



DRAFT NATIONAL ENERGY POLICY OF GUYANA – REPORT 2 - GREEN PAPER

Abstract

This document presents the suggested national policy objectives for Guyana as well as the specific policies for energy supply, energy demand, and the attendant cross cutting issues. For the special case of electricity, the policies are intended to move Guyana towards a goal of 100 percent renewable energy by the year 2025.

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List of Acronyms and Abbreviations

AE	Accredited Entity
AFD	Agence Française de Développement
AOG	Audit Office of Guyana
ASHRAE	American Society for Heating, Refrigeration and Air-conditioning Engineers
BMZ	German Federal Ministry for Economic Cooperation and Development
boe	Barrels of Oil Equivalent
CARPHA	Caribbean Public Health Agency
CARICOM	Caribbean Community
CARIFORUM	Caribbean Forum
CCCCC, 5C's	Caribbean Community Climate Change Centre
CCREEE	Caribbean Centre for Renewable Energy and Energy Efficiency
CDB	Caribbean Development Bank
CBI	Caribbean Basin Initiative
CJIA	Cheddi Jagan international Airport
CO	Carbon Monoxide
CROSQ	Caribbean Regional Organisation for Standards and Quality
DBIS	Demerara-Berbice Interconnected System
EE	Energy Efficiency
EnMS	Energy Management Systems
EPA	Economic Partnership Agreement (Europe)
EPA	Environmental Protection Agency (Guyana)
EPA	Environmental Protection Agency (USA)
ESCO	Energy Services Company
ESMAP	Energy Sector Management Assistance Programme
EU	European Union
GCF	Green Climate Fund
GDP	Gross Development Product
GDS	Green Development Strategy
GEA	Guyana Energy Agency
GHG	Green House Gas
GIS	Geographical Information Systems
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GPL	Guyana Power and Light
GRA	Guyana Revenue Authority
GUYSUCO	Guyana Sugar Corporation
HEC	Hinterland Electrification Company Inc.
HFO	Heavy Fuel Oil
IAST	Institute of Applied Science and Technology
IDB	Inter-American Development Bank
IEA	International Energy Agency
IHA	International Hydro Power Association

IPED	Institute of Private Enterprise Development
IPP	Independent Power Producer
IRENA	International Renewable Energy Association
ISO	International Association for Standards
Kboe	Kilo (thousands) Barrels of Oil Equivalent
LCDS	Low Carbon Development Strategy
LFO	Light Fuel Oil
MEPS	Minimum Energy Performance Standards
MTBE	Methyl-t-butyl Ether
O3	Ozone
OAS	Organisation of American States
ODA	Overseas Development Assistance
PCB	Polychlorinated Biphenyls
PPA	Power Purchase Agreement
PUC	Public Utilities Commission
PV	Photovoltaics
RD&D	Research, Development and Demonstration
RE	Renewable Energy
REETA	Renewable Energy and Energy Efficiency Technical Assistance
SECBI	Sustainable Energy Capacity Building Initiative
SECCI	Sustainable Energy and Climate Change Initiative
SIA	Social Impact Assessment
SIDS DOCK	(Approximate meaning - Small Island Developing States Docking Station)
SWERA	Solar and Wind Energy Resource Assessment
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial and Development Programme

1 INTRODUCTION

1.1 Executive Summary

This document sets out the National Energy Policy of Guyana. It updates the 1994 National Energy Policy of Guyana, while reflecting current national, regional and international commitments made by the Government of Guyana and its agencies up until 2016. The document addresses continuing concerns related to the dependence on imported fossil fuels, the need to address the efficiency and sustainability of energy supply and demand, and the need to address climate change issues plus the recent discovery of offshore petroleum reserves in 2014.

1.2 Rationale

During 2014, 80 percent of Guyana's total energy demand of 6,021 kboe comprised of imported fossil fuel products (4,805 kboe). Domestically produced sugar cane bagasse and firewood provided 954 boe and 220 boe respectively or 19 percent collectively. During that same year, oil product imports represented a 21 percent share of the Gross Domestic Product (GDP). Given the recent precipitous fall in petroleum prices, the share has fallen to 13 percent in 2015. However, the Government is concerned that the current regime of low oil prices will not be sustainable.

The Government is also concerned about the security of supplies especially within the context of volatile petroleum product prices and the loss of supply and pricing arrangements under the PetroCaribe initiative which is predicated on high oil prices and monopoly supply from Venezuela. Hence the Government has continued to embark on new initiatives to diversify supply by considering renewable energy, energy efficiency and more recently offshore oil and gas exploration.

The Government is also concerned about the negative environmental impacts of oil products both at the local and international levels. Oil products have negative impacts on local and global air quality, coastal ecosystems, drinking water, and the country's commitment to international climate change initiatives. There are further concerns about the negative impacts of oil spills on the coastal and marine environment.

Concerns persist about the lack of linkages between economic sub-sectors and the energy sector. Hence the Policy aims to establish linkages between the energy subsector and agriculture, biofuels and transport. Further, the policy seeks to establish energy efficiency and conservation as a subsector in its own right.

During the period 1994 until present, there have been several initiatives and studies that represent current thinking about the ways to diversify energy supply away from imported oil products and set Guyana on a more sustainable path to national development and poverty reduction. The most significant of these are:

1. Guyana Power Generation Expansion Study, 2016;
2. Green Development Strategy (GDS), 2016;
3. An Assessment of Fiscal and Regulatory Barriers to Deployment of Energy Efficiency and Renewable Energy Technologies in Guyana, 2014;
4. Low Carbon Development Strategy (LCDS), 2009 and revised in 2010 and 2013; and
5. National Development Strategy, 2001 to 2010.

2 OBJECTIVES OF THE NATIONAL ENERGY POLICY

The original 1994 overall objectives of the National Energy Policy of Guyana were intended to:

1. Provide stable, reliable and economic supply of energy;
2. Reduce dependency on imported fuels;
3. Promote where possible the increased utilization of domestic resources; and
4. Ensure energy is used in an environmentally sound and sustainable manner.

Given the evolution of the Government's priorities an evolved Policy is prescribed. This new Policy takes factors into account such as the growing concerns about climate change and environmental sustainability, the recent cost reductions in renewable energy technologies, and the maturity of energy efficiency technologies and techniques.

The suggested overall objectives of the National Energy Policy of Guyana are to:

1. Position the energy sector as an engine of national economic growth using a green development strategy that contributes to the achievement of the Millennium Development Goals.
2. Minimize the foreign exchange cost of energy to the national economy;
3. Increase the efficiency of energy use per unit of Gross Domestic Product (GDP);
4. Diversify away from imported fossil fuels in the national economy with the deployment of indigenous renewable energy resources;
5. Enhance environmental sustainability by minimizing the local and global negative environmental impact of the energy sector;
6. Attain universal access and equitable geographical distribution of green energy services at the least cost to consumers;
7. Establish a regional export trade of green energy services and commodities; and
8. Develop the oil and gas sector for export.

The next section of this Policy gives specific energy policy objectives that target energy demand and end use in the main economic subsectors of Guyana.

2.1 Energy Demand/End Use

In respect to overall energy demand and end use in Guyana, the Government's energy objectives are aimed at the six (6) major economic sub-sectors. These are: Residential; Agriculture, Transport; Mining; Industry and Commerce; and Tourism.

The overall objectives for energy demand and end use are to:

1. Decrease energy use through energy conservation and efficiency per unit of GDP;
2. Increase the demand for clean and sustainable energy from renewable energy resources; and

3. Increase the likelihood that consumer energy consuming behavior and decisions will be in keeping with the principles of the Green Development Strategy.

The immediate goal of the objectives is to:

1. Increase access to reliable, clean, least cost and affordable energy services that serve the basic needs and demands of the population.

The ultimate goal of the objectives is to:

1. Achieve universal access to green energy services to meet the demand for energy services such as light, process heat, thermal comfort/cooling, static and motive power as a means to enhance social and economic activity and quality of life at the least economic and environmental cost.

2.2 Residential Use

In respect to energy in the Residential sector, it is Government's objective to:

1. Improve the reliability and security of energy supply;
2. Increase end use energy conservation and efficiency;
3. Increase the use of solar hot water heaters;
4. Increase small scale grid tied and off grid electricity production from solar energy and wind energy;
5. Increase the use of biogas digesters; and
6. Improve environmental health and safety due to the energy use.

