmes, and the rationale therefore (see page 24);
- (c) a development and expansion programme setting forth the plans and projections through which the public supplier will develop and expand its facilities and services to be provided to consumers (see page 43);
- (d) the operating costs and capital expenditures of the programmes (see page 48);
- (e) the sources and amounts of revenues necessary to finance the programmes, including the proposed or actual costs, terms and sources of any debts or equity financing commitments necessary to carry out the programmes and any bids actually, or anticipated to be, received by the public supplier (see page 51);
- (f) the debt to equity ratio tolerances to be maintained by the public supplier in implementing the programmes (see page 51);
- (g) the timing, amounts and terms of any issuance of securities contemplated by the public utility for the financing of the programmes and the persons to whom they will, or are anticipated to, be offered or issued;
- (h) the impact the programmes are expected to have upon the natural and social environment (see page 54);
- (i) the extent to which the programmes facilitate the use of alternative forms of electricity generation using renewable resources and commercial feasibility thereof. (see page 31);
- (j) any other aspects of the programmes which the Minister may direct; and

(k) planned acquisition of new generating capacity; (See Page 30)

(l) loss reduction strategies; (See Page 39)

(m) plans to regain industrial customers; (See Page 41)

(n) plans for providing electricity for development and redevelopment projects in urban areas;  
(See Page 42)

(o) cost-benefit analysis for each investment project; (See Page 56) and

(p) consistent with any applicable regulations, the following items –

- i. a maintenance programme for the inspection, repair, replacement and upgrade of the supplier's works; (See Pages 33 & 38)
- ii. a programme for the promotion of technical efficiency and economy in its supply of electricity and in the consumption of electricity by consumers; (See Page 52) and
- iii. a report on the public supplier's compliance with any technical standards required under the regulations. (Note: the two Regulations under ESRA, The Technical Standards and Wiring Regulations have not been enacted into Law as yet)

## **1.1 Review of 2010 Achievement**

The generation plan included execution of the contract for the 15.6 MW expansion of the new Kingston Wartsila Plant. This was done on November 16<sup>th</sup> with completion expected in August, 2011. The other aspect of the generation plan for Demerara included replacement of the radiators at the 50Hz Wartsila plant at Kingston and the installation of new controls for the plant at GOE. While Wartsila was contracted to undertake these works, they were not executed in 2010 as lead time for the delivery of the various equipment would allow execution in 2011. Of the generation plans for Essequibo, mobile caterpillar modules were installed at Anna Regina and Bartica, as planned. One, rather than two mobile caterpillar modules was installed at Anna Regina.

Progress on the various sub-projects under the Infrastructure Development Project is as planned with the detailed field survey completed and the overall design parameters largely agreed.

Overall losses were projected to reduce by 3.7% for the year but this was reduced by 3% despite increased technical losses of 0.3%. Generation increased by 6.8% over 2009 and was 5.1% above the 2010 forecast. According to the 2010 forecast, fuel expenditure was expected to be G\$14.5B, at a weighted average cost (CIF) of US\$74.57 per bbl and profit after tax of G\$2.4B. Actual fuel costs were G\$16.6B at a weighted average cost of US\$82.86 per bbl and profits after tax were G\$553M.

The planning environment for the 2011 – 2015 D & E is shaped in many respects by activities that either had their genesis in 2010 or were progressed in that year. In terms of major capital projects in generation and T & D, these will be completed in 2011 or will continue to progress. No changes will be made to these plans. On the loss reduction front, the initiatives which produced results in 2010 will continue to guide the non-technical loss reduction effort while the technical loss reduction interventions which have been long planned will finally commence. The escalation in fuel prices is one change in the planning environment which will affect the Company's ability to

finance capital works from internal resources. This means that some capital projects will be deferred from 2011.

## 2. STRATEGIC PLAN 2011-15

The strategic business objectives of the company have been defined and developed by the Board of Directors, which culminate in a rolling five-year strategic plan, as detailed below. The current D & E Programme is a function of the 2011-15 Strategic Plan.

GPL is a regulated state-owned electricity utility that enjoys a monopoly in the transmission, distribution and sale of electricity in Guyana. As at the end of December 2010, GPL expects to have 151,000 customers, 946 employees and projected revenue of US\$128M of which 60% will be applied to fuel.

Present Electricity Supply	Medium Term Electricity Supply
<p>Mainly thermal:</p> <ul style="list-style-type: none"> <li>Installed Capacity: 171.5 MW : 78.7 MW Heavy Fuel Oil (includes 10 MW of IPP); 92.8 MW diesel</li> <li>Fuel Mix: 87% HFO; 13% diesel</li> <li>Total Availability : 120.7 MW : 110.7 MW owned (31 MW is either over 30 years old or high speed Units);</li> <li>Total Peak Demand: 100.6 MW</li> <li>Self Generation: Estimated at 42 MW</li> </ul>	<ul style="list-style-type: none"> <li>Proposed Renewable energy projects</li> <li>Hydro (starting 2015)— 140 MW</li> <li>Bagasse (extended use of co-generation - 2009)— 10 MW</li> </ul>
	<p><b>Key Challenges:</b></p> <ul style="list-style-type: none"> <li>High customer tariffs due to:</li> <li>Aged Infrastructure particularly in Transmission and Distribution</li> <li>High inefficiencies (technical &amp; commercial losses of 32.9 %)</li> </ul>

GPL has a balance sheet US\$159 M in assets. In 2010, 87% of GPL's generation was from HFO & Bagasse (cheaper than diesel). With a projected 140 MW hydro project achieving commercial operation in January 2015, GPL will need fossil fuel for 4% of its electricity supply but this is expected to reduce to 0.7% in 2016. As a state-owned entity, GPL's key objective is to deliver reliable electricity at the lowest sustainable price and without requiring Government support for its operations. This requires optimized efficiency in the production, transmission and distribution of power while prudently managing revenue collection, reducing technical and commercial losses and minimizing other costs, particularly employment. Capital needs are being met by low interest Government loans, with the resources actually coming from the China Exim Bank and the IADB.

## SWOT Analysis

<b>Strengths</b> <ul style="list-style-type: none"> <li>a. GPL has low level interest bearing debt that accounted for 45.7% of assets;</li> <li>b. Generation overwhelmingly coming from HFO fired capacity;</li> <li>c. Staff is competitively remunerated compared to Private Sector.</li> <li>d. Funding secured for major capital projects.</li> </ul>	<b>Weaknesses</b> <ul style="list-style-type: none"> <li>a. High level of technical and commercial losses currently at 32.9%;</li> <li>b. Limited pool of skills pose a problem to improving efficiencies;</li> <li>c. Financing limited only to concessional sources and internal resources.</li> </ul>
<b>Opportunities</b> <ul style="list-style-type: none"> <li>a. Hydro financial close should occur mid- 2011 with construction starting shortly after. Completion of hydro by Q1 2015 will lower electricity cost and attract self-generators to the grid;</li> <li>b. Expanded and strengthened grid will reduce losses, operating costs and improve reliability;</li> <li>c. Capital program fully funded from concessional resources;</li> <li>d. ISO 9001 can improve the quality of CS.</li> <li>e. Connection of 17,420 new customers by 2015 with secure metering will reduce electricity theft;</li> <li>f. Competitive staff compensation and incentives coupled with new infrastructure and modern equipment will result in improvements in productivity and attitude.</li> </ul>	<b>Threats</b> <ul style="list-style-type: none"> <li>a. Risk of rise in fuel prices can adversely impact costs and tariffs before 2015;</li> <li>b. Threat of strike action as GPL right sizes its workforce following investments;</li> <li>c. Implementation delays for capital projects could raise operating costs;</li> <li>d. Loss of key employees via migration could impact operations.</li> <li>e. Changes in global weather patterns could result in severe water shortages for the hydro.</li> </ul>

**Vision:** Guyana Power & Light Inc. aims to be Guyana's premier service provider, meeting and exceeding where possible the expectations of its stakeholders.

**Mission:** To provide an expanding customer base with electricity services which are technically, financially and environmentally sustainable, achieving best practice and acceptable international norms, delivered by our people performing in accordance with Company values to the highest ideals of work excellence and integrity.

### **Strategic Objectives:**

1. Optimize revenue
2. Minimize cost of operations
3. Improve Customer Service (CS)

4. Achieve a sustainable financial position
5. Enhance Corporate Governance Framework and Practices
6. Enhancing Skills and Competencies of Employees and Contract workers
7. Achieve national objectives

See strategies and targets for each below.

**Strategic Objectives (in black), Strategies and associated Targets**

1. Optimize Revenue:	2011	2012	2013	2014	2015
a. Maximize collection of billing (% of Billing collected)	99.5	99.5	99.5	99.5	99.5
(i) Maximize collection of billing (Government)	100	100	100	100	100
(ii) Maximize collection of billing (Non Government)	99	99	99	99	99
b. Maximize level of power billed (GWh)	432.7	466.7	506.7	552.5	739.3
(i) Convert illegal electricity consumers to GPL's customers	.03	.05	.035	.01	0.0
(ii) Regularize customers with bypass or tampering	0.7	1.20	0.8	0.17	1.2
(iii) Replace defective meters and bill accordingly	2.8	2.4	2.8	1.9	
c. Optimize growth:					
(i) Expand customer base (# of new customers added in yr.)	4,120	2,800	2,500	4,200	3,800
(ii) Increase uptake in recently served areas (No. of new connections)	2,500	1,699	1,517	2,549	2,306
(iii) Expedite new connection to the grid	1,058	719	642	1,078	975
(iii) Convert illegal electricity consumers to GPL's customers (No. of Accounts)	562	382	341	573	519
(iv) Net growth (MWh) (Combination of natural growth and loss reduction)	29,455	34,462	36,419	42,202	31,767
(v) New Consumers (MWh)	4,120	2,800	2,500	4,200	3,800
d. Expand overall revenue by optimizing price, volume and tariff mix (US\$ M)	136	148	160	171.6	175.7
(i) Annual increase in volume (US\$, over previous year)	8	12	12	11.6	4.10
(ii) Mix of customers					
Residential	7.3	10.9	10.9	10.5	3.7
Commercial	.71	1.07	1.07	1.03	0.37
Industrial	.03	.04	.04	.04	0.01
e. Maximize collection of arrears from past customers – Number of Accounts.	1440	1450	1460	1470	1480
(i) Pursue Inactive Customers – Number of demand letters.	400	415	430	445	460
(ii) Maximize legal action and enforcement – Number of cases filed in Commercial Court.	120	140	160	180	200

f. Ensure strong disincentives to Electricity Theft					
(i) Prosecute consumers found tampering/Bypass	800	750	700	650	600
(ii) Prosecute individuals with illegal connections	960	920	880	840	800
g. Maximize number of prepaid meters installed.	8,000	10,000	12,000	12,000	12,000

2. Minimize costs of operations	2011	2012	2013	2014	2015
a. Reduce Employment Numbers (number at end of year)	985	895	906	860	845
b. Control Employment Costs (annual US\$ K)	11,343	12,197	10,956	11,338	11,885
(i) Basic Pay	7,146	7,684	6,902	7,143	7,488
(ii) Overtime	1,134	1,220	1,095	1,133	1,188
(iii) Allowances	1,929	2,074	1,863	1,928	2,021
(iv) Employers Contribution	681	732	658	681	713
(v) Others	453	487	438	453	475
c. Reduce total technical and commercial losses (%)	29.9	28.5	26	24.7	24.3
(i) Reduce technical losses (total % remaining at end of period)	14.8	15.2	14.3	13.7	13.6
(ii) Reduce commercial losses (total % remaining at end of period)	15.1	13.3	11.7	11	10.7
d. Control Generation Costs (US \$K)	90,334	100,108	112,371	124,686	115,077
(i) Maximum use of cheaper sources of generation (HFO/Renewable/LFO mix)	82/5/13	93/5/2	94/5/1	64/35/1	9/90/1
(ii) Maximum availability of engine relative to weighted capacity	70%	75%	75%	75%	75%
(iii) Ensure contract for O & M, Leases, IPP's etc are managed to optimize value for money	As per contract	As per contract	As per contract	As per contract	As per contract
Availability	"	"	"	"	"
Lube oil Consumption	"	"	"	"	"
Fuel Efficiency	"	"	"	"	"
(iv) Optimize dispatched Power	Merit order system	Merit order system	Merit order system	Merit order system	Merit order system



(vi) Ensure fuel is procured at the lowest cost at all times	Ensure the contractual terms with Staatsolie are met	Ensure the contractual terms with Staatsolie are met	Ensure the contractual terms with Staatsolie are met	Ensure the contractual terms with Staatsolie are met	Ensure the contractual terms with Staatsolie are met
(vi) Ensure overhauls are done timely to minimize unplanned failures, reduce emergency procurement of spares, reduce downtime, maximize availability, minimize maintenance costs.	Meet Generation SAIFI & SAIDI	Meet Generation SAIFI & SAIDI	Meet Generation SAIFI & SAIDI	Meet Generation SAIFI & SAIDI	Meet Generation SAIFI & SAIDI
e. Optimize other controllable Costs (US\$K)	9,067	9,698	10,374	11,099	11,874
(i) Transmission & Distribution	1,942	2,077	2,222	2,377	2,543
(ii) Administrative	7,125	7,621	8,153	8,722	9,331

3. Improve Customer Service (CS)	2011	2012	2013	2014	2015
a. Meet Customer Service Standards & OS&PT.					
b. Implement ISO 9001:2000 Quality System					
c. Customer Satisfaction: Improve Image of GPL as first class utility via improving Customer Service, increase efficiency, and optimize tariffs.	Partial certification 65 %	Full certification 70 %	Maintain Certification 75 %	Maintain Certification 75 %	Maintain Certification 80 %
d. % of calls answered at Call Center	95 %	95 %	95 %	95 %	95 %
(i) Technical					
(ii) Commercial					
j. Enhance website access to encourage usage: Number of hits	40000	45000	50000	55000	60000
k. Increase collection outlets	5	5	5	5	5

4. Achieve Sustainable Financial Position	2011	2012	2013	2014	2015
a. Ensure that revenue collected is sufficient to cover all costs including CAPEX and debt service.					
b. Ensure that GPL is creditworthy to attract private investment in a 140 MW hydroelectric project at a projected capital cost in excess of US\$650 M without Government guarantees.					
c. Complete audited accounts and hold Annual Shareholders Meeting within 6 months of year end.					
d. Manage GPL finances and to justify concessional financing.	Ensure compliance with conditionalities.				

