



# Guyana Energy Agency

Annual Report 2015

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## EXECUTIVE SUMMARY

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### *Petroleum Products*

A total of 5,001,497 barrels of petroleum-based products was imported in 2015 representing about 13,703 barrels per day. This represents a 1.27% increase when compared to 2014. Petroleum imports for the year were acquired at a cost, insurance and freight (CIF) value of US\$355,201,732, representing a decrease of 36.76% from that of the previous year. Twenty-six percent (26%) or 834,056 barrels (2,285 bpd) of total imports were obtained under the PetroCaribe Agreement during 2015.

There were increases in the consumption of Mogas, Kerosene, Avjet, Fuel Oil and LPG with reductions in the consumption of Diesel and Avgas. Notably, consumption of Avjet and Fuel Oil increased by 32.58% and 5.11%, respectively.

The average cost per barrel of petroleum-based imports decreased from US\$113.72 in 2014 to US\$71.02 in 2015, a decrease of 37.55%. This downward trend also continued for the average unit CIF value for each petroleum product. There were decreases of 32.85%, 37.91% and 38.95% in the average unit CIF value (US\$/bbl) for Mogas (gasoline), Gasoil (diesel) and Jet fuel/Kerosene respectively. In addition, the average unit CIF value for Fuel oil, Aviation Gasoline (avgas) and LPG (cooking gas) also decreased by 42.08%, 22.31% and 34.13%, respectively.

### *Solar Energy*

1,164 kW of solar photovoltaic capacity was documented as being the total installed capacity in Guyana producing an estimated 2,125 MWh of energy annually.

Building on the experiences of GEA's solar PV grid-tied system, GEA, through competitive bidding, procured a 10 kWp solar PV system which will be installed at the Agency's head office in the first quarter of 2016. This will result in additional annual savings of G\$920,000 and avoided carbon dioxide emissions of 8.8 tons annually.

During 2015, GEA's Engineers installed 11 energy efficient LED solar-powered street lights, bringing the total number of installed solar-powered street lights to 13 and resulting in annual savings of about G\$800,000 per year.

GEA's Engineers, during the year, repaired and rehabilitated a total of 1.655 kW of solar PV equipment at 4 schools.

### *Hydropower*

The GEA, with support from GPL, coordinated with other Arco Norte countries to gather information to support an IDB funded pre-feasibility study to explore the possibility of an

electrical interconnection and generation expansion project involving Guyana, Brazil, Suriname and French Guiana.

Fifteen (15) visits were conducted at eight (8) hydropower sites in five different Regions during the year. As part of the GEA programme to encourage and demonstrate the use of renewable sources of energy, a number of activities were completed at the Hosororo, Region I hydropower site. Collection and analysis of water level data and watershed delineations were also done at the Kumu site, Region 9.

GEA worked with HECL and REETA to draft an Expression of Interest to rehabilitate the Moco-Moco Hydropower Station. Discussions on the rehabilitation of the Tumatumari hydro site were also advanced.

#### *Wind Energy*

GEA continued to monitor and record wind data (speed and direction) at four sites: Port Mourant, Kumu, Mahdia and UG.

GEA also assisted the Hinterland Electrification Company Inc. (HECL) in selection and evaluation of fifteen potential wind sites along Guyana's coast where the best four will be chosen to carry out wind measurements.

#### *Biomass Energy*

In exploring the use of rice husk biomass to generate electricity, a 400kW/hr gasification system was installed in Region 2 (Pomeroon - Supenaam) by a private rice miller. The project was installed with the assistance of The Energy Research Institute (TERI) and support from the Government of India.

100 energy efficient wood stoves purchased in 2014 were distributed and demonstrated at a pilot scale to 10 households in 10 hinterland communities.

Additionally, 10 energy efficient institutional wood stoves were also demonstrated and distributed to 9 hinterland residential schools/institutes. The energy efficient design will result in an 80% reduction in firewood consumption versus the open fire.

#### *Energy Efficiency*

Engineers from the GEA and Ministry of Public Infrastructure replaced 37 high pressure sodium vapour (HPSV) street lamps rated at 250 watts with energy efficient Induction Lamps rated at 120 watts. It is estimated that G\$1,173,000 would be saved annually and 14.7 tons of CO<sub>2</sub> emissions would be avoided.

Ten (10) energy efficient LED street lamps rated at 80 watts, 100 watts, and 120 watts replaced 10 x 250 watts high pressure sodium lamps.

Sixty-five x 100 watts LED street lamps were procured as part of the Agency's ongoing effort to promote energy efficient street lighting and replace existing 250 watts HPSV street lamps. It is estimated that G\$1,468,000 would be saved annually when the lamps are installed in 2016.