2.3 Agriculture

In respect to the Agricultural sector, It is the Government's objective to:

1. Increase the linkages between agriculture and energy;
2. Increase the substitution of imported oil products with locally produced agriculturally derived biomass and biofuels;
3. Expand power generation from bagasse for supply to the national electric grid;
4. Foster the production of electricity for on grid and off grid applications from new biomass resources such as risk husk and wood waste;
5. Foster the development of a biodiesel industry based on locally grown vegetable oil crops (e.g. African Oil Palm, Jatropha, etc.);
6. Increase the substitution of fossil fuels in the hinterland areas with locally produced energy crops that have co-benefits such as water retention, soil conservation, building materials etc;

7. Expand the production of sugar cane based alcohol to include industrial alcohol as a transport fuel;
8. Increase the production and use of biochar in a sustainable manner that reduces local negative environmental impacts; and
9. Improve corporate management practices in respect to standards for energy management systems (EnMS).

2.4 Transport

In respect to the Transportation sector, it is the Government's objective to:

1. Reduce the demand for imported fossil fuels for vehicular transport;
2. Reduce the local environmental and health impacts of the vehicular transportation sector;
3. Increase the efficiency of vehicle consumption of fossil fuels on a specific fuel consumption basis (e.g. miles per gallon);
4. Increase the octane level of gasoline by blending with domestically produced alcohol from sugar cane;
5. Foster the development of an electric vehicle industry to substitute fossil fuels with electricity while enhancing the ability of the electric grid to integrate high levels of intermittent renewable energy;
6. Foster the development of a green transportation fuel industry for internal air transport and river transport; and
7. Improve corporate management practices for fleet vehicles in respect to standards for energy management systems (EnMS).

2.5 Mining

In respect to energy in the mining industries, it is Government's policy to:

1. Increase end use energy conservation and efficiency;
2. Achieve grid tied cogeneration of electricity and industrial steam;
3. Reduce the local environmental impacts due to energy production;
4. Improve corporate management practices in respect to standards for energy management systems (EnMS); and
5. Enhance the socio-economic development of the surrounding Communities.

2.6 Industry and Commerce

In respect to energy the industrial and commercial sectors, the Government's objective is to:

1. Increase end use energy conservation and efficiency;
2. Increase the production of grid tied and off grid renewable energy;
3. Increase grid tied cogeneration of electricity and process heat;
4. Improve corporate management practices in respect to standards for energy management systems (EnMS); and
5. Improve environmental health and safety due to energy use.

2.7 Tourism

In respect to energy in the tourism sector, it is Government's objective to:

1. Enhance the eco-tourism product of Guyana in both the urban areas and the Hinterland through the use of renewable energy, green building practices, recycling, and waste reduction in the demand for energy;
2. Increase the installation of solar water heaters at facilities in the tourism sector;
3. Foster the use of green fuels for internal air transport and local maritime transport associated with the tourism sector;
4. Increase the use of electricity from renewable energy sources at tourism facilities;
5. Increase the use of energy efficiency and conservation products and services at tourism facilities; and
6. Increase the number of tour packages that promote internal destinations as being eco-friendly.

2.8 Government Institutions

In respect to energy in the public sector, it is the Government's intent to:

1. Increase energy end use conservation and efficiency;
2. Introduce corporate management practices in respect to standards for energy management systems (EnMS);
3. Introduce an energy purchasing and procurement policy; and
4. Increase the penetration of grid tied and off grid solar photovoltaic (PV) systems and other renewable electric technologies

3 POLICIES FOR ENERGY SUPPLY

The current supply of energy to Guyana comprises of imported petroleum products (80% of primary energy), two electric grids that generate power from fossil fuels to supply the main population areas, a number of isolated mini-grids, and biomass in the form of sugar cane bagasse and fire wood (collectively 19% of primary energy) that are used for heat and electricity. The two grids are the Demerara - Berbice Interconnected System (DBIS) and Linden. There are vast resources of hydro that are not currently utilized. There are significant resources of solar, wind, and other biomass. There is also the potential for participation in cross border electric grids and the development of large scale hydro power resources under the Brazilian led Arco Norte project that connects the State of Roraima in northern Brazil to the three Guianas and the Caribbean Sea. From the perspective of Guyana, this infrastructure project combines power grids, hydroelectric power, roadways, high speed communication systems and a port of harbour.

The following sections of this Policy gives specific policies for energy supply.

3.1 Electricity

Policies for the electric sector follow directly from the overall policy objectives and are given below under the relevant sub-sections. The goal is to work towards the achievement of 100 percent renewable energy penetration in the electric sector by 2025.

3.1.1 Central Grid

It is the intent of the Government to:

1. Facilitate the Guyana Power Company (GPL) in undertaking least cost expansion planning every five years and implementing the plan. In the short run, will be encouraged to consider grid scale wind energy, thermal power plans fuel with light fuel oil (LFO) and Heavy Fuel Oil (HFO), grid scale solar photovoltaics, and a midscale plant using wood residues. In the medium term, the plan calls for utility scale hydroelectric plants, and steam plants fired with sugarcane bagasse. In the long term, the plan considers thermal reciprocating plants fired with natural gas, however this Policy will examine the substitution of gas with biomass and biofuels for thermal generation. Further, investigations will be conducted to examine the potential role of hydro for base load generation;
2. Develop a licensing procedure aimed at independent power producers (IPPs) to produce bulk power from renewable energy and feed into the national electric grid.
3. Encourage private sector participation in the development and installation of utility scale solar and wind farms;
4. Develop a competitive tender or auction process to procure services to develop and construct solar and wind farms;

5. Identify and secure new solar and wind energy sites, and commence investment grade resource measurements as an inducement to the private sector developers.
6. Mandate GPL with collaboration from the GEA and the private sector to implement an electric utility demand side management (DSM) programme;
7. Investigate the technical, socio-economic and environmental impacts of the integration of distributed generation;
8. Investigate how the deployment of smart grid technologies and techniques on the central grid may mitigate any negative technical, socio-economic or environmental impacts due to the integration of high levels of intermittent renewable energy, and may lead to high levels of penetration of renewable energy into the central grid;
9. Set policy guidelines for the Public Utilities Commission (PUC) to require that GPL develop and publish a grid code inclusive of an interconnection policy, and a standardised power purchase agreement (PPA) for IPPs to interconnect and integrate into the national grid;
10. Encourage the bauxite industry and other large industrial companies to take advantage of the co-generation (i.e. heat and electricity) potential of its processes, and to interconnect and sell any excess electricity to the national grid; and
11. Investigate the feasibility of establishing a liquefied natural gas re-gasification plant at a suitable location for supply to power stations, industrial users, and residential users. Natural gas will serve as the bridge fuel to a full 100 percent renewable energy scenario should this prove to be necessary.

3.1.2 Distributed Generation

It is the intent of Government to:

1. Set policy guidelines for Public Utilities Commission to require the GPL to develop and publish a feed-in tariff mechanism for grid tied distributed renewable energy technologies;
2. Set policy guidelines for Public Utilities Commission to require the GPL to develop and publish interconnection policy for small scale and commercial scale distributed renewable energy systems;
3. Set policy guidelines to determine an appropriate market share for distributed generation versus IPP's versus GPL in respect to the generation of renewable energy;
4. Investigate the infrastructure needs to support customer ownership of electric vehicles (EVs), as well as the grid integration requirements and standards. This will include investigations into the EV charging infrastructure, installation standards, electric vehicle building codes. Investigations will also be undertaken of the training requirement of technical personnel;
5. Demonstrate the feasibility of electric vehicles. The Government will facilitate the private sector in the procurement of a number of electric vehicles and charging station to demonstrate the feasibility of these vehicles to the general public. The demonstration will comprise of cars, light commercial vehicles and trucks; and
6. Encourage the adoption of electric vehicles through education and awareness.