#### 5. Enhance Corporate Governance Framework and Practices

- a. Reports are submitted to Board and Sub-Committees on a timely basis.
- b. Ensure Financial Statements are audited within stipulated time frames.
- c. Ensure tenders for goods and services are in keeping with the Procurement Act.
- d. Ensure Internal Audit recommendations are implemented.
- e. Assist the Board in its annual self evaluation.

#### 6. Enhancing Skills and Competencies of Employees and Contract Workers

- a. Determine or identify the skills and competencies required for each job.
- b. Periodically assess the levels at which the employee is performing.
- c. Provide advice and/or feedback to the employee on performance, career and their future aspirations.
- d. Source requisite training/attachments/development interventions.
- e. Utilize team work and 'special assignment' strategies
- f. Seek out and provide opportunities for coach/mentor interactions.

#### 7. Achieve National Objectives

- a. Promote conservation of electricity by promoting/educating economic use and avoiding wastage
- b. Maximize use of **renewable** fuel to minimize generation costs and minimize fuel import bill
- c. Optimize tariffs and maximize efficiencies (low technical and commercial losses, high collections)
- d. Ensure regulatory compliance with electricity laws and GPL's license
- e. Expand national grid to other parts of country to allow economies of scale and lower avg. costs

#### Functional Strategies over 5 year period (with reference to Objective Strategies)

2011

##### Management/Overall Coordination

1. Manage all capital projects to ensure delivery on time and within budget, as appropriate.
2. Ensure that key skills are developed and retained.
3. Achieve partial certification of ISO 9001 - 2000 Quality system by July of 2011
4. Ensure internal communications are adequate and efficient to support achievement of CSS & OS&PT.

##### Commercial

1. Ensure Customer Service Standards are met consistently.
2. Optimize tools available in CIS to direct loss reduction field efforts.
3. Work pro-actively with Legal to recover balances on inactive accounts.

##### Finance

1. Manage cash flows in accordance with budget and to optimize working capital.
2. Secure funding for all capital projects and ensure timely financial reports.
3. Ensure efficient procurement process in compliance with procedures, and adequate, reliable and efficient inventory management system.
4. Install additional modules of the state-of-the art financial package (Oracle financials) to

replace semi-manual operations (by 3 <sup>rd</sup> quarter 2011)
<b>IT</b>
1. Ensure ongoing training to fully utilize CIS capabilities.
2. Optimize and maintain Local and Wide Area Network performance to ensure ready access to mission critical systems (e.g. CSS & OS&PT).
3. Manage Hardware and software infrastructure to ensure 99.9% system availability.
4. Facilitate training of personnel who are required to use CIS or any other application in the Company's efforts to meet CSS and OS&PT.
5. Optimize security and integrity of corporate systems.
<b>Loss Reduction</b>
1. Implement the Strategic Loss Reduction Plan (SLRP). – Dec. 15
2. Replace 8,000 meters with pre-paid meters. – Dec. 15 <sup>th</sup>
3. Meter 4,200 New Services. – Dec. 15 <sup>th</sup>
4. Continuously review the benefit of various initiatives to focus field activity.
<b>HR/Admin</b>
1. Continuously review employee attendance to determine appropriate actions to limit employment cost.
2. Maintain and manage continuous training program.
3. Complete new T&D Building – Sophia.
4. Complete right-sizing review for 2012 implementation – August 2011
<b>Projects -</b>
<b>Manage the following sub-projects effectively to ensure completion by Milestones indicated.</b>
1. Expansion of Kingston 11 Wartsila Plant by 15.6MW – August 2011.
2. Frequency conversion of Wartsila Kingston 1 Plant – 11MW to be converted by Dec. 2011.
3. Install 2 x 500kVA gensets in Leguan – October 2011.
4. Install 500kVA genset in Wakenaam – June 2011.
5. Commence Transmission line between Versailles and Edinburg sub-stations – Q4 2011.
6. Materials available to commence Submarine cable crossing Kingston – Versailles – Q4 2011.
7. Materials available to commence 69kV line from Sophia to Onverwagt (80 km) – Q4 2011.
8. Materials available to commence 69Kv line from Sophia to New Georgetown Substation – Q4 2011.
9. Commence work on Versailles & Edinburg substations – Q4 2011.
10. Materials & Equipment available for Diamond sub-station, including two tie lines – Q4 2011.
11. Materials & Equipment available for New Georgetown Sub Station – Q4 2011.
12. Materials and equipment available for New Sophia Sub Station – Q4 2011.
13. Materials and equipment available to extend Sophia sub-station – Q4 2011.
14. Materials and equipment available for Good Hope Sub Station – Q4 2011.
15. Materials and Equipment available for Columbia (Mahaicony) Sub Station – Q4 2011.

16. Materials and equipment available for Onverwagt sub-station - Q4 2011.
17. Complete Canefield HFO conversion – July 2011.
<b>Operations</b>
1. Georgetown frequency conversion Phase 11 (8MW) – December 15 <sup>th</sup> 2011 Network preparation complete except for transformers.
2. LV network upgrade – 100km of network to be upgraded – December 15 <sup>th</sup> 2011.
3. Install 2 remote controlled reclosers - July 2011.
4. Complete maintenance programme.

## 2012

<b>Management/Overall Coordination</b>
1. Manage all capital projects to ensure delivery on time and within budget, as appropriate.
2. Ensure that key skills are developed and retained.
3. Achieve full certification of ISO 9001 Quality system. – Q3 2012
4. Ensure internal communications are adequate and efficient to support achievement of CSS & OS&PT.
5. Undertake review of CSS & OS&PT internal procedures and update as necessary.
6. Complete quarterly review of Divisional performance based on work programmes.
<b>Commercial</b>
1. Ensure Customer Service Standards and met consistently. Complete review of procedures and recommend changes as necessary, July 5 <sup>th</sup> and Dec. 15 <sup>th</sup> .
2. Optimize tools available in CIS to direct loss reduction field efforts.
3. Work pro-actively with Legal to recover balances on inactive accounts.
<b>Finance</b>
1. Manage cash flows in accordance with budget and to optimize working capital
2. Secure funding for all capital projects and ensure timely financial statements reports
3. Ensure efficient procurement process in compliance with procedures, and adequate, reliable and efficient inventory management system
<b>IT</b>
1. Optimize and maintain Local and Wide Area Network performance.
2. Manage Hardware and software infrastructure to ensure 99.9% system availability.
3. Optimize security and integrity of corporate systems
<b>Loss Reduction</b>
1. Replace 10,000 meters with pre-paid meters.
2. Meter 2,800 New Services.
3. Implement the Strategic Loss Reduction Plan (SLRP).
4. Continuously review the benefit of various initiatives to focus field activity.

HR/Admin
1. Maintain and manage continuous training program.
2. Complete new T&D Building – New Amsterdam.
3. Implement rationalization plan.
4. Complete new building in New Amsterdam for Networks, Commercial Services and Loss Reduction. – December.
5. New building in Middle Street 10% complete.
Projects
1. Complete frequency conversion of Wartsila Kingston 1 Plan – September 2012
2. Overhaul, convert and install 2 x 3M W used Wartsila Units at Versailles – November 2011.
3. Install used 3M W HFO unit at Anna Regina – December 15 <sup>th</sup> 2012.
4. Install used 2 M W HFO Unit at Bartica – October 2012.
5. Complete Submarine Cable (1.8km) & OHTL, Kingston to Versailles - December
6. Complete Versailles to Edingburg OHTL (22km) – September
7. Complete 90% new Sophia to Onverwagt OHTL (80 km) - December
8. Complete new Sophia to New Georgetown Substation OHTL (5km) - December
9. Place orders for materials for OHTL extension from Edingburg to Parika – December 15 <sup>th</sup> .
10. Place order for submarine cable and accessories for crossing from Parika to Leguan – Dec. 15 <sup>th</sup> .
11. Place order for materials for transmission line across Leguan.
12. Place order for submarine cable and accessories for crossing from Leguan to Wakenaam – December 2012
13. Place order for materials for transmission line across Wakenaam – December 2010.
14. Place order for submarine cable and accessories for crossing from Wakenaam to Essequibo Coast – December 2012.
15. Place order for materials for transmission line along Essequibo Coast.
16. Complete New Diamond Sub Station – Dec. 2012.
17. Complete New Georgetown Sub Station – Dec. 2012.
18. Complete extended Sophia sub-station – Dec. 2012.
19. Complete New Good Hope Sub Station – Dec. 2012
20. Complete New Mahaicony (Columbia) Sub Station – Dec. 2012
21. Complete 90% Upgrade and expansion of Onverwagt sub-station – Dec. 2012
22. Complete New Versailles Sub Station
23. Complete New Edingburg Sub Station
24. Place order for materials and equipment for Parika sub-station – December 2012
25. Place order for materials and equipment for Leguan sub-station – December 2012
26. Place order for materials and equipment for Wakenaam sub-station – December 2012
27. Place order for materials and equipment for two Essequibo Coast sub-stations – December 2012

28. Complete new Williamsburg sub-station – December 15 <sup>th</sup> .
<b>Operations</b>
1. Complete upgrade of 180km of LV network – December 15 <sup>th</sup> .
2. Install 12 remote controlled reclosers – December 15 <sup>th</sup>
3. Complete Georgetown frequency conversion – September.
4. Introduce 700 alternative structures (steel and concrete).

## 2013

<b>Management/Overall Coordination</b>
1. Manage all capital projects and IPP arrangements (hydro) to ensure delivery on time and within budget, as appropriate.
2. Ensure that key skills are developed and retained.
3. Maintain certification with ISO 9001 Quality system.
4. Ensure internal communications are adequate and efficient to support achievement of CSS & OS&PT.
<b>Commercial</b>
1. Ensure Customer Service Standards are met consistently. Complete review of procedures and recommend changes as necessary, July 5 <sup>th</sup> and Dec. 15 <sup>th</sup> .
2. Optimize tools available in CIS to direct loss reduction field efforts.
3. Work pro-actively with Legal to recover balances on inactive accounts.
<b>Finance</b>
1. Manage cash flows in accordance with budget and to optimize working capital.
2. Secure funding for all capital projects and ensure timely financial statements reports.
3. Ensure efficient procurement process in compliance with procedures, and adequate, reliable and efficient inventory management system.
<b>Loss Reduction</b>
1. Replace 12,000 meters with pre-paid meters
2. Meter 2,500 New Services
3. Implement the Strategic Loss Reduction Plan (SLRP).
4. Continuously review the benefit of various initiatives to focus field activity.
<b>IT</b>
1. Optimize and maintain Local and Wide Area Network performance.
2. Manage Hardware and software infrastructure to ensure 99.9% system availability.
3. Optimize security and integrity of corporate systems
<b>HR/Admin</b>
1. Maintain and manage continuous training program.
2. Complete new Middle Street building.
3. Complete Company right-sizing review.

Projects
1. Commission SCADA
2. Commission New Sophia Control Center.
3. Complete submarine cable crossing – Parika to Leguan.
4. Complete transmission line across Leguan.
5. Complete submarine cable crossing between Leguan and Wakenaam.
6. Complete transmission line across Wakenaam.
7. Complete Parika sub-station.
8. Complete Leguan Sub-station
9. Complete Wakenaam Sub-station
10. Complete 50% Linden Sub-station.
11. Complete preparations for cable crossing between Wakenaam & Essequibo Coast.
12. Complete 25% of transmission line across Essequibo Coast.
13. Implement electrification programme – 4,000 lots.
Operations
1. Complete 80Km of LV network upgrade.
2. Complete Essequibo Coast network frequency conversion preparation.
3. Employ 2,100 alternative structures.
4. Complete distribution load balancing.
5. Complete Leguan network voltage upgrade.

2014

Management/Overall Coordination
1. Manage all capital projects to ensure delivery on time and within budget, as appropriate.
2. Ensure that key skills are developed and retained.
3. Maintain certification of ISO 9001 Quality system.
4. Ensure internal communications are adequate and efficient to support achievement of CSS & OS&PT.
Commercial
1. Ensure Customer Service Standards are met consistently. Complete review of procedures and recommend changes as necessary, July 5 <sup>th</sup> and Dec. 15 <sup>th</sup> .
2. Optimize tools available in CIS to direct loss reduction field efforts.
3. Work pro-actively with Legal to recover balances on inactive accounts.
Finance
1. Manage cash flows in accordance with budget and to optimize working capital
2. Secure funding for all capital projects and ensure timely financial statements reports
IT
1. Optimize and maintain Local and Wide Area Network performance.

2. Manage Hardware and software infrastructure to ensure 99.9% system availability.
3. Optimize security and integrity of corporate systems
<b>Loss Reduction</b>
1. Replace 12,000 meters with pre-paid meters
2. Meter 4,200 New Services
3. Implement the Strategic Loss Reduction Plan (SLRP).
<b>HR/Admin</b>
1. Maintain and manage continuous training program
2. Implementing staff right-sizing plan.
<b>Projects</b>
1. Complete submarine cable crossing between Wakenaam and Essequibo Coast.
2. Complete transmission line across Essequibo Coast.
3. Complete Linden sub-station and its interconnection.
<b>Operations</b>
1. Complete Essequibo Coast frequency conversion.
2. Employ 2,200 alternative structures.
3. Complete 40km LV network upgrade.