With support from the Work Services Group, a total of 300 defective photosensors on street lights were replaced as part of GEA's efforts to conserve energy, translating into annual energy savings of about G\$18.2 million.

GEA completed Energy Consumption Assessments of 70 buildings in the last three years along with the change-out of inefficient lighting at 28 buildings.

### *Research*

Engineers of the GEA conducted research in a number of areas: hydropower, natural gas, vapour recovery systems, biomass, woodwaste potential, energy potential from rice husk, gasification systems, refrigerant replacement, solar powered and energy efficient street lights.

GEA conducted several visits to the Town of Bartica based on government's mandate to transform the area into a 'Green Town'. Energy assessments targeted at government building and schools with the aim to reduce energy consumption, assessed the potential for roof top grid tie and standalone solar PV installation were conducted. Also a survey for the installation of LED and solar street lighting were carried out to assess the suitability of using both grid powered LED and standalone solar street lights where applicable. GEA also identified a suitable location to conduct wind measurement and is currently awaiting the relevant approval to install a wind mast.

### *Licensing Activities*

The Agency issued a total of 1,351 licences for 2015, inclusive of all categories of licences (Importing/Importing Wholesale/Wholesale, Export, Retail, Consumer Installation, Bulk Transportation Carriers, Storage). There was significant outreach across the country as a result of increased site inspections and field visits. With the completion of construction of the addition to GEA's Head Office, the Licensing Department was relocated, thereby facilitating a more customer-friendly environment and increased space for additional Licensing Officers in the upcoming year.

### *Fuel Marking Programme*

Under the Fuel Marking Programme, of the 12,227 total site visits conducted during the year, 1,446 sites were sampled at least once. 37 (3%) of the sites sampled at least once were found with *significant dilution (defined as more than 50%)* in at least one tank. From 2006 to 2015, the

percentage of sites found with significant dilution in at least one tank has progressively decreased from 34% in 2006 to 3% in 2015.

There were 25 joint operations with members of the Task Force on Fuel Smuggling and Contraband.

The Fuel Marking Programme recorded nine (9) convictions in 2015. Five new charges were filed. Two matters were dismissed of which one was appealed. At the end of 2015, there was one matter continuing before the Sparendam Magistrate's Court. Compensation was accepted from eight individuals under Section 33A Guyana Energy Agency Act 1997 as amended by Section 8 Guyana Energy Agency (Amendment) Act 2011.

#### *Information Dissemination*

GEA participated and facilitated many information dissemination and awareness activities which enabled interaction with members of the public, students and various organizations to provide lectures, seminars, information brochures, press releases, newspaper pull-outs, radio and TV infomercials with energy conservation tips.

GEA conducted forty-three (43) school presentations in 7 of Guyana's 10 Administrative Regions (Regions: 2, 3, 4, 5, 6, 7, and 10).

8 Seminars/workshops were conducted during 2015. For the period January-November 2016, GEA aired 822 Radio Adverts, broadcasted 168 Television adverts and published 121 print adverts, while a combined total of 2,707 infomercials and documentaries were aired. 7,160 brochures, 494 booklets, and 300 posters were distributed.

#### Administration

Works that commenced in 2014 were completed in 2015 resulting in extensions to the Northern and Southern sections of the building to create additional office and storage space.

The staff of the Agency benefited from training and workshops in several areas, through the conduct of 42 training programmes benefitting 182 Officers.

## I.0 Review of Activities: Energy & Energy Statistics Division

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### I.1 Petroleum-Based Imports

For the year 2015, the Division facilitated the importation of one hundred and twenty-one (121) shipments of petroleum-based products on Guyana's behalf, an increase from one hundred and one (118) shipments in the previous year. Twenty-seven (27) shipments were lifted from PDVSA under the Petrocaribe Agreement while ninety-four (94) were lifted from Petrotrin, Trinidad<sup>1</sup>. It was observed that the distribution of volumes of similar products (Mogas, Gasoil, Avjet/Kero and Fuel oil) from PDVSA and Petrotrin was skewed towards Petrotrin in 2015 when compared to the previous year. This was as a result of Guyana being unable to procure any shipments from Petr leos de Venezuela, S.A. (PDVSA), Venezuela after July 4, 2015.

Year	PDVSA		Petrotrin	
	bpd	%	bpd	%
2012	6,915	76%	2,212	24%
2013	4,376	51%	4,221	49%
2014	4,794	51%	4,563	49%
2015	2,285	26%	6,420	74%

*Comparison of the quantity of fuel shipments (measured in barrels per day) imported from PDVSA and Petrotrin for the period 2012 to 2015*

There was a great degree of uncertainty about obtaining any further shipments for the latter half of the year from the Venezuelan market and the oil companies instead opted to secure products from Petrotrin, Trinidad and Tobago. To date, no official explanation as to the reason for perceived halt in supplies has been provided and it is believed that the situation may be as a result of the present strained relations between Guyana and Venezuela.