3.1.3 Hinterland

It is the intent of Government to:

1. Support and facilitate the Hinterland Electrification Co. Inc. (HECI), and the Ministry of Public Infrastructure to expand and improve its programmes in rural electrification with an emphasis on micro-grids, solar photovoltaic systems with batteries, run-of-river and river dam hydro, and hybrid renewable energy systems using photovoltaics or wind with biodiesel and other biofuels. Specific facilitation and funding will be provided for:
 - a. Market barrier research aimed at designing new programmes and improving existing programmes;
 - b. Programme impact and process evaluations aimed at refining existing programmes;
 - c. Greater facilitation of the private sector by retaining them as programme implementation partners in the delivery of energy services; and
 - d. Market clearing activities by introducing a purchasing programme to benefit suppliers of biodiesel and other sustainable fuels. The intent is to remove the risk faced by local biodiesel producers who have experienced difficulties in receiving payments from local power producers. The HECI would absorb this risk and purchase the bio fuels from producers and re-sell to local electricity producers. The producers would then face the full force of Government in the recovery of payments.
2. Explore new and proven methodologies for financing of rural electrification. The aim is to examine methodologies for both public sector and private sector financing;
3. Support the development of independent micro grids by hinterland communities. Programme support will prioritize electrification for productive uses and key social services. The main sectors include health, education, water supply and agriculture;
4. Identify and carry out feasibility studies on micro/mini hydro sites and other sources to provide power to mini-grids in remote areas. The management of these schemes will be done by local rural communities or local entrepreneurs;
5. Introduce fixed price feed-in tariff mechanisms for rural mini and micro grids. These mechanisms are aimed at cost effective renewable energy resources. The cost effectiveness criterion will ensure that only least cost renewable technologies are employed, while providing a reasonable return to householders and investors.

3.1.4 River Islands

It is the intent of Government to:

1. Encourage community owned projects on the river islands that deploy solar-diesel hybrid systems, or other hybrids based on locally available biofuels, or off-grid and on-grid solar PV systems with battery back-up;
2. Establish and operationalize the legislative and institutional mechanisms necessary to facilitate community based projects;
3. Support the development of independent hybrid micro-grids by hinterland communities. Programme support will prioritize electrification for productive uses and key social services. The main sectors include health, education, water supply and agriculture; and
4. Encourage residential customers to install off grid and on grid solar photovoltaic (PV) systems with battery backup.

3.1.5 Eco/Sustainable Tourism

In respect to energy in the tourism sector, it is Government's policy to:

1. Encourage private lending institutions to introduce leasing schemes and low-interest loans for the purchase of sustainable energy technologies. The aim is to provide the tourism sector with a solution to access to capital and the cost of financing;
2. Facilitate the GEA in the implementation of awareness raising and training programs aimed at the tourism sector. The aim is to fill institutional and technical capacity gaps;
3. Implement a programme aimed at green building practices to encourage new and retrofitted sustainable energy developments. The focus will be energy conservation, energy efficiency, solar hot water and other renewable energy systems, water efficiency, recycling, waste management, hazardous waste reduction. The programme will also assist in implementing a marketing scheme that is based on branding facilities as being "green";
4. Introduce a technical assistance and or financial assistance programme to assist the tourism sector in retaining the services of technical experts. The aim would be to increase the use of renewable energy and energy efficiency;
5. Encourage the concept of "Green Meetings" in conference facilities. The aim is to encourage zero waste, minimize carbon footprint, carbon offsetting options, and greening services for compostable and recyclable products; and
6. Examine fire safety issues in lodgings in respect to the installation of solar electric systems on thatched roof. The aim is to address technology issues and develop installation guidelines that address the fire safety issues in lodgings that use fire prone building materials.

3.2 Oil and Gas: Development

It is the intent of Government to:

1. Implement a public information campaign. The objective of the campaign will be to engage stakeholders, manage the expectations of the general public about the potential benefits of the sector, and to earn the public's trust. The campaign will adapt the principles and standards of the Extractive Industries Transparency Initiative, EITI;
2. Implement policies to maximize local content inputs to the sector. The aim is to maximize the benefits to the economy;
3. Support public and private capacity and skills training efforts to enable local content objectives to be realized;
4. Establish a new regulatorily oversight agency to balance multiple competing interests of public and private entities, and enable growth of the sector while supporting the efficient, safe and orderly development of energy resources while minimizing the environmental footprint of the sector. This agency will be established after it has been demonstrated that significant long term exploitable oil and gas reserves have been verified. This will serve as the single credible body to monitor and regulate all aspects of the sector; and
5. Establish a sovereign wealth fund to serve as a funding mechanisms for national development and regional and international oil and gas diplomacy.

3.3 Liquid Fuels

It is the intent of Government to:

1. Strengthen the licensing procedures under the Petroleum and Petroleum Products Regulations 2014 enacted under the Guyana Energy Agency Act 1997 (as amended), CAP 56:05GEA for the importation, export, bulk transportation and storage of petroleum products in anticipation of the development of the oil and gas industry;
2. Introduce standards for the handling, storage, testing and dispensing of aviation jet fuel (avjet) and aviation gasoline (avgas) at the Cheddi Jagan International Airport (CJIA), the Eugene Correia International Airport, and all other ports and harbours in Guyana;
3. Continuously review and strengthen the Fuel Marking Programme, and support its implementation through the GEA, the Ministry of Public Security, the Guyana Police Force, Guyana Revenue Authority, Guyana Defense Force Coast Guard, and the Customs Anti-Narcotics Unit;
4. Facilitate the GEA in the deployment of driver awareness programmes aimed at changing driving behavior towards more energy conserving habits.
5. Improve transportation planning systems. This will be undertaken by facilitating better coordination between various Government agencies, and through greater coordination between national, regional and local authorities;
6. Introduce fleet management using monitoring, geo-tracking and measurement techniques;

7. Provide annual vehicles tail pipe emission testing and the enforcement of standards as part of the vehicle licensing process;
8. Link the fiscal regime to fuel mileage (miles per gallon) and engine capacity
9. Introduce fiscal measures to discourage the supply of inefficient vehicles and vehicles with high tail pipe emission. This will include the linking the tax regime to mileage per gallon and the engine capacity;
10. Encourage labelling for vehicle efficiency standards at the point of sale. The purpose would be to encourage greater customer demand for vehicles with higher fuel efficiencies. Subsequently, the Government will make labelling mandatory;
11. Encourage the supply of non-engine fuel efficient components and parts through the adoption of the relevant manufacturer standards. These components will include tires, air-conditioning, and aerodynamic devices;
12. Facilitate the diversification of vehicles and fuel systems to minimize fossil fuel demand. Particular attention will be paid to electric vehicles that have greater equivalent fuel mileage consumption than their fossil fuel counterpart;
13. Collaborate with member States of CARICOM in the regional harmonisation of vehicle and fuel efficiency standards;
14. Investigate the greater use of barges as a mode of transportation for bulk industrial materials such as sand and aggregate; and
15. Increase supplier and customer awareness through training and information awareness programmes.

3.4 Solar Energy

It is the intent of Government to:

1. Establish a transparent and streamlined process for evaluation and approval of energy projects. The aim is to facilitate private sector interest and confidence in participating in energy projects;
2. Encourage the installation of grid tied solar photovoltaic farms on lands that have low agricultural value;
3. Require that developers of solar photovoltaic farms consult with the local community before applying for planning permission;
4. Encourage the utilisation of local content by developers in the purchase of goods and services, and in the employment of labour;
5. Introduce fiscal incentive aimed at residential customers, commercial entities and developers to encourage the wide spread deployment of small, medium and large scale renewable energy technologies. For example,
 - a. Tax rebates that reduce the taxable income of purchasers by the costs of the technology;
 - b. Reduced duties free access at the port of entry;
 - c. Inclusion of the cost of the technology in home mortgages; and

- d. Increased import duties and taxes on competitive technologies such as electric water heaters.
6. Support the GEA to construct pilot projects to demonstrate a residential scale and commercial scale grid tied (with and without battery backup) solar photovoltaic (PV). The aim is to demonstrate the technical and commercial feasibility and benefits of these technologies.

3.5 Wind

It is the intent of the Government to:

1. Identify potential Wind Energy Zones to be earmarked for wind farm development. The potential zones will be investigated to firmly characterize the wind resource for investment purposes in accordance with international best practice. Preliminary transmission interconnection planning will also be undertaken. While these sites will be restricted to wind farm development, integrated land use activities will also be considered;
2. Collaborate with GPL to define the wind farm zoning process. This process will comprise of resource assessment, geotechnical and environmental impact assessment, securing of land rights, social impact assessment, preliminary transmission planning, development of a tailored power purchase agreement, and the release of a wind farm development request for proposal (RFP) to potential developers;
3. Facilitate the GEA to conduct wind resource measurements at wide variety of sites across the country to support the development of wind farms and other purposes;
4. Facilitate the GEA in deploying a number of wind energy demonstration projects in hinterland communities; and
5. Facilitate the GEA to explore the feasibility of offshore wind energy systems.