2015

<b>Management/Overall Coordination</b>
1. Manage all capital projects to ensure delivery on time and within budget, as appropriate.
2. Ensure that key skills are developed and retained.
3. Maintain certification of ISO 9001 Quality system.
4. Ensure internal communications are adequate and efficient to support achievement of CSS & OS&PT.
<b>Commercial</b>
1. Ensure Customer Service Standards are met consistently. Complete review of procedures and recommend changes as necessary, July 5 <sup>th</sup> and Dec. 15 <sup>th</sup> .
2. Optimize tools available in CIS to direct loss reduction field efforts.
3. Work pro-actively with Legal to recover balances on inactive accounts.
<b>Finance</b>
1. Manage cash flows in accordance with budget and to optimize working capital
2. Secure funding for all capital projects and ensure timely financial statements reports
<b>IT</b>
1. Optimize and maintain Local and Wide Area Network performance.
2. Manage Hardware and software infrastructure to ensure 99.9% system availability.
<b>Loss Reduction</b>
1. Replace 12,000 meters with pre-paid meters



2. Meter 3,800 New Services
3. Implement the Strategic Loss Reduction Plan (SLRP).
<b>HR/Admin</b>
4. Maintain and manage continuous training program
<b>Operations</b>
1. Upgrade 45km of LV network.
2. Employ 2,500 alternative structures.

#### Monitoring, Review and Management of Plan

GPL will review and revise its strategic plan as appropriate half-yearly, based on reports presented by management to the Board of Directors and decisions of the Board. Management's detailed operating plans will be consistent with this strategic plan.

### 3. OPERATING STANDARDS AND PERFORMANCE TARGETS

The Availability Target is based on the ratio of declared capacity and available hours to installed capacity and hours in the period.

Category	Analysis and Projections					
Customer Interruptions	Targets for System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) proposed for 2010 - 2014 are:					
	$SAIFI = \frac{\text{Total Number of Customer Interruptions}}{\text{Total Customers Served}}$					
	$SAIDI = \frac{\text{Total Customer Hours of Interruptions}}{\text{Total Customers Served}}$					
		2011	2012	2013	2014	2015
	SAIFI	140	120	80	85	68
	SAIDI	195	180	120	115	103

Voltage Regulation	The nominal voltage and frequency levels are indicated in paragraph 3.6 of the Standard Terms & Conditions.					
	GPL will seek to maintain, in stable conditions voltages, of $\pm 5\%$ of the nominal voltage and $\pm 10\%$ following a system disturbance. Since it is difficult to monitor the voltage delivered to each customer the Standard is based on number of voltage complaints and the time taken to resolve them.					
		2011	2012	2013	2014	2015
	100% of customer voltage complaints due to network reconfiguration, vegetation, upgrade of lines, additional transformer, etc.	75 days	60 days	45 days	30 days	30 days.

Category	Definition of Target					
Meter Readings	<b>Large Consumers – Maximum Demand Consumers</b> Produce Ninety-Seven percent (97%) of Maximum Demand Bills based on actual meter readings  <b>Domestic and Small Business Consumers</b> Produce Eighty-Seven percent (87%) of non Maximum Demand Bills based on actual meter readings.					
		2011	2012	2013	2014	2015
	M D Cust	97%	97%	97%	97%	97%
	Non M D	90%	90%	90%	90%	90%

Category	Definition of Target					
Issuing of bills	Issue Non Maximum Demand Bills within twelve (12) days of meter reading					
	Issue Maximum Demand Bills within seven (7) days of meter reading					
Days	2011	2012	2013	2014	2015	
Non M D	12	7	7	7	7	
M D	7	7	7	7	7	

Category	Definition of Target					
Accounts Receivable	The status of GPL accounts receivable is stated in its audited annual financial statements. The quoted figures are net of provision for doubtful debts. Unlike the figures in the financial statements the receivables as per the billing system include GEC's receivables.					
	Net	2011	2012	2013	2014	2015
	Days	55	50	45	30	30
Accounts Payable	While most of GPL's Creditors offer 30 days credit some of the largest ones actually offer up to sixty days. The determination of this target is from the invoice date.					
		2011	2012	2013	2014	2015
	Days	32	30	26	26	26

Losses	The level of losses at Dec. 2010 is projected at 32.9% of dispatched power with technical losses estimated at 14.3% and non-technical at 18.6%. The total projected losses as a percent of dispatched power are included below, along with the forecasted split: The Company expects to achieve these targets at end of the respective years.					
		2011	2012	2013	2014	2015
	Technical (%)	14.8	15.2	14.3	13.7	13.6
	Non-Technical (%)	16.7	14.9	13.3	12.6	12.3
	Overall (%)	30.1	28.7	26.2	24.9	24.5
Average Availability	Availability = $\frac{\text{Available capacity} \times \text{Total Available Hours}}{\text{Installed capacity} \times \text{Hours in the period}}$					
		2011	2012	2013	2014	2015
	Availability	70%	75%	75%	75%	80%

#### **4. DEVELOPMENT AND EXPANSION PROGRAMME 2011 - 2015**

##### **4.1 Demand Forecast**

The demand forecast was done utilizing a median forecast done for the Amaila Falls hydro project. This forecast used an annual growth of 4.7 to 4.9% except in 2015 when Linden consumers and self-generators were added to the grid. GPL has modified the Mercados forecast between 2011 and 2015 to reflect a more accurate loss position, connection of new consumers every year and the other indicators explained below:

##### **(a) Natural growth**

GPL used Mercados' median forecast which forecasted natural growth of between 4.7 and 4.9% per year. The forecast for 2015 includes all the demand in Linden and 50% of the consumption from all the major self generators in Demerara and eighty former (Pre-2003) large GPL customers. The off-grid demand is forecasted to contribute 30MW to the peak in 2015. No consideration has been taken of any new industrial development requiring significant power.

##### **(b) New Customers**

Net customer growth over this planning period has been projected at 17,420. This includes additions from UAEP Phases 1 and 2 and the GOG AU AEP financed areas.

By 2013 another electrification project, targeting about 4,000 consumers would be necessary. This expectation is based on the rate at which housing expansion is being experienced and the addition of Linden to the national grid in 2013. With greater efficiency and reduced production costs being reflected in the tariffs, the customer base and demand will grow steadily.

##### **(c) Loss Reduction**

Progress in loss reduction and demand side management should result in reduced demand and increased sales. In the forecast, 40% of the recovery resulting from meter replacements and electricity theft and all the reductions resulting from billing errors are flowing to increased sales while the other 60% recovery from meter replacements and electricity theft and all the technical loss reduction will result in reduced demand. 0.52% of all technical loss reduction (0.035%) is projected to come from demand side management initiatives.

##### **(d) Tariff rebalancing**

It has been established that Tariff A is being subsidized by almost 33% and that Tariffs B, C, D and all Government tariffs are providing this cross-subsidy. While progress on loss reduction has been projected each year of the programme, GPL intends to use the additional cash flow to continue to invest in loss reduction and to ensure any reasonable escalation in fuel prices above the forecasted annual increases of 8% can be met without recourse to tariff increases.

It is intended however that when hydropower is available commercially in 2015 that a complete rebalancing will be done to reflect the actual economic tariff for each category. GPL will also, in

2015 introduce a new tariff category; call a high voltage industrial category, which will target users with a demand of 2.5 MVA and above.

**(e) Reduction in un-served energy**

A reduction in energy not served associated with generation shortfall and network unavailability. This will be achieved by having:

- Adequate reserve generation capacity to cater for planned maintenance and emergency repairs;
- New base-load plants to meet base-load needs more reliably;
- Shorter feeders with multiple alternative feeds and enhanced maintenance capability and co-ordination;

**(f) Reduction in parasitic power consumption**

The frequency standardization project in Georgetown will result in the removal of the frequency converters from their usual duty. The annual losses in the converters exceed 5 GWh. The use of new generating plants for base-load operation would reduce the dependency on older plants using up to 6% (New plants use about 2.7%) of their generation for auxiliaries.

The results of this forecast for the entire system are included in the table below.

**Table 4.1.1: Projected Demand and Energy, GPL System**

	2010	2011	2012	2013	2014	2015
Net Generation (MWH)	605,186	642,465	678,927	716,939	761,363	1,005,625
Sophia Aux. (MWH)	621	492	246	15	15	15
Converter losses (MWH)	5,214	4,135	2,067	-	-	-
Station Auxiliary (MWH)	15,253	16,200	17,053	18,012	3,197	962
%	2	2	2	2.45	0.42	0.10
Gross generation	626,274	663,292	698,293	734,966	764,575	1,006,602
% Growth	6.7	5.91	5.28	5.25	4.03	31.66

**Table 4.1.2: Regional Forecast**

<b>ESSEQUIBO</b>	2010	2011	2012	2013	2014	2015
Net Energy (MWH)	31,855	34,172	36,273	38,447	41,071	43,133
Load factor -%	0.62	0.62	0.62	0.62	0.63	0.63
Peak (MW)	6.12	6.57	6.96	7.38	7.74	7.82
Gross Energy (MWH)	33,257	35,675	37,796	40,062	42,714	43,133
Aux use (Fraction)	0.044	0.044	0.042	0.042	0.04	-
<b>DEMERARA</b>	2010	2011	2012	2013	2014	2015
Net Energy (MWH)	475,926	504,982	533,632	563,501	598,404	835,337
Peak (MW)	78	79	82	86	88	121
LF	0.72	0.76	0.765	0.77	0.78	0.79
Sop. Aux Use & Converter Losses (MWH)	5,835.00	4,627.18	2,313.59	15.00	15.00	15.00
Gross energy (MWH)	494,849	523,496	550,621	579,012	599,018	836,188
Aux Use (Fraction)	0.0275	0.0275	0.0275	0.0275	0.001	0.001
<b>BERBICE</b>	2010	2011	2012	2013	2014	2015
Net Energy (MWH)	97,405	103,311	109,022	114,990	121,888	127,155
Peak (MW)	19	20	20	21	23	23
LF	0.60	0.60	0.62	0.62	0.62	0.62
Gross Energy (MWH)	98,168	104,121	109,877	115,892	122,843	127,282
Aux use (Fraction)	0.0078	0.0078	0.0078	0.0078	0.0078	0.001
<b>Total (MWH)</b>	<b>626,274</b>	<b>663,292</b>	<b>698,293</b>	<b>734,966</b>	<b>764,575</b>	<b>1,006,602</b>

Table 4.1.3: GPL 15-Year Forecast

Year	2011	2012	2013	2014	2015	2016	2017	2018
Growth	0.045	0.057	0.056	0.254	0.102	0.047	0.047	0.047
Net Energy (MWH)	663,292	698,293	734,966	764,575	1,006,602	1,053,470	1,102,683	1,154,705
Year	2019	2020	2021	2022	2023	2024	2025	
Growth	0.047	0.048	0.048	0.048	0.049	0.049	0.049	
Net Energy (MWH)	1,209,498	1,267,302	1,328,250	1,392,303	1,459,986	1,531,260	1,606,464	

The load factor (average annual demand as a percentage of peak demand) for the Demerara System has increased gradually from 69% six years ago to 72.4% in 2007, 72.7% in 2008, 73% in 2009 and 75.6% (to September) in 2010. The load factor in Demerara is projected to increase to 76% in 2010 and continue to increase incrementally to 79% by the end of 2015 to recognize the impact of increase sales to MD customers due to favourable tariffs and a reliable supply.

The load factor for the Berbice system has averaged 59% over the six-year period from 2000 but was 62% in 2007, 65.3% in 2008, 61.6% for 2009 and 62% so far (September) for 2010. It is projected to reduce to 60% in 2011 and increase back to 62% by 2012 and remain at this level for the forecast period to reflect the impact of loss reduction. Demand in Berbice is expected to be driven by both domestic and manufacturing (rice milling) demand.

The average load factor for the Essequibo system over for the six-year period from 2000 was 56.2% but was 60.8% in 2007, 64% in 2008, 65.4% for 2009 and 65% up to September 2010. The load factor trend in Essequibo is projected to peak at 72% during the life of this Programme to reflect the impact of loss reduction activities and the sustained increase in power demand for rice milling.

The DBIS peak demand is projected to grow to 144MW by 2015 while the Essequibo peak is projected to be 7.82MW in 2015. It should be noted that the Off-Grid demand informing the demand forecast for 2015 is adding 31MW to the peak.

#### 4.2 Planned Retirements and Generation Expansion, DBIS

The Generation Expansion Programme (GEP) is premised on the independent operation of the Demerara Interconnected System (DIS) and Berbice Interconnected System (BIS) until 2012 when the completion of the Sophia – Onverwagt transmission link would realize the Demerara-Berbice Interconnected System (DBIS). The GEP is also premised on the interconnection of the Leguan, Wakenaam and Essequibo Coast Systems by 2014.

The integration of the DIS and BIS in 2012 and three of the four isolated Essequibo Systems by 2014 would allow not only an optimum merit order dispatch to be derived from available generating capacity in the systems but also for reserve capacity to be shared. The integrated system coupled with the installation of new substations would improve system management, stability and overall service quality, particularly voltage regulation. The Company would be able to dramatically reduce operating cost on the Islands of Leguan and Wakenaam.

Four mobile Caterpillar units have been installed at Leonora but sustained growth on the West Coast requires further intervention, the installation of larger generators at Versailles to enable the

entire West Coast to be repowered as one feeder. This will be done in 2011 in addition to installing two remote operated re-closers on the feeder. These interventions will allow power interruptions to consumers to be held to brief periods under any circumstances other than network failure. Completion of the transmission link to Vreed-en-Hoop by 2012 along with the sub-stations at Vreed-en-Hoop and Edinburg would allow for generation capacity at Versailles to be relegated to peaking and or reserve duty and the West Coast to be served by three feeders instead of one.

The Georgetown 60Hz standardization plan, which is expected to be completed by the first quarter of 2012 would require the 22M W Wartsila built plant at Kingston to be converted to 60Hz, starting in the third quarter of 2011. The plant will be converted in two phases with each phase lasting approximately three months. During this period 11M W capacity would be unavailable which would create a deficit in generation capacity in Demerara. The current plan is to use rented Cat modules to cover any shortfall.

The generation plan is premised on having adequate HFO fired or renewable capacity to meet all the energy needs in Berbice by the third quarter of 2011 when the Canefield upgrade and conversion is expected to be completed and in Demerara by the first quarter of 2012 when the 15.6M W expansion at Kingston and the transmission link between East and West Demerara is expected to be completed.