3.6 Hydropower

It is the intent of the Government to:

1. Support the construction of a 150 to 180 MW hydroelectric project and a connecting 230 kV electricity transmission line to the electric substation at Linden;
2. Support the GEA to continue providing all reasonable support for the assessment of likely hydroelectric sites with an aim of development to the point of commercial acceptance by a developer. For example in the short run, the GEA will conduct a feasibility study for hydroelectric projects at Kumu Falls in Region 9 and Hosororo in Region 1;
3. Support the GEA to assess suitable sites for the construction of pilot projects for Pico hydro systems;
4. Support the Guyana Environmental Protection Agency (EPA) in collaboration with the GEA to develop a standardize approach for conducting environmental and social impact

- assessment for hydroelectric projects of any size. The process should be consistent with the recommendations of the International Hydropower Association (IHA) Sustainability Guidelines. The intent is to include these into the local regulatory framework of the EPA.
5. Support the EPA and the GEA to develop a life cycle environmental management process for hydro projects. The scope would include: planning; construction; decommissioning; human health and safety impacts; water quality impacts; flow rules that impact other water users; fish passage for migratory species; conservation and the protection of biodiversity; reservoir sedimentation and reservoir debris; monitoring and evaluation of mitigation measures; and
 6. Support the GEA to develop and implement a community involvement strategy. The aim is to establish a transparent and streamlined process for evaluation and approval of energy projects. This would facilitate private sector interest and confidence in participating in energy projects. In respect to the Hinterland, the principles of “Free Prior and Informed Consent” will be observed.

3.7 Biomass

It is the intent of the Government to:

1. Adopt a definition of biomass for the purposes of this policy. Biomass is defined to be firewood, shrubs, grasses, forest wastes and agro-industrial residues. Examples are bagasse, husks, wood waste, trash from sugar cane, king grass, river tamarind, oil palm milling, grain milling, etc. Biomass will also include organic municipal and industrial wastes like paper wastes, old clothes, polythene, spent grains in breweries, animal wastes, abattoir wastes and sewage sludge, which can be used as sources of energy;
2. Support the GEA to collaborate with the Institute of Private Enterprise Development (IPED) in the implementation of the Integrated Farming Model. The GEA will support demonstration projects to showcase biogas digesters being fed on a feedstock of farm yard manure (e.g. pig and cattle waste). The GEA will also prepare information and awareness materials to support the IPED;
3. Support the Institute of Applied Science and Technology (IAST) in its work and designs for existing biogas operations located at the IAST and in the community;
4. Support demonstration projects in local communities aimed at increasing the wide spread deployment of more efficient charcoal kilns;
5. Promote high-efficiency cooking stoves. The Government will encourage retailers and customers to replace inefficient biomass traditional stoves, and/or promote fuel substitution of traditional biomass for use in rural areas;
6. Support the implementation of public awareness and education programmes aimed at increasing the efficiency of wood fuel use and other biomass;
7. Support the GEA in conducting research to improve the quantification of how the forestry resources of Guyana contribute the charcoal and biochar industries;
8. Support the GEA in examining the feasibility of king grass and River tamarind as potential sources of bioenergy;

9. Support the GEA in examining the potential of Antelope Grass and other weed in the canals of Guyana, as a potential source of bioenergy; and
10. Support the GEA in further examination and research in resolving the problems associated with the precipitation of silica and coal tar in combustions chambers and tubes of furnaces that burn rice husks.

3.8 Bagasse

It is the intent of the Government to:

1. Support GUYSUCO in collaboration with the GEA and other agencies to determine feasibility of deploying bagasse fired steam cogeneration systems at all sugar cane estates. The analysis should consider the feasibility of year-round storage of bagasse, so that power plant capacity could be downsized and thus operated continuously throughout the year;
2. Support the GEA and GUYSUCO in investigating the outdoor storage of bagasse following earlier research findings in Belize; and
3. Support the Institute of Applied Science and Technology, IAST in its work on the use of bagasse for steam co-generation and to use mobile briquetting technology to allow excess bagasse from some estates of Guysuco to be utilized at other estates and non-Guysuco generating facilities.

3.9 Rice-Husk, Wood Waste

It is the intent of the Government to:

1. Support the continued involvement of the GEA in developing the potential of rice husk and wood waste as sustainable biomass fuels for generating electricity. The GEA will continue its work to use a geographical information system to map the locations of resource sites and quantify the availability of biomass in order to aid sector planning. In the near term, the GEA will guide local stakeholders in the installation of a demonstration 20 to 30 kW rice husk to energy plant;
2. Support collaboration between the GEA and the EPA in implementing sustainable waste management practices for wood waste. The GEA/EPA will identify specific sites for the aggregation of wood waste from the surrounding areas. These sites will provide the feedstock for the design, installation and operation of a pilot wood waste to energy plant.
3. Support the IAST in the continued development and deployment of mobile technology to convert wood waste and rice husk waste into energy briquettes; and
4. Support the IAST in its continuing work to research energy efficient stoves which utilize the briquettes developed tested at the IAST.

3.10 Biofuels e.g. Ethanol, Biodiesel

It is the intent of the Government to:

1. Support the development of ethanol as a transportation fuel. The Government will collaborate with GUYSUICO in the development of an industrial scale ethanol distillery using sugar cane juice or molasses at the GUYSUICO Skeldon sugar cane factory;
2. Implement the necessary gasoline and ethanol standards that will make it possible to blend ethanol into the fuel supply;
3. Develop and implement a comprehensive strategy to increase the production of palm oil and other oil crops as a feedstock for biodiesel;
4. Facilitate market transactions and provide a secured market for producers by introducing a Government purchasing mechanism to buy biodiesel from the producers for resale to the power producers in remote locations;
5. Expand and commercialise the industrial biodiesel research and demonstration projects of the Institute for Science and Technology to include biodiesel derived from agriculturally produced palm oil;
6. Encourage and expand the production of industrial ethanol at sugar factories and other private sector interests;
7. Encourage the private sector to secure agricultural land for the farming of the Africa Oil Palm and other oil crops suitable for producing biodiesel.

3.11 Other Renewable Energies

It is the intent of the Government to:

1. Strengthen research, development and demonstration (RD&D) of indigenous renewable resources and technologies with an aim of building capacity at government agencies, at local research and education institutions, and the private sector;
2. Investigate waste-to-energy resources and technologies for municipal landfill gas and combustion; and
3. Investigate the potential for ocean tidal energy along the river estuaries in Guyana.

4 POLICIES FOR CROSS-CUTTING ISSUES

There are a number of policies attendant to the cross-cutting issues that contribute to the development of the Energy sector in a comprehensive and internally consistent way. It is therefore the Government's policy to develop programmes to address these cross-cutting issues to enhance the security and sustainability of the supply of energy in a way that is consistent with the Green Economy and towards the achievement of the Millennium Development Goals and the Green Economy. For example, a reduction in fossil fuel demand through conservation, efficiency and substitution will enhance local storage and additional energy security. These policies will result in a reduction in the future cost of energy, which will enhance the country's ability to repay loans and financing costs. In addition, any increase in renewable energy will diversify supply and reduce risks to supply interruptions, while improving health, gender and poverty issues. Further, research and development will build local capacity of individuals and institutions, while enhancing local content in the energy sector. Finally, integrated energy planning will ensure that interactions between the energy sub-sectors are fully accounted for, which in turn will contribute to a more optimal deployment of scarce resources.

Specific policies for the cross-cutting issues are given below.

4.1 Financing

It is the intent of the Government to:

1. Coordinate financing mechanisms with stakeholders. The aim is to build awareness among lenders and borrowers that will enhance the probability of success of the programmes;
2. Source programme funding from overseas development assistance (ODA) institutions such as multilateral banks, bilateral aid agencies, and regional organisations; and
3. Facilitate greater access to international and bilateral climate financing mechanisms for supporting nationally relevant sustainable energy projects;

Fiscal

4. Provide fiscal incentives such as tax and Customs exemptions;
5. Provide tax relief to individual purchasers of sustainable energy technology at the point of purchase;
6. Provide tax relief to project developers at the time of the supply of equipment;
7. Waive import duties on sustainable energy equipment and technology; and
8. While Government will not provide loan guarantees to capital invested by large developers and IPP's, the Government will support these entities in seeking risk adjusted loan repayments (including interest rate reductions) from their lending institutions.