The criterion for reserve capacity used in previous expansion plans is the size of the two largest units, resulting in a reserve of 11 M W in the DIS and 7.5M W in the BIS. However the 7.8M W Wartsila Units to be installed in Kingston will result in the Demerara reserve being increased to 15M W but a reserve of 10M W will be used for the BIS despite the IPP largest Units being 15M W.

In 2015, with the availability of 140M W of hydropower capacity, GPL would have to maintain adequate capacity in 2016 to cater for planned maintenance / inspection for a period of 1.3 months when no power will be delivered from the hydro. From 2015 a reserve capacity of 50M W is considered more appropriate as this would be adequate to power all the essential services and provide some semblance of supply (in addition to what can be dispatched from GuySuCo) to customers in the unlikely event that the double circuit transmission interconnection fails. Realistically, GPL will maintain all its generating capacity, where feasible.

**Table 4.2.1: Capacity Forecast W/O Additions, DBIS**

Existing Capacity, M W	2011	2012	2013	2014	2015
<b>DEMERARA</b>					
Garden of Eden Power Station	13.00	8.00	8.00	8.00	8.00
Demerara Power ( Kingston 1)	22.00	22.00	22.00	22.00	22.00
Demerara Power, (Kingston 11)	20.70	20.70	20.70	20.70	20.70
Demerara Power 1 ( GOE)	22.00	22.00	22.00	22.00	22.00
Versailles Power Station	2.20	2.20	2.20	2.20	0
Mobile Units	10.00	10.0	0	0	0
<b>Total Demerara</b>	<b>89.90</b>	<b>84.90</b>	<b>74.90</b>	<b>74.90</b>	<b>72.70</b>
Reserve Capacity	15.00	15.00			
Peak Demand	79	82			
<b>Excess (Shortfall)</b>	<b>(4.1)</b>	<b>(12.1)</b>			

<b>B E R B I C E</b>					
<b>C anefield</b>					
No.3 Mirrlees Blackstone	5.5	5.5	5.5	5.5	5.5
No. 4 Mirrlees Blackstone	5.0	5.0	5.0	5.0	5.0
M obile Units	3.0	3.0	0	-	
<b>O nverwagt</b>					
No. 5 & 6 General Motors	4.4	4.4	0	0	0
<b>I P P</b>	8.0	8.0	8.0	8.0	8.0
<b>Total Berbice</b>	<b>25.90</b>	<b>25.90</b>	<b>18.50</b>	<b>18.50</b>	<b>18.50</b>
Reserve Capacity	10.00	10.00			
Peak Demand	20	20			
<b>Excess (Shortfall)</b>	<b>(4.1)</b>	<b>(4.1)</b>			
<b>Total DBIS</b>	<b>115.80</b>	<b>115.80</b>	<b>93.40</b>	<b>93.40</b>	<b>91.20</b>
<b>Diesel Fired Capacity (DFC)</b>	<b>32.60</b>	<b>32.60</b>	<b>10.20</b>	<b>10.2</b>	<b>8.0</b>
Reserve Capacity			15.00	15.00	50.0
Net Capacity			78.40	78.40	41.20
Peak Demand			107.00	111.00	144.00*
<b>Excess(Shortfall)</b>			<b>(28.6)</b>	<b>(32.6)</b>	<b>(102.8)</b>

\* - 113M W peak without hydro.

The forecast indicates that there is a need for 102.8M W of additional generating capacity by 2015, of which 24.6M W is for replacement capacity (Note that with hydro the reserve capacity has been increased to 50M W in 2015 and that demand has been projected to grow by 31M W due to self generators and Linden being served by GPL). The proposed additions are included in Table 4.2.2 below.

**Table 4.2.2: Proposed Generation Addition, DBIS**

<b>Capacity Additions, M W</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Kingston Plant Expansion	15.6	0	0	0	0
Hydro IPP	-	-	-	0	0
Versailles addition		6.0			
New Additions	15.6	6.0	0	0	0
Total Available new Capacity	15.6	21.6	21.6	21.6	161.6
<b>Excess(shortfall) – Demerara</b>	11.5	9.5			
<b>Excess (Shortfall) – Berbice</b>	(4.1)	(4.1)			
<b>Excess (Shortfall) – DBIS</b>			(7)	(11.0)	58.8
<b>Diesel Fired Capacity to be used for peak</b>	<b>0.5</b>	<b>5.2</b>	<b>9.2</b>	<b>0</b>	<b>0</b>

In Berbice, the completion of the Canefield 10M W upgrade and HFO conversion by the third quarter of 2011 coupled with a commitment from Guysuco to provide between 8 – 12M W (out and in crop) will provide adequate capacity until 2014. Since the PPA between GPL & GuySuCo provides for a guarantee capacity of 8M W, this amount is reflected in the plan (which shows a shortfall of 4.1M W in 2011 and 2012).

#### **4.3      Essequibo Generation Expansion**

The expansion plan for Essequibo includes the installation in 2011 of two 500kVa gensets at Leguan and one similar unit at Wakenaam. In 2012 it is proposed to install a used 3M W HFO fired Unit at Anna Regina and a used 2M W HFO fired unit at Bartica.

#### **4.4      Use of Renewable Sources of Energy**

##### **(a)      C o - generation**

Renewable energy has begun to make a contribution with the commissioning of the Skeldon 30M W co-generation facility. While operational and other difficulties since its commissioning in 2008 have severely limited the dispatch of power from the co-generation facility, GuySuCo is guaranteeing twenty-six weeks of co-generation operation from 2012.

##### **(b)      H ydro Power**

The co-generation plant would be complemented in 2015 with at least 140M W of power from the Amaila Falls Hydroelectric Project. These projects, with adequate compensation in the GPL network, should provide over 99% of all GPL's energy requirements by 2015.

The contractor identified for the construction of the Amaila Falls hydropower project is projecting a forty-two month construction period. Work on the access road, which was financed by the Guyana Government, has commenced. Many initiatives are being employed to reduce the EPC cost and the annual cash requirement.

It is expected that the China Development Bank will provide the bulk of the debt while all the equity will be coming from Sithe Global. Among the initiatives to reduce the annual cash flow requirement would be a buy-down of the equity and Government foregoing any returns on its investment in the access road. Financial close is expected to occur by the second quarter of 2011 and construction is expected to start shortly after. With financial close, the tariff will be determined but this is not expected to exceed US\$0.11/kW h. Initiatives to reduce the tariff by buying down the equity during the early years would be limited by a minimum threshold for its equity set by Sithe.

The installed capacity of the plant would be 154M W with 140M W guaranteed at the delivery points (Linden and Sophia). The annual guaranteed energy is expected to be 900 G W H but the potential would be about 1,200G W h. GPL will implement initiatives to develop the market to realize the best tariff as an annual cash flow has to be guaranteed to the IPP.

While it is critical that GPL employ initiatives to expand the market, such expansion has to be managed to ensure available generation and network capacity remain adequate and the Company is not forced into expensive short term fixes.

##### **(c)      W ind Power**

GPL and Delta Caribbean signed a MOU in March 2007 for the construction of a 13.5M W Wind Farm at Hope beach on the East Coast of Demerara. High equipment prices, due largely to the strength of the Euro and the worldwide demand for wind turbines, required a complete project



review. The stability study has been completed and G W I has submitted an updated commercial proposal which proposes a tariff of US\$0.105 / k W h based on a delivery point at Hope Beach for a 18 M W wind farm. The proposal indicates that financing is being pursued but it has been considered prudent not to include the wind farm from the projections due to the degree of uncertainty.

#### **4.5 PLANS TO MEET GENERATION NEEDS OVER 15-YEAR FORECAST**

G P L's strategic long term generation plan is premised on the continued use of renewable sources of power to meet base-load generation needs. The development of a large hydropower facility by the Brazilians at Turtruba would assist G P L to meet its incremental power needs when the capacity at A m a i l a becomes inadequate by 2018. At this time no expansion of the A m a i l a project is contemplated.

It would be recognized that the changes in global weather patterns would impact water availability for any hydro development, both positively and negatively. G P L would therefore continue to maintain a minimum of 50 M W of fossil fuel capacity to fill capacity gaps.

#### 4.6 GENERATION MAINTENANCE PLAN - 2011

		2011												Total (hrs)
WOGI 1		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
	Run hrs	134,222	134,837	135,529	136,190	136,872	137,542	138,226	138,908	139,577	140,261	140,791	141,483	
Eng No. 1 6163	Type Maint.	5K	6K		7K	8K		9K	10K		11K	12K		
		134,045	135,045		136,045	137,045		138,045	139,045		140,045	141,067		
	Duration (hrs)	8	10		8	10		8	10		8	140		202
Eng No. 2 6164	Run hrs	134,334	134,951	135,643	136,302	136,986	137,656	138,348	139,032	139,701	140,383	141,053	141,505	
	Type Maint.		5K	6K		7K	8K		9k	10K	11k		12k	
			134,932	135,932		136,932	137,932		138,932	139,932	140,932		141,697	
Eng No. 3 7397	Run hrs	114,635	115,260	115,942	116,611	117,295	117,955	118,639	119,331	119,990	120,674	121,344	122,026	
	Type Maint.	3k		4k		5k	6k	7k		8k	9k		10k	
		115,027		116,027		117,027	118,027	119,027		120,027	121,027		122,027	
Eng No. 4 7396	Run hrs	115,234	115,849	116,533	117,202	117,414	118,076	118,768	119,450	120,111	120,803	121,463	122,147	
	Type Maint.		10k	11k		12K	1k		2k	3k		4k	5k	
			116,147	117,147		117,778	118,778		119,778	120,778		121,778	122,778	
WOGI 2	Run hrs	106,246	106,876	107,558	108,208	108,882	109,542	110,214	110,888	111,548	112,220	112,872	113,554	
	Type Maint.	12K	1k		2k	3k		4k	5k		6k	7k		
		106,644	107,644		108,644	109,644		110,644	111,644		112,644	113,644		
Eng No. 1 7651	Run hrs	101,273	101,911	102,583	103,235	103,907	104,567	105,241	105,683	106,335	107,017	107,667	108,341	
	Type Maint.	7k		8k	9k	10k		11k	12k	1k		2K	3K	
		101,994		102,994	103,994	104,994		105,994	106,894	107,894		108,894	109,894	
Eng No. 2 7653	Run hrs	88,834	89,464	90,146	90,796	91,478	92,130	92,802	93,484	94,136	94,578	95,238	95,912	
	Type Maint.	6K	7k		8k		9k	10k		11K	12k		1K	
		89,110	90,110		91,110		92,110	93,110		94,110	94,990		95,990	
Eng No. 3 7652	Run hrs	99,905	100,535	101,217	101,867	102,549	103,201	103,643	104,325	104,977	105,649	106,309	106,983	
	Type Maint.	8k	9k		10k		11K	12k		1K	2K		3K	
		100,057	101,057		102,057		103,057	103,991		104,991	105,991		106,991	
Eng No. 4 7650	Run hrs	10	8		10		8	240		8	10		8	302
	Type Maint.													
WOGI 3	Run hrs	10,084	10,708	11,392	12,061	12,513	13,174	13,866	14,547	15,209	15,900	16,559	17,243	
	Type Maint.	10K		11K		12K	1K		2K	3K		4K	5K	
		10,000		11,000		12,000	13,000		14,000	15,000		16,000	17,000	
Eng No.1 132184	Run hrs	9,664	10,278	10,962	11,631	12,083	12,744	13,436	14,117	14,779	15,460	16,129	16,813	
	Type Maint.		10k	11k		12k	1k		2k	3k	4K		5k	
			10,000	11,000		12,000	13,000		14,000	15,000	16,000		17,000	
Eng No.2 132186	Run hrs		10	8		240	8		10	8	10		8	
	Type Maint.													
Eng No.3 132185	Run hrs	9,486	10,110	10,802	11,471	11,923	12,592	13,276	13,957	14,627	15,310	15,969	16,661	
	Type Maint.		10k	11k		12k		1k	2k		3K	4k		
			10,000	11,000		12,000		13,000	14,000		15,000	16,000		
	Run hrs					240		8	10		8	10		
	Type Maint.													
	Total hrs	414	52	28	56	524	34	284	276	42	286	168	282	2,446