Private Financial Institutions

9. Work with local banks and financial institutions to develop risk adjusted loan programmes that offer reduced interest rates to sustainable energy projects. These loans are intended to have an easy, concise, and predictable application process with quick loan approval. The GEA will be supported in administering a tracking mechanism for the details of the loan, such as costs, and energy savings or reductions. This data will be used for programme evaluation and feedback to the banks and financial institutions. The GEA will also be supported to administer a project monitoring mechanism through the lending cycle, as well as for the construction, commissioning, operations and decommissioning of the projects;
10. Encourage the involvement of local commercial banks and credit unions, as there are usually more flexible and responsive than the Overseas Development Assistance (ODA) institutions; and
11. Provide technical assistance through the GEA to the local lending institutions to enhance their understanding of sustainable energy technologies and their rates of return and economics. The aim is to encourage risk adjusted loans with lower interest rates that reflect the enhanced ability of the borrower to repay the loans given the reduction in their ongoing energy costs.

In respect to the Development Partners, it is the intent of Government to:

12. Facilitate access to small loans or hire purchase schemes. The Government will work with development partners to provide start-up capital to local financial institutions and retailers who will offer small risk adjusted loans and credit schemes to customers for efficient stoves and energy efficient lighting, appliances and equipment;
13. Pursue donor funding opportunities posed by the Joint Declaration on Sustainable Energy between the European Union, the European Investment Bank and CARIFORUM on reinforced co-operation in the field of sustainable energy. This Declaration was one of the highlights of the recently concluded EU-Caribbean Sustainable Energy Conference which was held in Barbados from 10-11 October 2016. This initiative is designed to assist CARIFORUM countries in meeting their obligations stipulated in the Paris Agreement on Climate Change and the United Nations Sustainable Development Goals;
14. Leverage funding for capacity building through the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE), Barbados which was established in 2016. CCREEE works under the technical and financial support of the United Nations Industrial Development Organization (UNIDO), as well as SIDS DOCK and the Austrian Development Agency. CCREEE aims to leverage investment towards renewable energy in the region by fostering partnerships between the EU, Caribbean countries, development partners, and the private sector;
15. Pursue funding opportunities presented under the Memorandum of Understanding (MOU) signed on 04 May 2016 by the IDB, CDB, CARICOM and the US Department of Energy to support renewable energy and energy efficiency in the Caribbean. The MOU seeks to increase energy security, reduce energy vulnerability, promote renewable energy, energy efficiency, and low-carbon technologies in the region. In addition, the MOU seeks to

- promote collaboration for a potential Energy Co-Financing Facility for Caribbean Sustainability to be developed by the IDB, with a particular focus to attract international investors;
16. Pursue funding opportunities for climate change adaptation and mitigation projects presented by the Credit Facility Agreement signed by the Caribbean Development Bank (CDB) and the Agence Française de Développement (AFD) for financing sustainable infrastructure projects in the Caribbean region;
 17. Leverage the recent accreditation of the Caribbean Development Bank (CDB) as a partner institution of the Green Climate Fund (GCF) to access funding to support low-emission and climate-resilient programmes and projects in the bank's Borrowing Member Countries (BMCs). This also includes the management of environmental and social risks and gender concerns;
 18. Leverage the funding opportunities for climate change adaptation and mitigation projects presented by the Caribbean Community Climate Change Centre (CCCCC or 5C's), as an Accredited Entity (AE) to the Green Climate Fund (GCF);
 19. Continue to leverage the funding opportunities made available under the Guyana Country Strategy of the Inter-American Development Bank (IDB) in the areas of areas of: Sustainable Energy; Natural Resource Management; Private Sector Development; and Public Sector Management. In particular, the Government will:
 - a. Sustainable Energy
 - i. Continue capacity building of GPL to reduce technical and commercial losses
 - ii. Increase generation capacity and promote the development of a more sustainable and greener mix of energy supply;
 - iii. Improve electricity coverage;
 - iv. Enhance institutional, legal, and regulatory measures and support the agencies involved in the sector.
 - b. Natural Resource Management
 - i. Boost sustainable growth in the natural resource sectors;
 - ii. Strengthen institutional capacity for natural resource management that supports the implementation of the LCDS while meeting international standards of ecological sustainability; and
 - iii. Mitigate disaster risk by prioritising risk management (including the impacts of climate change) into natural resource management.
 - c. Private Sector Development
 - i. Improve the business climate by enhancing access to credit by firms, as well as expanding the training and retention of skilled labor;
 - ii. Enhance government's institutional and regulatory capacity to promote and enforce standards of quality as well as investments in quality control; and
 - iii. Strengthen the capabilities of local firms to facilitate the adoption of new production technologies and encourage product and export diversification.
 - d. Public Sector Management

Cross-cutting theme: Working with Guyana's Indigenous Communities.

 - i. Leverage the technical cooperation and investment loan operations of the Inter-American Development Bank (IDB) to increase the consideration of the

following issues in respect to indigenous communities during the implementation of the Country Strategy.

1. Sustainable Energy: Improve access to electricity in the Hinterland upon consultation with Amerindian communities regarding infrastructure projects financed by the IDB.
 2. Natural Resources Management: Enhance the protection of land rights and sustainable forest exploitation by Hinterland communities by implementing community-based disaster risk reduction and adaptation measures.
 3. Private Sector Development: Increased support to the development of sustainable income generation activities; increased access to affordable financial services for households in the Hinterland communities; and capacity building in regards to the development of knowledge and skills to save and invest surplus financial assets.
- ii. Expand the dialog with the IDB on:
1. Water and Sanitation: The Government in collaboration with the IDB will explore alternatives for further improvements in efficiency, quality, sustainability and coverage of the potable water supply, sanitation services, and solid waste management.
 2. Transport: The Government in collaboration with the IDB will explore the options to restructure the transportation sector to improve its efficiency with a shift from rehabilitating the road system to expand its capacity and the improvement of urban transportation in a sustainable manner that results in a reduction in energy demand.
- e. Continue to foster the strengthening of GPL's electricity system's reliability and efficiency, enhance its operational efficiency, improve its corporate performance, and facilitate the funding of infrastructure investments to reduce overall losses. This will be pursued through the European Union's Power Utility Upgrade Program which is administered by the Inter-American Development Bank; and
- f. Continue to seek funding opportunities aimed at mainstreaming renewable energy (RE), energy efficiency (EE), biofuels, carbon financing, and the insertion of climate change adaptation into policies and programmes across the energy sectors. One such opportunity is the Sustainable Energy and Climate Change (SECCI) programme of the Inter-American Development Bank.
20. Leverage funding opportunities that aim to enhance energy science education to achieve critical thinking skills required for the labor market and future economies in respect to sustainable energy. One such programme is the Sustainable Energy Capacity Building Initiative (SECBI) of the Organisation of American States (OAS);
21. Intensifying cooperation between China and Guyana to pursue a green economy and encourage the greater use of clean, green and low-carbon technologies and renewable sources of energy. This will be leverage through China's 13th Five-year Plan (2016-2020) which is committed to achieving a green economy;

22. Leverage the resources available under the Regional Tourism Health Information, Monitoring and Response Systems and Standards to Enhance Sustainable Tourism Project being implemented by the Caribbean Public Health Agency (CARPHA);
23. Continue to leverage the benefits of the Memorandum of Understanding between Norway and Guyana (09 November 2009) in support of the Low Carbon Development Strategy (LCDS). Two sub-projects of particular interest are:
 - a. An equity investment by Norway in the Amaila Falls Hydro Electric Project; and
 - b. The Micro & Small Enterprise Development Project which targets and support businesses in low carbon sectors and build alternative livelihoods for vulnerable groups through access to finance and business skills.
24. Explore technical assistance and funding opportunities for capacity building through with resources from the International Energy Agency (IEA);
25. Explore technical assistance and funding opportunities for energy sector roadmaps with resources from the International Renewable Energy Agency (IRENA);
26. Explore technical assistance and funding opportunities for the Solar and Wind Energy Resource Assessment (SWERA) with resources from the Energy Sector Management Assistance Programme (ESMAP) at the World Bank; and
27. Explore technical assistance and funding opportunities from the United Nations Development Programme, UNIDO under the Programme for Country Partnership, the programme for Sustainable Industrial Development for Shared Prosperity, and the Climate Resilient Industries Initiative.

4.2 Environmental, Health and Safety

It is the intent of Government to:

1. Follow the International Conventions that relate to environmental protection, namely the United Nations Framework Convention on Climate Change (UNFCCC) and the Vienna Convention on Protection of Ozone Layer and Montreal Protocol on Substances that Deplete the Ozone Layer. The main objective of the UNFCCC is to reduce global warming by stabilizing of greenhouse gases (GHG) concentrations in the atmosphere. The main objective of the Montreal Protocol is to protect human health and the environment due to the reduction of the ozone layer;
2. Encourage the private sector to address indoor air quality concerns at the time of the installation or retrofit of energy appliance and energy saving measures:
 - a. Encourage the supply and installation of detection devices for smoke, carbon monoxide (CO), and ozone (O₃);
 - b. Encourage the proper disposal of batteries at the level of the household, business and institutions. Encourage the municipal waste authorities to properly and safely handle and dispose of batteries;
 - c. Encourage that adequate ventilation is provided for indoor spaces that have combustion appliances like wood stoves;

- d. Use fiscal measures to discourage the importation of wood stoves, kerosene stoves, and other appliances that use combustibles that do not have a certification by a standards agency such as the US Environmental Protection Agency and the American National Standards Institute (ANSI);
 - e. Encourage the sealing of all leaks in air conditioning ductwork that provide pathways for harmful airborne contaminants;
 - f. Encourage that ventilation systems adhere to the ventilation standard of the American Society of Heating, Refrigeration, Air-conditioning Engineers (ASHRAE 62.2);
 - g. Investigate the presence of polychlorinated biphenyls (PCBs) in fluorescent light ballasts, particularly those manufactured before 1979. For ballasts manufactured between 1979 and 1998, they should be marked "No PCBs". For those manufactured after 1998, there should not be any PCBs as these are likely to be electronic ballasts.
 - h. Use fiscal measures to discourage the importation and supply use of fluorescent fixtures with ballasts that use PCB's;
 - i. Provide training for contractors to be able to detect when smoke from appliances that use combustibles have negatively impacted the indoor environment; and
 - j. Support the GEA in implementing a monitoring, capacity building and awareness programme concerning PCBs.
3. Continue to support the GEA in the sustainable management of liquid petroleum products.
- a. Investigate leaks and ground water contamination of gasoline storage tanks as they can leak and contaminate groundwater;
 - b. Investigate the potential presence of Methyl-t-butyl ether (MTBE) in the potable water supply;
 - c. Substitute the gasoline additive, MTBE with an octane enhancer such as ethanol;
 - d. Investigate measures that would decrease vehicle idling, e.g. permitting left turns on red traffic lights at intersections;
 - e. Monitor the presence of ground level ozone in smog; and
 - f. Monitor emissions from power plants owned by GPL and large industrial companies.

Large Hydro

- 4. Require developers to provide an Environmental Monitoring and Management Plan (EMP), Environmental Impact Assessment (EIA), Social Impact Assessment (SIA) when evaluating a potential large hydroelectric site. Require penalties and fines for non-compliance.
- 5. Require a social action plan framework and a watershed management plan for projects that may not have significant impacts;
- 6. Require that developers offset any loss of natural terrestrial habitat where there is need to enhance the productivity and sustainability of aquatic resources within the reservoir and its tributaries;
- 7. Require the application of the ISO 14001 standard of the International Organization for Standardization (ISO) which specifies the actual requirements for an environmental management systems. It aims to reduce the environmental footprint of a business and to decrease its pollution and waste generation; and

8. Support capacity building among public sector officials who are required to review EIAs, EMPs and other required environmental planning documents. Training may include topic such as: ecologies of the rivers and riparian areas, important species habitats, fisheries and fish migration, wildlife and forestry, watershed activities and reservoir sedimentation, sediment transport of the rivers, river erosion, downstream hydrogeology, water quality, risks and safety, hydrology and flooding, environmental flows, environmental health, initial water releases from reservoirs, reservoir greenhouse gas generation, trans basin implications, and construction impacts. The reviewers should examine if the initial and long-term adverse impacts are properly addressed in the EIA and EMP documents. Special expertise in each field is required to perform an adequate review.

4.3 Social and Economic Issues

It is the intent of Government to:

1. Provide fiscal incentives to encourage the private sector to provide economic opportunities to Hinterland communities, skills development, and infrastructure development;
2. Increase the number of energy interventions that create opportunities for women's empowerment and gender equality;
3. Encourage a greater enrolment of women in energy-related academic and vocational disciplines;
4. Adopt gender-sensitive budgeting in energy-sector planning and programming, based on donor protocols;
5. Support rural electrification programmes that ease the burden of women in sourcing energy and reduce the health impacts of the combustion of fuel wood; and
6. Increase the role of women in Central Government decision making and planning.

4.4 Fiscal and Pricing Issues

It is the intent of Government to:

1. Provide fiscal incentives. The Government intends to provide fiscal incentives to encourage customers to make energy conscious decisions;
2. Provide fiscal incentives to encourage the private sector to offer economic opportunities to local communities, skills development, and infrastructure development;
3. Provide fiscal incentives such as tax and custom exemptions;

4. Provide tax relief to individual purchasers of sustainable energy technology at the point of purchase;
5. Provide tax relief to project developers at the time of supply equipment; and
6. Waive import duties on sustainable energy equipment and technology.

4.5 Feed-In Tariffs in the Electric Sector

It is the intent of Government to:

1. Provide policy direction to the Public Utilities Commission (PUC) to require GPL to develop a fixed price feed-in tariff regime for all its customers. The aim is to enhance the bankability of the renewable energy projects and to provide for a reasonable return to householders and investors;
2. Encourage GPL to establish a streamlined process for quick approval of the feed-in tariff and the interconnection to the national grid. The aim is to reduce the administrative burden and transaction costs faced by customers and investors;
3. Encourage terms on feed-in tariffs of 10 to 20 years. The aim is to provide stability and investment security;
4. Encourage the Commission to consider rates under the feed-in tariffs that are:
 - a. Calculated based on the levelized point of generation of renewable energy;
 - b. Have a predefined and transparent mechanism for rates to be adjusted for inflation.
5. Encourage that GPL's costs of implementing feed-in tariffs be appropriately allocated to all customers through the decisions of the Commission; and
6. Encourage a net billing approach to reconciling revenue and costs to customers through the decisions of the Commission.

4.6 Research, Development and Demonstration (RD&D)

It is the Government's intent to:

1. Support the GEA to collaborate with GUYSUOCO to conduct research on the year round outdoor storage of bagasse. The aim is to determine the feasibility of downsizing power plant capacities, and operating plants continuously throughout the year in order to maximize the capacity value of the plants to GPL;
2. Expand and commercialise the industrial biodiesel research and demonstration projects of the IAST to include biodiesel derived from agriculturally produced palm oil and other oil crops;
3. Support RD&D at the IAST and other local research institutions in the area of biomass. Priority will be given to the combustion of rice husk and the management of silica residues, the production of briquettes from bagasse and other organic residue, and the combustion of biomass from forestry and agricultural and all other sources; and

4. Support the University of Guyana to expand its RD&D and teaching agenda to support the implementation of the National Energy Policy of Guyana.

4.7 Integrated Energy Planning

It is the intent of government to:

1. Encourage the use of top-down national energy planning techniques in conjunction with bottoms-up engineering planning techniques to integrate the interactions between sectors;
2. Encourage the use of analytical planning techniques and software that include energy, economics, environmental impact analysis;
3. Support GPL in the acquisition of software and training that is appropriate for generation expansion planning, planning for demand side management, and integrated resource planning. Support GPL in the acquisition of software for transmission and distribution planning, and planning for the integration of distributed energy resources into the national grid;
4. Support the GEA in acquiring appropriate software and training for integrated national energy planning; and
5. Support the University of Guyana and other agencies in applying techniques from geographical information systems (GIS) technology to the collection, processing, analysis, and presentation of spacial data to aid in the visualization and communication of complex energy systems and their interactions with the country and economy at large.