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>LEONORA</b>												
No. 1 Catset		500 hrs Service		Major Overhaul		500 hrs Service		1000 hrs Service		1500 hrs Service		2000 hrs Service
No. 2 Catset	1000 hrs Service		1500 hrs Service		2000 hrs Service		500 hrs Service		1000 hrs Service		Top Overhaul	500 hrs Service
No. 3 Catset		1000 hrs Service		1500 hrs Service		2000 hrs Service		500 hrs Service		1000 hrs Service	Top Overhaul	500 hrs Service
No. 4 Catset	1000 hrs Service		1500 hrs Service		2000 hrs Service		500 hrs Service		1000 hrs Service		1500 hrs Service	
<b>VERSAILLES</b>												
No. 2 Cat-Set	2000 hrs Service	500 hrs Service	1000 hrs Service	Top Overhaul	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service
No. 3 Niigata												
No. 4 Cat-Set	1000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	Major Overhaul	500 hrs Service
No. 6 G.M	500 hrs Service	1000 hrs Service	500 hrs Service	1000 hrs Service	500 hrs Service	1000 hrs Service	500 hrs Service	1000 hrs Service	500 hrs Service	1000 hrs Service	Top Overhaul	500 hrs Service
No. 7 Cat-Set	1000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	Major Overhaul	500 hrs Service
No. 9 Cat-Set	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	Top Overhaul	500 hrs Service	1000 hrs Service
<b>GARDEN OF EDEN</b>												
No. 2 Crossley	1000 hrs Service				Major Overhaul				500 hrs Service			
No. 4 Crossley		Major Overhaul				500 hrs Service				1000 hrs Service		
No. 5 Niigata		500 hrs Service			2000 hrs Service			500 hrs Service			1000 hrs Service	
No. 6 Niigata	500 hrs Service			2000 hrs Service			500 hrs Service			1000 hrs Service		
No. 8 Cat-Set		1000 hrs Service				1500 hrs Service				2000 hrs Service		
No. 11 Cat-Set	500 hrs Service				1000 hrs Service				1500 hrs Service			
<b>CANEFIELD</b>												
NO. 7 CAT				500 hrs Service	1000 hrs Service	1500 hrs Service	500 hrs Service	1000 hrs Service	2000 hrs Service	500 hrs Service	1500 hrs Service	2000 hrs Service
						2000 hrs Service		1500 hrs Service		1000 hrs Service		500 hrs Service
NO. 10 CAT		500 hrs Service	1000 hrs Service	1500 hrs Service	500 hrs Service	1000 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	500 hrs Service	1000 hrs Service
				2000 hrs Service		1500 hrs Service				2000 hrs Service		
NO. 11 CAT	1000 hrs Service	1500 hrs Service	500 hrs Service	500 hrs Service	1000 hrs Service	2000 hrs Service	500 hrs Service	1500 hrs Service	2000 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service
		2000 hrs Service	Major Overhaul		1500 hrs Service		1000 hrs Service		500 hrs Service			500 hrs Service
NO. 12 CAT	500 hrs Service	1000 hrs Service	2000 hrs Service	500 hrs Service	Top Overhaul	500 hrs Service	1500 hrs Service	2000 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	1500 hrs Service
		1500 hrs Service		1000 hrs Service		1000 hrs Service		500 hrs Service			500 hrs Service	
NO. 13 CAT	1000 hrs Service	1500 hrs Service	500 hrs Service	1000 hrs Service	2000 hrs Service	500 hrs Service	1500 hrs Service	2000 hrs Service	1000 hrs Service	Top Overhaul	500 hrs Service	
		2000 hrs Service		1500 hrs Service		1000 hrs Service		500 hrs Service			1000 hrs Service	
NO. 20 CAT	500 hrs Service	1000 hrs Service	2000 hrs Service	500 hrs Service	1500 hrs Service	2000 hrs Service	1000 hrs Service	Top Overhaul	500 hrs Service	1500 hrs Service	2000 hrs Service	1000 hrs Service
		1500 hrs Service		1000 hrs Service		500 hrs Service			1000 hrs Service		500 hrs Service	
NO. 3 MIRPLEES	3000 hrs Service	1000 hrs Service	1500 hrs Service	1000 hrs Service	Top Overhaul	1000 hrs Service	1500 hrs Service	500 hrs Service	3000 hrs Service	500 hrs Service	1500 hrs Service	500 hrs Service
	500 hrs Service		500 hrs Service		500 hrs Service			1000 hrs Service		1000 hrs Service		
NO. 4 MIRPLEES	1000 hrs Service	1500 hrs Service	1000 hrs Service	3000 hrs Service	1000 hrs Service	1500 hrs Service	1000 hrs Service	6,000 hrs service	1000 hrs Service	1500 hrs Service	500 hrs Service	1500 hrs Service
		500 hrs Service		500 hrs Service		500 hrs Service		500 hrs Service			1000 hrs Service	
<b>ONVERWAGT</b>												
# 5 GM	2350 & 2700	3050	3400	3750 & 4000	4000	350	700	1050	1400	1750	2000 & 2350	2700
# 7 GM	3750	4000 & 4350	4700	5050 & 5400	5750	6000 & 6350	6700	7050 & 7400	7750 & 8000	8000	350 & 700	1050
# 9 Cat	1500 hrs Service	-	2000 hrs Service	500 hrs Service	-	1000 hrs Service	Top Overhaul	-	500 hrs Service	-	1000 hrs Service	1500 hrs Service
<b>Anna Regina</b>												
#1 Wartsila	500 Hrs	500 Hrs	1000 Hrs	2000 Hrs	500 Hrs	1000 Hrs	2000 Hrs	500 Hrs	500 Hrs	2000 Hrs	1000 Hrs	500 Hrs
	2000 Hrs		500 Hrs			500 Hrs		1000 Hrs		500 Hrs		1000 Hrs
#2 Wartsila	1000 Hrs	500 Hrs	500 Hrs	1000 Hrs	2000 Hrs	500 Hrs	1000 Hrs	2000 Hrs	500 Hrs	500 Hrs	Major Overhaul	1000 Hrs
		2000 Hrs		500 Hrs			500 Hrs		1000 Hrs		500 Hrs	
<b>Bartica</b>												
#4 Cat	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	Major Overhaul	500 hrs Service
#5 Cat	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	Major Overhaul	500 hrs Service	1000 hrs Service	1500 hrs Service
<b>Wakenaam</b>												
#1 Cat	Major Overhaul	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service
#2 Cat	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service	500 hrs Service	1000 hrs Service	1500 hrs Service	2000 hrs Service
<b>Leguan</b>												
#1 Cat	2000 hrs Service		500 hrs Service		1000 hrs Service		Major Overhaul		500 hrs Service		1000 hrs Service	
#2 Cat		500 hrs Service						1000 hrs Service				

#### 4.7 T & D Expansion and Modernization Plan

The major system expansion is expected to cost US\$69.4 million and will comprise of the following:

- Construction of a 69kV transmission link between Kingston and a new sub-station at Vreed-en-Hoop and terminating at a substation at Edinburg on the West Coast.
- Construction of new 69kV substations at Golden Grove (E.B.D.), Sophia and South Georgetown (New Georgetown Substation) and expansion of the existing sub-stations at Sophia and Kingston in Demerara.
- Construction of a 69 kV transmission line from Sophia to Onverwagt, with substations at Good Hope and Columbia (Mahaicony) and upgrade of the Onverwagt substation.
- Construction of a new 69Kv sub-station at Williamsburg.
- Expansion of the 69kV network from Edinburg to Parika and further to Leguan, Wakenaam and the Essequibo Coast with sub-stations at Parika, Leguan, Wakenaam and two sub-stations on the Essequibo Coast.
- Construction and interconnection of a 25MVA substation at Linden.
- Completion of the frequency conversion and upgrade of the 50Hz system in Georgetown.

This includes:

- The replacement of 17MVA, 11KV, 50Hz transformers with 13.8KV, 60Hz transformers.
- Extension of 18Km of primary circuits.

(It should be noted that the frequency conversion done in 2010 would see 10MW being converted while most of the transformers for Phase 11 have already been procured.)

- Re-design of the distribution network in areas with sub-feeds to allow individual connections.
- Installation of new 60Hz feeders and the re-assignment of loads in Georgetown, East Coast (both lower and upper East Coast), East Bank, West Coast and on the Corentyne.
- Introduction of pole mounted breakers with auto-reclose capability for long feeders.
- Use of pole mounted breakers with remote close capability to provide alternative feeds.
- Installation of automatic compensation equipment to maintain a Power Factor of 0.98
- Phased upgrade of secondary networks to the current construction standard and to meet fraud proofing requirements.
- Use of concrete and tubular steel structures to reduce the long term maintenance burden presented by wooden poles.
- Acquisition of specialized vehicles and equipment for T & D.

The construction of the transmission links to Berbice and West Demerara will enable the GPL to keep in reserve or for emergency situations; the diesel fired units at Versailles and Onverwagt and provide base-load power to those distribution points from larger and more efficient HFO fired units and or from the renewable sources. The extension of the transmission line to Leonora and the construction of a 69 kV substation at this location will not only provide a better quality, more reliable and secure supply to the West Coast Demerara but also reduce technical losses.

The Williamsburg Substation will be designed to split the Canefield to Skeldon transmission line. This will improve the supply reliability to the Substation and the manageability of the transmission system. It would also allow GPL the opportunity to use a phase shifting transformer in the future, if necessary.

The plan to install substations is aimed at improving supply quality and available distribution network capacity but will also reduce technical losses. Shorter feeders and lighter loads would also allow for improved overall management, including maintenance and reduction in un-served energy due to line plant unavailability. The timing of construction of the various Substations is targeted at optimizing network capacity to meet current demand and expected growth over a ten-year period in an efficient and timely manner.

The linking of the Berbice and Demerara (Sophia to Onverwagt) systems is also a critical requirement, as it will allow the sharing of generating capacity between the two major systems, reduce the reserve requirement and improve overall system stability. The link between Sophia and Onverwagt will be done in three sections, one from Sophia to Good Hope, the other from Good Hope to Columbia and the third from Columbia to Onverwagt. The three-section arrangement would allow for better management and the use of phase shifting transformers in the future.

The interconnection of Leguan, Wakenaam and Essequibo Coast to the national grid by 2014 would allow for access of these load centers to hydropower. The interconnection of Bartica is projected for 2017.

Provision has also been made for moving bulk power from the Linden delivery point (for hydro) to interconnect with the existing 13.8Kv feeders. In fact, it is proposed to have two 69Kv tie lines between the hydro delivery point and a 13.8Kv distribution point with five (5) feeders.

The cost of the proposed expansion of the T & D System is included in the following table :

**Table 4.7: T & D Expansion Programme, Capital Cost – US\$ '000**

<b>T&amp;D Capital Investment Summary -US\$'000</b>		<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>Total</b>
<b>Transmission Lines</b>		\$ 10,119	\$ 5,017	\$ 5,834	\$ 1,194		\$ 22,163
<b>Substations</b>		\$ 11,762	\$ 7,274	\$ 6,656	\$ 1,774		\$ 27,466
<b>Distribution</b>		\$ 2,175	\$ 4,168	\$ 3,995	\$ 3,500	\$ 4,250	\$ 18,087
<b>Capacity building</b>		\$ 390	\$ 350		\$ 950		\$ 1,690
	<b>Total</b>	<b>\$ 24,446</b>	<b>\$ 16,809</b>	<b>\$ 16,484</b>	<b>\$ 7,418</b>	<b>\$ 4,250</b>	<b>\$ 69,407</b>

While major transmission and sub-station projects will be outsourced to overseas contractors, a key strategy of this Programme is the outsourcing of major distribution capital jobs to local Contractors. The ongoing engagement of Contractors in system improvement works and network extension has allowed the Contractors to not only improve and expand the skills available to them but also their complement of tools and equipment.

GPL would continue to provide technical training to Contractor's personnel to further improve their competence. This can only accrue benefits to GPL over time.

The objectives of promoting private participation in the T & D activities of the Company are the following:





- Improved efficiency in executing major T&D upgrades and network extension;
- Reduced outages to consumers;
- Improved reliability of the T&D system as more work can be done during outages;
- Reduction of Energy not Served due to T&D faults and maintenance activities;
- Reduction of costs;
- Reduction of Capital Investments in specialized T&D tools and equipment.

Some of the main capital works that will be outsourced during the programme are the following:

- ✓ Rehabilitation of feeder backbone structures;
- ✓ Major network rehabilitation and system upgrades;
- ✓ Secondary network upgrade.
- ✓ Network expansion.
- ✓ Specific interventions targeting areas with high levels of emergency calls;
- ✓ Customer capital jobs and system extensions;
- ✓ Vegetation management.

As a result of outsourcing these capital works, the Company will be able to find the resources to continuously upgrading the tools and equipment available to T&D crews to vastly improve productivity.

This will lead to the following benefits:

-  Better training of remaining work force;
-  Better equipped crews;
-  Quicker responses to emergency calls;
-  Improved efficiency.

The Company proposes to spend a total of US\$1,690,000 over this programme on T&D equipment and vehicles. Outsourcing will continue to build momentum in 2011 and increase progressively over the following years.

4.7.1 Network Maintenance Plan - 2011

DATE:		Jan - Dec 2011			DEMERARA	ESSEQUIBO ISLANDS	BERBICE	T & D AREAS
					ANNUAL TOTAL	ANNUAL TOTAL	ANNUAL TOTAL	ANNUAL TOTAL
TARGET INDICATORS					AMOUNT	AMOUNT	AMOUNT	AMOUNT
					Plan	Plan	Plan	Plan
POLE REPLACEMENT		PRIM.			626	204	315	1145
		SEC.			819	263	393	1475
POLE PLUMBING		PRIM.			337	206	380	923
		SEC.			331	256	512	1099
POLE TREATMENT		PRIM.			2121	2464	1882	6467
		SEC.			3199	3278	2623	9100
OLD POLE REMOVAL		PRIM.			625	192	447	1264
		SEC.			862	256	598	1716
POLE STUBBING		PRIM.			112	50	153	315
		SEC.			115	60	183	358
ANCHOR BLOCK REPLACEMENT.		PRIM.			72	33	172	277
		SEC.			103	45	259	407
GUY REPLACEMENT		PRIM.			87	31	348	466
		SEC.			125	39	233	397
REPLACEMENT DEFECTIVE CROSS ARMS		PRIM.			513	334	302	1149
INSULATOR REPLACEMENT		PRIM.			461	572	378	1411
		SEC.			338	165	154	657
LINE/HARDWARE TRANSFER		PRIM.			656	193	256	1105
		SEC.			836	254	324	1414
LINE EXTENSION (KM)		PRIM.			6	3.43	12	21
		SEC.			6	4.4	33	43
LINE UPGRADEMENT (KM)		PRIM.			9	0.23	38	47
		SEC.			49	5.65	5182	5237
LINE RETENSION (KM)		PRIM.			48	2.05	20	70
		SEC.			46	4.42	42	92
SERVICE LINE REPLACEMENT (MTS)					10736	3990	4056	18782
INSTALLATION/REPLACEMENT (GAB)		PRIM.			52	2	336	390
INSTALLATION/REPLACEMENT (SPD)		PRIM.			52	1	197	250
INSTALLATION/REPLACEMENT (RCO)		PRIM.			399	45	117	561
INSTALLATION/REPLACEMENT (PMCO)					378	264	331	973
TRANSFORMER MAINTENANCE		SEC.			490	248	626	1364
INSTALLATION OF ADDITIONAL TRANSFORMERS		SEC.			74	16	673	763
MAINTENANCE OF CAPACITOR BANKS					50	0	291	341
JUMPER SERVICING/REPLACEMENT		PRIM.			733	149	147	1029
		SEC.			663	219	228	1110
SERVICE CONNECTION @ CONSUMER					6836	3116	857	10809
INSTALLATION OF ADDITIONAL EARTHS					300	73	474	847
ROUTE CLEARING (KM)		PRIM.			64	12.62	86	163
		SEC.			83	34.51	172	290
LINE INSPECTION (KM)		PRIM.			357	135	324	816
		SEC.			356	98.48	434	889
C.E.O.F CARDS		SEC.			1974	486	929	3389
TOTAL MANHOURS								

The T & D maintenance programme is scoped to replace or reinforce approximately 2% of secondary structures and 4% of primary structures. As mentioned before, outsourcing and investments to improved GPL's maintenance capacity and capability will serve to ensure that the targets are achieved.

In Demerara, network management is divided into four areas of control, Central is responsible for the network between Liliendaal and Rahaman's turn, South is responsible for the network south of Rahaman's turn and both transmission lines, East is responsible for the network between Liliendaal and Bygeval (Mahaica) while West is responsible for the entire West Demerara.

West Berbice has responsibility for the network in west Berbice and upper East Coast, east of Bygeval. East Berbice has responsibility for all network in that area while the Essequibo office has responsibility for Essequibo Coast, Leguan, Wakenaam and Bartica.

#### **4.8 Loss Reduction**

The reduction of losses, technical and non-technical, is one of the key challenges facing the GPL. By the end of 2010 total losses (dispatched power less billed sales) is 31.3% of dispatched power. The strategies which will be employed in our Loss Reduction programme are expected to reduce losses to 24.3% by the end of 2015.

##### **4.8.1 Non-Technical Loss Reduction**

It has been confirmed that the single most effective strategy to reduce non-technical losses is ensuring that there is adequate, secure metering. The completion of the ITRON programme which includes 2,900 installations that account for 60% of sales is critical and should be completed by the first quarter of 2011.

For other consumers, the use of pre-paid meters will deliver the double benefit of reducing losses while at the same time improving customer service. It is expected that 54,000 pre-paid meters will be installed over the next five years, replacing post-paid electromechanical and electronic meters. Amendments to ESRA enacted into law in 2010 allow GPL to submit a prepaid metering programme to the Minister for approval. This would ensure that the target set by GPL can be met.

GPL expects that in 2011 all new single phase services will have pre-paid meters installed. Columbia has found that the latest version of the pre-paid meter, the split-meter, is a very useful tool to counter electricity theft and its use has also resulted in a reduction in demand by up to 15%. The split-meter is now being used as the standard in South Africa's rural electrification programme. In Dominica, the pre-paid meter was introduced on a pilot basis but now the Utility is inundated by requests for the meter.

GPL will continue to use the ITRON meters for all Maximum Demand (MD) and large non-MD installations. All new services that fall into this category will be served by this meter while 2,800 existing accounts that provide 65% of GPL's revenue will be outfitted with the ITRON meter by the end of the first quarter of 2011.

Our billing statistics, which indicate that just over 68,000 consumers use up to 75kWh per month, confirm that theft of electricity is not only a problem in un-served and recently served areas but



chronic among other consumers. The introduction of split-meter pre-paid technology and its eventual universal application for single phase services, the fraud proofing of the distribution network and the use of co-axial cables for distribution in special cases should comprehensively address this problem .

The activities envisaged over the life of this Programme require a capital investment of US\$9.285M and include:

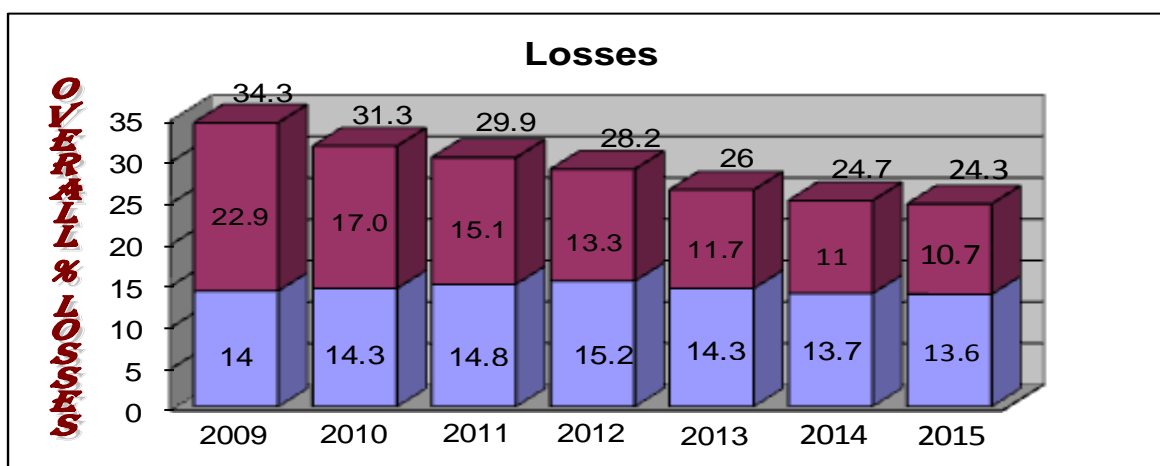
- Installation of 54,000 split-meters by the end of 2015.
- Continuation of raids in areas mentioned before, where electricity theft is a problem .
- Prosecution all cases of illegal electricity extraction
- Ongoing investigation of cases of zero and persistent low consumption
- Continued use of the Intelligence Unit to process and evaluate billing data to identify anomalies.
- Utilizing intelligence to identify and prosecute individuals involved in the “business” of meter tampering.

It should be noted that investments in the distribution network to prevent illegal connections, while having non-technical loss reduction value, has been charged to LV network upgrade (Technical loss reduction).

#### 4.8.2 Technical Loss Reduction

T&D investment in technical loss reduction will be US\$77M over the life of this programme . The investment will address losses at the distribution level, within both the primary and LV network . An estimate of 1.6% reduction in technical losses is projected over the life of the programme .

**Table: 4.8.2 Loss Reduction Projections**



## 5 Operations

### 5.1 Sales and Revenue Collection

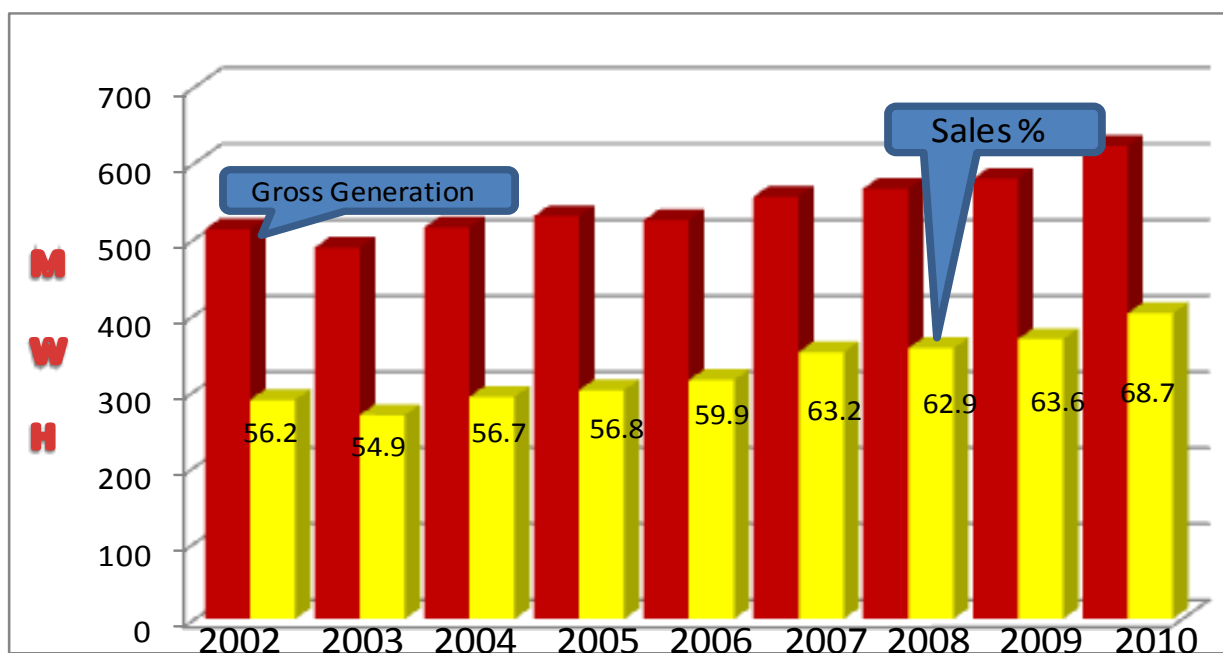
Sales growth from 2010 to 2015 shows an increase based on the expectation that losses will be brought down from 31.3% in 2010 to 24.3% by the end of 2015 and that 2.94% will translate fully into Sales.

It is projected that the customer base will increase from 151,000 in 2010 to around 168,420 by the end of 2015. The projected increase in the customer base is largely as a result of new connections in recently served areas and the forecasted electrification programme in 2013.

The quality of meter reading will continue to improve with persons becoming more familiar with the hand held meter reading loggers employed in 2010. The meter reading data is being downloaded to the billing system rather than individual readings being keyed in, further improving accuracy.

An active campaign to reduce Receivables will continue and a cash collection rate of 99.5% (cash collections as a percentage of sales) has been assumed for the years 2010 to 2015. The target is based on historical collection trends over the past few years.

Table 5.1 Gross generation & Sales



### 5.2 PLANS TO REGAIN INDUSTRIAL CUSTOMERS

There is no doubt that industrial consumers expect:

- A reliable and efficient service.
- Attractive tariff.
- Power to be available to meet their growth.

The investments in generation, transmission, sub-stations, control facilities and loss reduction are all geared towards providing a reliable, least cost service. GPL expects to maintain its tariffs until power is available commercially from the hydro to reduce and rebalance tariffs in one process.

Before hydro, industrial consumers would be able to access power that is more reliable but the tariff reduction which many will be looking for would not come until 2014. GPL is not projecting to lose more industrial consumers but expects that developers will be looking to GPL to meet their power needs.

### **5.3 PLANS FOR PROVIDING ELECTRICITY FOR DEVELOPMENT AND REDEVELOPMENT PROJECTS IN URBAN AREAS**

**Georgetown** - The frequency standardization project in Georgetown will result in increased feeder capacity because of the higher distribution voltage. The new Georgetown substation will allow additional feeders to be available to serve the Georgetown load while the frequency conversion of the 22M W W artsila built plant at Kingston and the expansion of the 20.7M W 60Hz plant by 15.6M W would ensure adequate generation capacity is available.

**New Amsterdam** - New Amsterdam is served from Canefield and the construction of a new substation at Williamsburg will effectively off-load canefield so that more of the power delivered to Canefield can be directed to New Amsterdam. The interconnection of the Demerara and Berbice systems will allow consumers in New Amsterdam to also access power from Demerara.

**Rose Hall** - The new substation at Williamsburg will provide a vastly improved quality of service for consumers in Rose Hall. The new feeders will allow GPL to meet growth in the Town for at least ten years. The new feeder emanating from GuySuCo's Skeldon facility will ensure adequate network capacity to deliver power to meet growth in Corriverton.

**Corriverton** - Corriverton is being served by a feeder emanating from GuySuCo's new Skeldon factory. This allows access to generation and network capacity that would be more than adequate to meet the medium term needs of the Town.

Through the life of this programme the generation needs of Berbice in general and its Towns in particular would be met from GuySuCo's Skeldon facility, Canefield power station (11M W of HFO fired Mirrlees capacity) and from Demerara.

**Anna Regina** - GPL's power plant on the Essequibo Coast is located at Anna Regina. The interconnection of the Essequibo Coast to the national grid in 2014 and the construction of two sub-stations on the Coast would provide access to the necessary generation and network capacity to meet any development needs in the Town. It should be mentioned that the Anna Regina Plant will be converted to 60Hz and used as stand-by.

## 5.4 SUMMARY OF WORK PLAN

2011	
Generation	15.6MW Extension - Kingston 11 Plant
	Frequency conversion - 22MW Wartsila Kingston 1 Plant
	2 x 500kW Genset - Leguan
	500Kw Genset - Wakenaam
Transmission Lines	Transmission Line between Versailles and Edinburg Substations
	Transmission Line between Versailles and Kingston Substations, inclusive of submarine cable
Technical Loss Reduction	Transmission Line between New Georgetown and New Sophia
	Transmission Line between New Sophia and Onverwagt
	Substations Versailles Substation
	Edinburgh Substation
	Diamond Substation, including tie-in Lines 1 And 2 (69kV)
	New Georgetown
	New Sophia Substation
	Extended Sophia Substation
	Good Hope
	Mahaicony (Columbia) Substation
	Onverwagt
Distribution	Georgetown Frequency Conversion (Phase 11)
	LV network upgrade (Fraud proofing included)
	Distribution automation
DSM - Demand Side Management , energy efficiency Initiative	
Non Tec Loss Reduction	Replace 8,000 meters with pre-paid meters
	HV Distribution
	Coaxial cable use (Service Drops)
New Services	4,200 new services
Buildings	Complete new T&D building - Sophia
Capacity Building	Acquire T&D Equipment & Tools

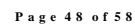
2012	
Generation	Frequency conversion - 22MW Wartsila Kingston 1 Plant
	3MW HFO Unit for Anna Regina
	2 x 3MW used Wartsila Units (Versailles)
	2MW HFO Unit for Bartica
Transmission Lines	Transmission Line between Versailles and Kingston Substations, inclusive of submarine cable
	Transmission Line between New Georgetown and New Sophia
	Transmission Line between New Sophia and Onverwagt
	Transmission line from Edinburg to Parika
	Submarine cable from Parika to Leguan
	Transmission line across Leguan
	Submarine cable from Leguan to Wakenaam
	Transmission line across Wakenaam
	Submarine cable from Wakenaam to Essequibo Coast
	Transmission line along Essequibo Coast
Substations	Diamond Substation, including tie-in Lines 1 And 2 (69kV)
	New Georgetown
	New Sophia Substation
	Extended Sophia Substation
	Good Hope
	Mahaicony (Columbia) Substation
	Onverwagt
	Parika Substation
	Leguan Substation
	Wakenaam Substation
	Two Essequibo Coast Substations
	Williamsburg sub-station
Distribution	LV Network upgrade (fraud proofing included)
	Distribution automation
	Georgetown frequency conversion
	Introduction of alternative structures
DSM	Demand Side Management
Non Tec Loss Reduction	Replace 10,000 meters with pre-paid meters
	HV Distribution
	Coaxial cable use (Service Drops)
New Services	2,800 new services
Buildings	New T&D Building New Amsterdam
	New Building Middle Street