4.8 Policies for Energy Conservation and Efficiency

It is the intent of Government to:

1. Support the GEA in implementing an behavioral energy conservation programme that seek to use techniques of awareness building, education, moral suasion, communication, and non-financial incentives to promote energy conservation and efficiency measures in all economic sectors. Emphasis will be placed on measures that are no-cost or low-cost;
2. Provide technical and financial support for the routine use of the ISO 50001 Standard for Energy Management Systems (EnMS) to aid corporate level decision making about the implementation of both no cost and low cost energy efficiency and conservation measures as well as major capital investment measures;
3. Encourage GPL and the GEA to collaborate on the design, implementation, monitoring evaluation of a programmatic approach to electric utility demand side management (DSM).
4. Support the GEA to design, implement, monitor and evaluate a programmatic approach to public and private sector energy efficiency programmes;

5. Support the GEA to establish a data tracking systems that would regularly collect data on indicators for conservation and efficiency;
6. Stimulate investment in energy efficiency. The aim will be to create self-sustaining energy efficiency markets. Government will encourage collaboration between public and private, stakeholders to create public private partnerships, develop financing mechanisms with local financial institutions, build capacity of professions and foster the development of energy service companies (ESCOs), and the implementation of information and public awareness campaigns;
7. Seek the support of the donor community in providing programme budgets that include funding for incentive payments to programme participants in energy efficiency and energy conservations programmes;
8. Implement energy labeling for lighting, appliances and equipment. The Government will encourage retailers to provide public display of information that will improve customer decision-making at the point of sale for appliances. Retailers will be encouraged to import appliances that are been subject to energy labeling requirements in other jurisdiction. Labelling of appliances provides information to buyers which supports informed decision-making and promotes a gradual shift in market demand to more efficient appliances;
9. Implement Codes and Minimum Energy Performance Standards (MEPS). The Government will encourage real estate developers and building code officials to adopt codes and MEPS for buildings. Government will undertake pilot projects in public sector buildings to showcase successful energy efficiency projects and provide guidelines on best practices. Codes and standard MEPS in the private sector will be encouraged on a voluntary basis. This allows time for market adoption before transitioning to compulsory mandates;
10. Implement market transformation initiatives. The Government will seek to accelerate the introduction and uptake of energy efficient lighting, appliances and equipment by introducing formal market transformation programmes. This programmatic approach is intended to foster customer behavioral changes that lead to significant energy savings in a relatively short period. Government will explore the use of financial incentives as an inducement to customers to make the right decision when making purchases. This programme will be supported by a corresponding energy awareness programme;
11. Introduce relevant regulations and legislations. Government will subsequently develop regulations and legislation for standards and labelling of lighting, appliances and equipment.
12. Collaborate with Member States of CARICOM through the CARICOM Regional Organisation for Standards and Quality (CROSQ), to implement lighting, appliance and equipment standards, as well as labels and testing procedures;
13. Phase out the least efficient equipment with the use of appropriate fiscal measures;
14. Implement an Energy Audit Programme in the Agriculture Sector. Government will encourage lenders and grant sources to tie their loans and grants to the conduct of an acceptable energy audit;
15. Increase supplier and customer awareness through training and information awareness programmes; and
16. Facilitate the training of architects, engineers, draftsmen, technicians, quantity surveyors, and construction professionals to routinely design, build and renovate commercial buildings

and manufacturing facilities to incorporate energy conservation and energy efficiency, in addition to the greater use of building materials that minimize energy demand.

4.9 Policies to Foster Institutional Strengthening

The sub-objective of the institutional strengthening initiatives in the energy sector is to increase the efficiency, transparency, sustainability and accountability of the various energy sub-sectors.

In respect to electricity, it is the intent of Government to:

1. Develop an overall institutional and regulatory framework. The institutions are: The Ministry of Public Infrastructure, the Guyana Energy Agency (GEA), the Public Utilities Commission and Guyana Power and Light (GPL). The focus will be to modernise the institutional arrangements that would: (a) Facilitate the routine interconnection and integration of renewable energy from large scale independent power producers, and small and commercial scale distributed generators; (b) facilitate the routine supply, installation and commissioning of off-grid renewable energy; (c) facilitate the routine supply, installation and commission of microgrids and hybrid renewable energy systems in the hinterland and river island communities;
2. Strengthen the capabilities of the sector to supply electricity in an economic, efficient and sustainable manner;
3. Set guiding operational policies that assign responsibilities to various institutions, but leave the details of implementation to those institutions;
4. Set guiding policies for the Commission while ensuring that its independence is maintained in key areas such as tariff-setting, monitoring and standards;
5. Create a climate of certainty and transparency that gives comfort to investors and customers that appropriate safe guards are in place to guard against discriminatory practices or unfair advantage to any party;
6. Periodically review the pricing mechanisms for grid electricity and renewable energy (whether on grid, off grid, or microgrid) to reflect the dynamic developments in energy technology. Particularly as it relates to cost reductions so that customers benefit from these reductions;
7. Set guiding policies for the Commission and the GEA to periodically review environmental permitting and environmental standards for energy technologies, as well as investment and procurement procedures by GPL and off-grid investors; and
8. Set guiding operational policies for GPL to conduct:
 - a. Integration resource planning procedures and studies;
 - b. Power factor studies;
 - c. Impact studies on grid stability due to interconnections of intermittent renewable energy resources;
 - d. Loss studies for each region or sub grid including technical and commercial losses, billing and metering errors, and electricity theft;
 - e. Demand and load forecasting for the central grid, as well as at each major substation;

- f. Wind and solar energy measurement and forecasting at each major substation; and
- g. Quality of service evaluations for each region or sub-grid.

In respect to upstream and midstream oil and gas, it is the intent of Government to:

1. Develop an overall intuitional and regulatory framework for the oil and gas sector that includes the Ministry of Infrastructure, the Guyana Energy Agency, the Audit Office of Guyana (AOG), Guyana Revenue Authority (GRA), and the Ministry of Finance;
2. Establish a new institution to regulate the oil and gas sector;
3. Create a new directorate for petroleum in the Ministry of Public Infrastructure to provide policy guidance and licensing for the upstream, midstream and downstream aspects of the petroleum value chain;
4. Evaluate the requirements for a petroleum refinery based on the results of the current off-shore oil and gas exploration;
5. Evaluate the requirements for off-shore gas transmission pipelines and on an on-shore gas distribution network based on the results of the current off-shore oil and gas exploration;
6. Evaluate the requirements of oil and gas storage facilities based on the current off-shore oil and gas exploration;
7. Establish the legal and regulatory framework for the upstream and midstream petroleum sectors. This may include Acts for: Petroleum exploration, development and production; and petroleum refining, conversion, transmission and midstream storage;
8. Provide training and capacity building for officials in oil and gas related disciplines, including petroleum geoscience, law, audit, taxation and management;
9. Introduce artisanal and technical skills training at certificate and diploma levels at the University of Guyana and local technical institutes; and
10. Develop a Licensing Strategy and Plan. This will include model contracts for multi-client seismic survey; a procedure for international bidding and open licensing for producers; a promotional campaign; establishment of a data facility and procedures; and procedures for sales of data packages.

4.10 Governance and Institutional Capacities

The sub-objective of the initiatives aimed at governance and Institutional capacities is to strengthening the legislation to better equip the energy sector policy, legislative and regulatory institutions to properly direct the various energy sub-sectors towards the strategic objectives and goals of this Policy.

In respect to electricity, it is the intent of Government to:

1. Review with a view to amend the Electricity Sector Reform Act, CAP 56:01, Section 65 (Duties of the Minister) to make explicit reference to:
 - a. The interconnection and integration of intermittent renewable energy resources into the public electric grid;

- b. The introduction of markets for electric energy, capacity and ancillary services supplied the public electric utility;
 - c. The introduction of markets to facilitate the reduction of the environmental impact of the public electric utility and the non-utility deployment of renewable energy, energy conservation and energy efficiency resources; and
 - d. The modernization of the national electric grid (meaning the implementation of Smart Grid concepts) to facilitate integration of very high penetration levels of intermittent renewable energy.
2. Provide policy guidance to the Public Utilities Commission in respect to:
- a. Interconnection and integration of intermittent renewable energy resources into the public grid;
 - b. Markets for electric energy, capacity and ancillary services supplied by the public electric utility;
 - c. Markets to facilitate the reduction of the environmental impact of the public electric utility.
 - d. Grid modernisation meaning the implementation of Smart Grid concepts into the public grid; and
 - e. The imposition of cost effectiveness criteria on the public utility when making decisions on the development and expansion of facilities or services.