2013	
Technical Loss Reduction	Generation Frequency Conversion - Anna Regina Wartsila Units
	Transmission Transmission line from Edinburg to Parika
	Submarine cable from Parika to Leguan
	Transmission line across Leguan
	Submarine cable from Leguan to Wakenaam
	Transmission line across Wakenaam
	Submarine cable from Wakenaam to Essequibo Coast
	Transmission line along Essequibo Coast
	Substation Good Hope
	Mahaicony (Columbia) Substation
	Onverwagt
	Parika Substation
	Leguan Substation
	Wakenaam Substation
	Two Essequibo Coast Substations
	Linden Substation & interconnection
	Distribution LV network upgrade (fraud proofing included)
	Frequency Conversion - Essequibo Coast
	Alternative structures
	DSM DSM - Demand Side Management
Non Tec Loss Reduction	Replace 12,000 meters with prepaid meters
	HV Distribution
	Coaxial cable use (Service Drops)
New Services	2,500 new services
Electrification	Un-served Areas Electrification
Building	New building Middle Street

2014	
Technical Loss Reduction	Transmission Lines Submarine cable from Leguan to Wakenaam
	Transmission line across Wakenaam
	Submarine cable from Wakenaam to Essequibo Coast
	Transmission line along Essequibo Coast
	Substation Parika Substation
	Leguan Substation
	Wakenaam Substation
	Two Essequibo Coast Substations
	Linden Substation & interconnection
	Distribution LV network upgrade (fraud proofing included)
	Alternative structures
Non Tec Loss Reduction	Replace 12,000 meters with pre-paid meters
New Services	4,200 new services
Capacity building	T&D Equipment

2015	
Non Tec Loss Reduction	Replace 12,000 meters with pre-paid meters
New Services	3,800 new services
Distribution	LV network upgrade (fraud proofing included)
	Alternative structures

## D &amp; E P R O G R A M M E 2 0 1 1 – 2 0 1 5





## 6 OPERATING COSTS AND CAPITAL EXPENDITURES

### 6.1 Accounts Summaries

Table 6.1.: Profit & Loss Account

	2011	2012	2013	2014	2015
	G\$'000	G\$'000	G\$'000	G\$'000	G\$'000
<b>OPERATING REVENUE</b>					
Sales	29,181,876	31,453,928	34,376,348	37,147,754	31,008,206
Miscellaneous Income	881,604	379,036	386,617	394,349	402,236
	<b>30,063,480</b>	<b>31,832,965</b>	<b>34,762,965</b>	<b>37,542,103</b>	<b>31,410,442</b>
<b>OPERATING COSTS</b>					
<b>Generation Expenses</b>					
Fuel	16,800,309	18,204,052	20,882,581	23,569,450	1,621,554
Operations & Maintenance contract	1,305,952	1,609,420	1,663,238	1,783,303	76,608
Repairs & Maintenance	1,293,723	729,781	788,163	851,216	919,314
Rental of Equipment	385,527				
Purchased Power	433,094	438,098	442,310	445,709	22,133,577
	<b>20,218,605</b>	<b>20,981,351</b>	<b>23,776,292</b>	<b>26,649,678</b>	<b>24,751,052</b>
<b>GROSS INCOME</b>	<b>9,844,875</b>	<b>10,851,613</b>	<b>10,986,673</b>	<b>10,892,425</b>	<b>6,659,389</b>
<b>Other Expenses</b>					
Employment costs	2,336,699	2,501,054	2,475,978	2,604,675	2,626,659
T&D Repairs and Maintenance	400,017	432,018	324,014	333,734	343,746
Depreciation	2,214,424	2,312,161	2,805,446	3,047,386	3,260,573
Administration	1,467,793	1,585,217	1,712,034	1,848,997	1,996,917
Rates	28,766	31,067	33,552	36,236	39,135
Bad debts	437,728	471,809	515,645	557,216	310,082
PUC Assessment & Licence	51,000	51,000	51,000	51,000	51,000
	<b>6,936,427</b>	<b>7,384,325</b>	<b>7,917,669</b>	<b>8,479,244</b>	<b>8,628,112</b>
<b>Total Operating Costs</b>	<b>27,155,032</b>	<b>28,365,676</b>	<b>31,693,960</b>	<b>35,128,922</b>	<b>33,379,165</b>
<b>Operating Profit</b>	<b>2,908,448</b>	<b>3,467,288</b>	<b>3,069,004</b>	<b>2,413,181</b>	<b>(1,968,723)</b>
<b>Finance Charges</b>					
Interest	315,400	279,726	256,732	237,554	223,474
Net profit before Taxation	2,593,048	3,187,562	2,812,272	2,175,627	(2,192,197)
Taxation	61,000	188,638	80,000	150,778	80,000
<b>Net profit after taxation</b>	<b>2,532,048</b>	<b>2,998,924</b>	<b>2,732,272</b>	<b>2,024,850</b>	<b>(2,272,197)</b>
Dividends		(1,053,203)	(1,053,203)	(1,053,203)	(1,053,203)
<b>Accumulated (losses)/profits b/fwd</b>	<b>(2,008,330)</b>	<b>523,718</b>	<b>2,469,440</b>	<b>4,148,509</b>	<b>5,120,155</b>
<b>ACCUMULATED (DEFICIT) / PROFIT C/F</b>	<b>523,718</b>	<b>2,469,440</b>	<b>4,148,509</b>	<b>5,120,155</b>	<b>1,794,756</b>

	2009	2010	2011	2012	2013
	G\$000	G\$000	G\$000	G\$000	G\$000
<b>Revenues</b>					
Sales	29,181,876	31,453,928	34,376,348	37,147,754	31,008,206
Miscellaneous Income	881,604	379,036	386,617	394,349	402,236
<b>Total Revenues</b>	<b>30,063,480</b>	<b>31,832,965</b>	<b>34,762,965</b>	<b>37,542,103</b>	<b>31,410,442</b>
<b>Costs</b>					
Generation expenses	20,218,605	20,981,351	23,776,292	26,649,678	24,751,052
Employment costs	2,336,699	2,501,054	2,475,978	2,604,675	2,626,659
T&D Repairs & Maintenance	400,017	432,018	324,014	333,734	343,746
Administrative costs	1,547,559	1,667,283	1,796,586	1,936,233	2,087,052
Bad Debts	437,728	471,809	515,645	557,216	310,082
Depreciation	2,214,424	2,312,161	2,805,446	3,047,386	3,260,573
Interest	315,400	279,726	256,732	237,554	223,474
<b>Total Costs</b>	<b>27,470,432</b>	<b>28,645,402</b>	<b>31,950,693</b>	<b>35,366,476</b>	<b>33,602,638</b>
Profit before taxation	2,593,048	3,187,562	2,812,272	2,175,627	(2,192,197)
Taxation	61,000	188,638	80,000	150,778	80,000
Profit after taxation	2,532,048	2,998,924	2,732,272	2,024,850	(2,272,197)
Dividends	-	(1,053,203)	(1,053,203)	(1,053,203)	(1,053,203)
Accumulated (loss)/profit b/fwd	(2,008,330)	523,718	2,469,440	4,148,509	5,120,155
<b>Accumulated (loss)/profit c/fwd</b>	<b>523,718</b>	<b>2,469,440</b>	<b>4,148,509</b>	<b>5,120,155</b>	<b>1,794,756</b>

In accordance with GPL's Licence the Shareholder is entitled to a required rate of return on equity of 7.53 % per annum .

**Table 6.2 : Cash Flow Statement**

	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
	G\$000	G\$000	G\$000	G\$000	G\$000
<b>RECEIPTS</b>					
Sales collections	28,890,057	30,982,120	33,860,702	36,590,538	30,698,124
Loans	5,737,413	2,992,259	2,865,312	629,174	-
Capital Contributions	120,179	129,793	140,176	151,390	163,502
Other Receipts	1,058,643	379,036	386,617	394,349	402,236
Customer Security Deposits	69,249	64,896	70,088	75,695	81,751
VAT Refunds	724,594	446,150	471,235	505,638	274,284
<b>TOTAL RECEIPTS</b>	<b>36,600,134</b>	<b>34,994,253</b>	<b>37,794,131</b>	<b>38,346,783</b>	<b>31,619,896</b>
<b>PAYMENTS</b>					
Fuel	16,800,309	18,204,052	20,882,581	23,569,450	1,621,554
O&M Contract	1,305,952	1,609,420	1,663,238	1,783,303	76,608
Generation Maintenance	1,487,333	729,781	788,163	851,216	919,314
Purchased Power	433,094	438,098	442,310	445,709	22,133,577
Rental of Generators	385,527				
R&M - T&D	608,461	432,018	324,014	333,734	343,746
Employment Costs	2,341,426	2,501,054	2,475,978	2,604,675	2,626,659
Administration Expenses	1,639,270	1,636,217	1,763,034	1,899,997	2,047,917
Rates & Taxes	-	31,067	33,552	36,236	39,135
Interest	315,400	279,726	256,732	237,554	223,474
Corporation & Property Taxes	61,000	188,638	80,000	150,778	80,000
Principal Loan Repayments	657,520	682,332	703,132	567,572	550,677
VAT	408,050	449,613	473,201	508,587	252,984
<b>TOTAL PAYMENTS</b>	<b>26,443,342</b>	<b>27,182,016</b>	<b>29,885,935</b>	<b>32,988,810</b>	<b>30,915,644</b>
<b>Operating cash surplus before Capex</b>	<b>10,156,792</b>	<b>7,812,238</b>	<b>7,908,196</b>	<b>5,357,974</b>	<b>704,252</b>
<b>CAPITAL EXPENDITURE</b>					
Non-T&D	876,562	1,001,136	970,260	527,000	539,632
Generation	4,394,481	2,077,885	199,500	-	-
T&D & Metering	5,035,811	3,496,210	3,961,712	1,572,574	909,500
<b>TOTAL CAPITAL EXPENDITURE</b>	<b>10,306,854</b>	<b>6,575,230</b>	<b>5,131,472</b>	<b>2,099,574</b>	<b>1,449,132</b>
<b>Net cash flow before dividends</b>	<b>(150,062)</b>	<b>1,237,008</b>	<b>2,776,724</b>	<b>3,258,400</b>	<b>(744,880)</b>
Dividends	-	(1,053,203)	(1,053,203)	(1,053,203)	(1,053,203)
Balance b/f	2,822,568	2,672,506	2,856,311	4,579,833	6,785,030
<b>BALANCE C/F</b>	<b>2,672,506</b>	<b>2,856,311</b>	<b>4,579,833</b>	<b>6,785,030</b>	<b>4,986,948</b>

## 7 PROJECTED CAPITAL EXPENDITURE

**Table 7.1: Summary of Capital Expenditure, US\$**

<u>Summary of Capital Expenditure</u>						
	2011	2012	2013	2014	2015	Total
Generation	\$ 21,332,430	\$ 9,989,830	\$ 950,000	\$ -	\$ -	\$ 32,272,260
Transmission Lines	\$ 10,118,985	\$ 5,016,925	\$ 5,833,500	\$ 1,193,800	\$ -	\$ 22,163,210
Substations	\$ 11,762,138	\$ 7,274,105	\$ 6,655,842	\$ 1,774,000	\$ -	\$ 27,466,085
Distribution	\$ 2,174,563	\$ 4,167,670	\$ 3,995,000	\$ 3,500,000	\$ 4,250,000	\$ 18,087,233
DSM	\$ 225,000	\$ 200,000	\$ 255,000	\$ -	\$ -	\$ 680,000
Non-Technical Loss Reduction	\$ 1,560,000	\$ 2,020,000	\$ 2,405,000	\$ 1,620,000	\$ 1,680,000	\$ 9,285,000
New services	\$ 525,000	\$ 378,000	\$ 350,000	\$ 630,000	\$ 608,000	\$ 2,491,000
Buildings	\$ 350,000	\$ 1,494,000	\$ 896,000	0	0	\$ 2,740,000
Capacity building	\$ 390,000	\$ 350,000	0	\$ 950,000	0	\$ 1,690,000
Electrification		\$ -	\$ 2,380,952	\$ -	0	\$ 2,380,952
<b>Total</b>	<b>\$ 48,438,116</b>	<b>\$ 30,890,529</b>	<b>\$ 23,721,295</b>	<b>\$ 9,667,800</b>	<b>\$ 6,538,000</b>	<b>\$ 119,255,740</b>

**Table 7.2: Summary of Capital Expenditure, G\$M**

Guyana Dollar (Millions)	2011	2012	2013	2014	2015	Total
Exchange Rate	206	208	210	212	214	
Generation	\$ 4,394	\$ 2,078	\$ 200	\$ -	\$ -	\$ 6,672
Transmission Lines	\$ 2,085	\$ 1,044	\$ 1,225	\$ 253	\$ -	\$ 4,606
Substations	\$ 2,423	\$ 1,513	\$ 1,398	\$ 376	\$ -	\$ 5,710
Distribution	\$ 448	\$ 867	\$ 839	\$ 742	\$ 910	\$ 3,805
DSM	\$ 46	\$ 42	\$ 54	\$ -	\$ -	\$ 142
Non- Technical Loss Reduction	\$ 321	\$ 420	\$ 505	\$ 343	\$ 360	\$ 1,950
New services	\$ 108	\$ 79	\$ 74	\$ 134	\$ 130	\$ 524
Buildings	\$ 72	\$ 311	\$ 188	\$ -	\$ -	\$ 571
Capacity building	\$ 80	\$ 73	\$ -	\$ 201	\$ -	\$ 355
Electrification	\$ -	\$ -	\$ 500	\$ -	\$ -	\$ 500
<b>Total</b>	<b>\$ 9,978</b>	<b>\$ 6,425</b>	<b>\$ 4,981</b>	<b>\$ 2,050</b>	<b>\$ 1,399</b>	<b>\$ 24,834</b>

## 8 FUNDING

### 8.1 Sources of Funding

Funding over the next five years will come from both internal and external sources. External sources include the IDB and the Government of Guyana. The table below summarizes the sources and amounts of funding.