4.11 Energy Infrastructure

For the purposes of this section, the Energy Infrastructure may be defined as the large-scale enabling technologies to transport energy from producer to consumer, and to direct and manage energy flow. Within the context of Guyana, the energy infrastructure was therefore limited to the traditional electric transmission and distribution grid.

Given the recent discovery of off-shore oil and gas, and the need to integrate high levels of intermittent renewable energy into the national grid, the Government intends to include the following in the definition of the Energy Infrastructure:

1. Oil and gas pipelines;
2. Storage facilities for crude oil and refined petroleum products;
3. Oil refineries;
4. Marine transport for oil and gas; and
5. Large-scale energy management technology in the electric sector such as advanced metering infrastructure (AMI), distribution systems, smart building technologies, modern power plant control systems, and the information and communication infrastructure necessary to manage the flow of electricity. Collectively these strategies are referred to as the “Smart Grid”.

It is intent of Government to follow the State of California in its definition of the Smart Grid and encourage the following:

1. Increased use of cost-effective digital information and control technology to improve reliability, security, and efficiency of the electric grid;
2. Dynamic optimization of grid operations and resources, including appropriate consideration for asset management and utilization of related grid operations and resources, with cost-effective full cybersecurity;
3. Deployment and integration of cost-effective distributed resources and generation, including renewable resources;
4. Development and incorporation of cost-effective demand response, demand-side resources, and energy-efficient resources;
5. Deployment of cost-effective smart technologies, including real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer devices for metering, communications concerning grid operations and status, and distribution automation;
6. Integration of cost-effective smart appliances and consumer devices;
7. Deployment and integration of cost-effective advanced electricity storage and peak shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air-conditioning;
8. Provision to consumers of timely information and control options;
9. Application of standards for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid; and
10. Identification and lowering of unreasonable or unnecessary barriers to adoption of smart grid technologies, practices, and services.

4.12 International and Regional Trade

It is the intent of Government to:

1. Collaborate with the Government of Brazil on the development of the Arco Norte project that connects the State of Roraima in northern Brazil to the three Guianas and the Caribbean Sea. From the perspective of Guyana, this infrastructure project combines roadways, hydroelectric power, high speed communication systems and a port of harbour.
2. Intensify trade and cooperation between China and Guyana to pursue a green economy and encourage the greater use of clean, green and low-carbon technologies and renewable sources of energy. This will be leverage through China's 13th Five-year Plan (2016-2020) which is committed to achieving a green economy;
3. Continue to take advantage of the opportunities under the Renewable Energy and Energy Efficiency Technical Assistance, REETA, a project funded by the German Federal Ministry for Economic Cooperation and Development (BMZ), and executed by the Caribbean Community (CARICOM) Secretariat with assistance from the German aid agency, GIZ;

4. Explore the options for the export of industrial alcohol produced in Guyana to the United States of America (USA) under the trade terms of the Caribbean Basin Initiative (CBI). This will include indigenously grown and produced alcohol from sugar cane, as well as feedstock from countries such as Brazil which do not enjoy the same favourable trade terms with the USA;
5. Investigate cooperation with the European Union under Article 138 (Cooperation on eco-innovation and renewable energy) and Article 183 (Objectives and sustainable development context) and Annex IV of the Economic Partnership Agreement (EPA). This includes application to qualified projects of the Clean Development Mechanism (CDM) under the United Nations Framework Convention on Climate Change (UNFCCC);
6. Further encourage and promote cooperation under the Agreement on Trade, Economics and Technical Cooperation between CARICOM and the Government of the Republic of Colombia. The relevant areas of cooperation are energy, human resource development, institution building, science and technology, research and development, environmental management, disaster preparedness and management, tourism and agricultural development. Also included are exchanges among universities, training and research institutions, the provision of experts, the granting of training awards, graduate studies, strengthening of information systems and participation in seminars and workshops; and
7. Explore the trade agreement signed by the CARICOM Secretariat on the behalf of Guyana and other Member States of CARICOM and the Government of Costa Rica in respect to cooperation in hydro electricity production. Costa Rica has recently achieved 100 % renewables, with the bulk of the generation coming from long standing hydroelectric plants.

4.13 Green Economy

It is the Government's intent to:

1. Encourage the minimization of waste through recycling and waste re-use;
2. Encourage the adoption of green procurement practices;
3. Facilitate the introduction the principles of cleaner production;
4. Investigate the concept of carbon neutral buildings within the context of Guyana; and
5. Intensify the cooperation between China and Guyana to pursue a green economy and encourage the greater use of clean, green and low-carbon technologies and renewable sources of energy. This will be leverage through China's 13th Five-year Plan (2016-2020) which is committed to achieving a green economy.

5 SUGGESTED IMPLEMENTATION STRATEGY

The Government intends to pursue the following strategy in implementing this National Energy Policy:

1. Identify Multi-Level Stakeholders. Identify institutions across different levels of government: National and Subnational (regional, cities, communities); Regional; and International. This multi-level approach is intended to help define an institutional framework for the policy making process. It also helps to enhance ownership of the outcomes and the greater likelihood of implementation.
2. Identify a Multi-Sectoral Approach. The aim is to:
 - a. Integrate sector specific climate change mitigation and adaptation objectives and policies, as well as sector specific sustainable development goals into the energy policy and planning process. Sectors to include residential, agriculture, transportation, mining, industry and commerce, tourism and Government institutions.
 - b. Direct the identification of technical assistance and financial resources.
3. Determine how to best integrate climate change and sustainable development issues at the sectoral level into strategies for accessing technical and financial assistance from the international and donor community.
4. Identify and co-opt members of the multi-stakeholder groups (public sector, private sector, civil society, regional and international) who should be consulted and actively engaged in the planning process.
5. Map the Climate Economy. The aim is to define the sectors, actions and stakeholders for consideration during the next steps.
6. Scan the policy, fiscal, legislative, regulatory, legal, financial, and governance issues across the sectors. The aim is to lay the foundation for a detailed evaluation of the sectors and direct the course of actions. This step will:
 - a. Identify the synergies and tradeoffs among the array of policy and fiscal options and priorities under consideration;
 - b. Identify the government ministries, departments and agencies at different levels that should be involved with policy process. Analyze and clarify their roles, responsibilities and mandates.
7. Established Working Groups. The groups to consider are:
 - a. Climate diagnostics and mapping;
 - b. Policy, legal and financial;
 - c. Energy, transport and industry;
 - d. Electric utility planning, infrastructure and waste management;
 - e. Ecosystems, environmental, and natural resource management, including agriculture, forestry and water;
 - f. Sustainable human development, poverty and gender.
8. Recruit an Implementation Team. The responsibilities of the team are to programme, coordinate, supervise and monitor the steps of the policy making process, and coordinate the multi-stakeholder task force and working groups.
9. Design and implement formal interventional programmes to realise the desirable outcomes of the Policy. The programme design approach will include:

- a. Market research to define baselines, identify barriers, determine attitudes, and determine awareness.
 - b. Programme design to address the barriers in the cross matrix of economic sectors and technology sectors.
 - c. Design the monitoring protocol for the programmes, and define a programme tracking system.
 - d. Define an evaluation protocol that would evaluate outcomes and offer feedback to refine programme design. The evaluations will consist of process evaluations and impact evaluations. Process evaluations are undertaken in the early stages of programme implementation. They are intended to determine how well the internal management systems are working, the level of awareness of the programme by the stakeholders and beneficiaries, how well the stakeholders and beneficiaries understand the programme objectives and strategies. The impact evaluations measure the ultimate beneficial impacts of energy savings, environmental emission reduction, costs reductions, and other socio-economic benefits.
 - e. Market transformation research to determine if the programme interventions have reached the stage when the programmes may exit.
10. Implement demonstration projects. These would be realized in parallel with the targeted implementation programmes above.
 11. Budgeting.
 - a. Examine the current financial status of the government, its budget, sources of revenues, and spending responsibilities in relation to the energy sub-sectors and the cost of energy to the remaining economic sectors.
 - b. Define the budgets to support the actions to address the policy, fiscal, legislative, regulatory, legal, financial, and governance issues.
 12. Develop a Work Plan for the next two (2) years.
 13. Hire private sector contractors to implement and evaluate the programmes.
 14. Report the results of the programme implementation to interested parties.
 15. Glean best practices and share nationally, regionally and internationally.