**Table 8.1: Summary and Sources of Funding US\$**

Source of Funding (US\$)	GPL	Debt	IPP	IDB	GOG	Total
Generation	\$ 24,587,032	\$ 7,685,228				
Transmission Lines	\$ -	\$ 22,163,210				
Substations	\$ 1,995,000	\$ 25,471,085				
Distribution	\$ 15,237,233	\$ -		\$ 2,850,000		
DSM	\$ -			\$ 680,000		
Non- Technical Loss Reduction	\$ 9,285,000			\$ -		
New services	\$ 2,491,000					
Buildings	\$ 2,740,000					
Capacity building	\$ 1,690,000					
Electrification	\$ 1,000,000				\$ 1,380,952.38	
<b>Total</b>	<b>\$ 59,025,265</b>	<b>\$ 55,319,522</b>	<b>\$ -</b>	<b>\$ 3,530,000</b>	<b>\$ 1,380,952</b>	<b>\$ 119,255,740</b>
<b>Percentage</b>	<b>49%</b>	<b>46%</b>		<b>3%</b>	<b>1%</b>	

All new debt will be via concessional financing. The table below shows how different sources of funding affect the debt: equity ratio.

**Table 8.2 Debt / Equity Ratio**

Year	Debt	Equity
2011	51%	49%
2012	52%	48%
2013	53%	47%
2014	52%	48%
2015	56%	44%

## 9 TARIFF TRENDS AND TARIFF REBALANCING

Tariff rebalancing is recognized as necessary in order for the GPL to maintain and to recapture former industrial consumers, now self generating. A tariff study done in 2010 confirmed that Tariff A is being subsidized by the other tariff categories. No tariff rebalancing will be done until 2015, when hydropower is available commercially. At this time complete tariff rebalancing will be done by disproportionately reduce all tariffs. Based on a marginal cost approach, the study indicates that Tariff A should be increased by 25% while Tariffs B, C and D should be reduced by 17%, 17% and 29% respectively.

In keeping with the recommendation of the tariff study a new industrial tariff would be introduced in 2015 for consumers using 2.5M VA and above.

The tariff rebalancing forecast presented below is premised on:

- The projected loss reduction targets being achieved;

- Fuel prices not escalating significantly above 8% per annum
- Exchange rates not exceeding significantly the projected rates
- Hydro achieves commercial operation in Q1 2015.
- GPL expanding the market to maximize dispatch from the hydro.

The forecasted tariff rebalancing plan is premised on GPL tariffs at December 31<sup>st</sup> 2010 and reflects the recommendations from the tariff study, financed by the IADB in 2010. The movements in tariff prior to hydro in 2015 are reflective of exchange rate changes only.

**Table 9.1 Tariff rebalancing plan (US¢ / kWh)**

<b>Average Selling Price - US cents/kWh</b>						
	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
<b>Tariff</b>						
A below 75	25.12	25.12	24.88	24.64	24.41	18.14
A above 75	27.72	27.72	26.69	27.20	26.94	20.02
B	36.77	36.77	35.40	36.07	35.73	19.47
C	36.18	36.18	34.83	35.49	35.16	20.90
D	32.58	32.58	31.36	31.96	31.66	17.25
E	25.90	25.90	24.93	25.40	25.16	17.45
F						15.52
GA below 75	28.86	28.86	27.78	28.31	28.04	
GA above 75	29.24	29.24	28.14	28.68	28.41	
GB	36.33	36.33	34.97	35.64	35.30	
GC	34.82	34.82	33.51	34.15	33.83	
GD	33.40	33.40	32.15	32.76	32.45	
GE	27.06	27.06	26.05	26.55	26.30	

The advent of hydropower in 2015 would allow for Government tariffs to be aligned (reduced) with the corresponding non-Government tariff category. It would also provide opportunities for industrial tariffs C and D to be reset at points which would attract large companies back to the grid with a price below their projected self generation cost.

## **10 DEMAND SIDE MANAGEMENT (DSM)**

Demand Side Management (DSM) is the implementation of policies and measures which serve to control, influence and generally reduce electricity demand. DSM has been pursued internationally over the last two decades as an initiative to reduce demand growth while leveraging advantages to both Utilities and Consumers. It is recognized as a major solution in the fight against climate change and significant investment is being made by developed countries. In Guyana, it would support the Government's Low Carbon Development Strategy while allowing GPL to forego investments in generation and T&D.

DSM relies essentially on two pillars, behavioral change and technological intervention. GPL has set the following objectives for DSM :

- ❖ Ensure that the average customer is aware of the benefits of using energy efficient appliances.
- ❖ The average school child is aware of what can be done to reduce electricity wastage.
- ❖ Energy efficient appliances are more common on the local market.
- ❖ The sale of energy efficient appliances increases from year to year.

The following are some of the initiatives that will be employed in the pursuance of DSM objectives.

- Continuing to provide information to consumers via flyers, radio, television and printed media regarding energy management and efficient use of electricity.
- Making the secondary school debating competition focusing on energy efficiency and behavioral change and their impact on electricity use, an annual event.
- Continuing to interact with consumers and the public at large at trade fairs country-wide and discussing ways to use electricity efficiently.
- Working with the GEA on the public education campaign to encourage use of energy star rated appliances.
- Actively pursue grant financing for an Energy Efficiency Action Plan, develop a street lighting standard, implement an energy efficient street lighting pilot project and develop a database to capture information that would facilitate future interventions.
- A public lighting standard will be pursued based on energy efficient lighting.
- The initiative to introduce pre-paid meters is in itself a technological intervention as consumers can now access information that facilitates conservation through more prudent use of power.
- GPL will develop a database, providing grant financing is available, and begin to populate it with the following information:

a) End-use equipment for consumers by tariff category -

- i) Power demand
- ii) Type of design – Energy efficient or traditional
- iii) Year of manufacture
- iv) Typical hours of use
- v) Operating Power Factor (where applicable)

b) Energy efficient equipment available on the market –

- i) Manufacturer, specifications, construction standard, energy consumption and guarantees.
- ii) Prices and availability including names and addresses of local and Regional distributors.

c) Energy Efficiency Consultants / Service Providers available in the Region –

- i) Names and contact information.
- ii) Experience and availability

## **10.1 BENEFITS OF DSM**

GPL recognizes that an effective DSM Programme is an essential part of its menu of activities to manage demand and growth, improve service and ensure that customers receive a quality supply at a least cost price. It is recognized that:

- a) Investment in generation and networks can be deferred.
- b) Technical losses can be reduced due to reduced load on feeders, particularly the peak demand.
- c) Network faults can reduce and supply reliability can improve due to reduced load on feeders.
- d) Consumers can improve their standard of living and more can afford service if they can use power more efficiently.
- e) The company will reduce its greenhouse gas emissions.

Significant work needs to be done to develop a database which can allow important management decisions to be made including assessing the least-cost delivery of energy services based on a consideration of both the demand and supply sides.

## **11 HUMAN RESOURCES**

Maintenance of the requisite core of skills to manage a modern integrated electricity system would be critical for GPL. It is recognized that a significant amount of training would be required at all levels, particularly in the technical areas, to manage and maintain a system that would take a quantum leap in the technology it employs. While large investments would be made in training, the company also recognizes the need to create the conditions to retain adequate skills. While every effort will be made to attract and retain the best and the brightest, GPL recognizes that it cannot compete with the attraction of overseas employment.

GPL would continue to invest adequate resources to ensure that training is ongoing, timely, relevant and targeted to meet the direct needs of the company and contractors who will be engaged in capital works.

Multi-skilling continues to be pursued as technicians have replaced Journeymen, Operators, Electricians, etc. The drive to expose technical staff to a wide range of training will continue as the benefits derived to date are significant.

In the non-technical areas GPL will continue to provide opportunities for Accountants by maintaining the trainee Accountant programme. The skill pool in the country involving basic computer and accounting skills is very large and GPL would not need to intervene in any way.

## **12 IMPACT OF PROGRAMME ON NATURAL & SOCIAL ENVIRONMENT**

All new generating facilities are to be constructed in strict compliance with the Environmental Protection Act while a number of the older facilities are to be retired or relegated to occasional use. More importantly, the use of renewable resources would have a net positive environmental impact. GPL has obtained the necessary permits for the construction of the various transmission lines and substations from the EPA. Similar approval will be pursued for the generation investments, which will be based on current technology for the largest units.

With respect to the social environment, GPL expects that the ready access to power legitimately, the significant investments in generation and networks to improve power quality, improved customer service and planned reductions in tariffs would impact positively on the social environment.

GPL is however conscious that the removal of illegal services, prosecuting persons caught stealing electricity and taking prompt steps to collect revenues would have some consequences. These measures are likely to generate some negative social impact, especially by the perpetrators of illegal activities. The more severe penalties provided for in the amendments to ESRA will hopefully serve as a deterrent. Public Relations initiatives to warn persons will be enhanced.

## **13 RISK AND MITIGATION**

### **13.1 Loss Reduction**

GPL has set itself realistic targets for loss reduction over the life of this Programme. The resources necessary to drive the various loss reduction initiatives, which are financed by internal cash-flows are at risk of high fuel prices and the Company not meeting its loss reduction targets. The risk of not achieving the projected level of loss reduction however depends, not only on reversing the culture of electricity theft but more importantly on technological interventions to raise the bar, including completing the pre-paid programme and the LV network modifications and upgrade. While implementation of the pre-paid metering programme has its challenges, the reduction of electricity theft in a sustainable way presents a more substantial challenge. Use of the amendments to ESRA and the Evidence Act, vigorous and proactive policing by GPL and measures to reach out to communities to try to break the culture are initiatives designed to mitigate the risk of under-achievement.

### **13.2 Fuel Prices**

The volatility of fuel prices on the world market remains an ever present risk. While co-generation from Guysuco would help to mitigate against the impact of high fuel prices in the short term, the plan to change the fuel mix urgently to reduce diesel use to a minimum is the optimal interim arrangement until the advent of hydro in 2015, which would obviously mitigate this risk significantly. GPL's plan to use the benefits of loss reduction to stabilize tariffs and attract self generators to the grid could be derailed if fuel prices increase significantly beyond the forecasted 8% per annum. The use of HFO fired equipment and renewable energy to meet most of the energy needs in the DBIS by 2011 would mitigate this risk somewhat as HFO prices are less volatile and cheaper than diesel.

### **13.3 Market Size**

The risk of not expanding its market size would result in GPL having to pay for energy and capacity that it cannot use when hydro comes on line in 2015. Not being able to market all the energy in 2015 would result in the full benefits of lower cost energy not being realized by customers. GPL expects that with the advent of hydro, rebalanced and reduced tariffs (below the avoided cost of self generators) and stable supply, self generators will be attracted back to the grid.



## 14 CONTINGENCY

The debt financing envisaged for this five-year Programme has almost been fully secured, which means that the transmission, substation and control facilities will be constructed. GPL will finance the expansion of the 15.6MW plant in Kingston and significant elements of the loss reduction programme. Provision has been made in the financial projections for some capacity to absorb increased operating costs without derailing the capital programme.

There is a limit to any contingency arrangement as resources are constrained by a variety of factors.

### 14.1 GENERATION

GPL would have to continue to rely on diesel capacity to meet demand and energy needs should the HFO expansion or the commercial operation of hydro be delayed. The emergency generation addition would be based on additional high speed capacity.

### 14.2 TRANSMISSION & DISTRIBUTION

The T&D facilities which include all the transmission lines, substations and feeder upgrades are critical to reduce technical losses, reduce cost and improve supply quality. If the transmission lines are not constructed then the substations would not be constructed and GPL would have to take urgent measures to off-load feeders on the East and West Coast and in Georgetown.

About US\$1.2M would have to be spent to extend the Sophia F6 and F8 feeders and reassign loads among the F2, 6, 7 and 8 feeders to effectively off-load the F6 feeder. On the West Coast a second feeder would have to be extended from the Versailles power station to Leonora. GPL would be able to fund the critical T&D works from its cash flow if the non-technical loss reduction targets are achieved and fuel prices stay within projections.

## 15 COST-BENEFIT ANALYSIS OF INVESTMENT PROJECTS

The transmission and sub-station projects have been grouped logically to calculate the cost-benefit analysis. The logical grouping is necessary as each group forms a complement that is necessary to perform a desired function. The cost-benefit analysis has been done for a twenty-year period.

Project	Cost (US\$M)	Benefit	
		NPV (US\$M)	IRR
Upgrade existing Sophia, build new G'town sub-station & interconnection	6.891	2.887	7 %
Golden Grove Substation	3.102	3.852	12 %
Vreed-en-Hoop Substation and Kingston interconnection.	6.528	11.387	14 %
New Edinburgh (Leonora) Substation & transmission line from Vreed-en-Hoop.	4.212	3.205	9 %
New Good Hope sub-station.	1.295	2.334	17 %
New Columbia Sub-station	1.360	5.653	30 %
Expand & Upgrade Onverwagt, New Sophia sub-station & Control Centre,			

Sophia to Onverwagt 69 kV transmission line & SCADA	15.575	39.937	18 %
Kingston 15.6MW extension	22.1	18.5	36 %
2 x 500kW gensets for Leguan	0.15	0.015	10 %
500Kw genset for Wakenaam	0.068	0.019	14 %
Anna Regina interconnection, including interconnection of Leguan & Wakenaam and related works.	17.36	2.64	8 %
Linden Interconnection.	4.5	5.95	56 %
Williamsburg sub-station	1.995	1.347	9 %
2 X 3MW Units for Versailles	3.0	2.889	38 %
3MW Unit for Anna Regina	2.5	1.665	37 %
Kingston Wartsila 22MW frequency conversion (50 – 60Hz)	7.685	9.895	14 %