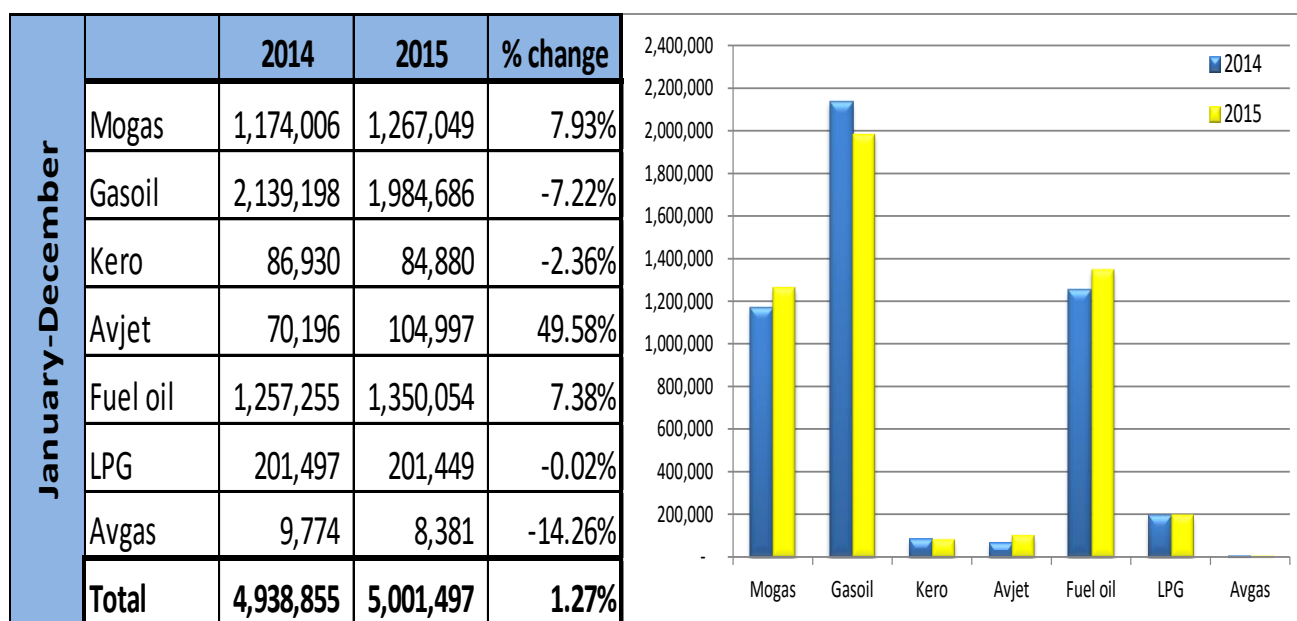
Under the Petrocaribe Agreement, 834,056 barrels were imported during 2015, representing a 52.34% decrease when compared to volumes in 2014. The decrease in volumes imported from Venezuela in 2015 was also accompanied by decreases in total shipment FOB value and long-term financing portion under the Petrocaribe Agreement which fell by 68.17% and 76.81% respectively. The decline in FOB value and long-term financing under the Agreement is primarily due to falling oil prices on the international market. Since the latter half of 2014, oil prices have considerably declined due to contraction in demand along with record growth in non-OPEC supply.

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<sup>1</sup> Shipments relate solely to Mogas, Gasoil, Avjet/Kerosene and Fuel oil.

Year	No. of Shipments	PetroCaribe Imports (BBLs)	Total Shipment FOB Value US\$	Financed Portion US\$
2007	23	640,895	61,280,208.48	27,261,993.84
2008	39	1,419,868	157,368,354.55	80,096,309.65
2009	25	1,079,252	76,352,580.73	32,853,436.32
2010	25	1,022,907	89,233,164.90	44,836,346.06
2011	35	1,451,843	175,776,131.35	105,140,994.29
2012	67	2,378,982	298,812,764.74	178,830,961.05
2012 (Spot)	4	151,925	18,720,660.61	-
2013	44	1,597,341	193,100,300.02	115,206,051.20
2014	53	1,749,883	191,446,541.18	110,155,890.54
2015*	27	834,056	60,936,471.10	25,545,680.42
<b>Total</b>	<b>342</b>	<b>12,326,952</b>	<b>1,323,027,177.66</b>	<b>719,927,663.38</b>

\*Last shipment received July 4, 2015. No shipment was lifted in August to December 2015.



The total petroleum imports recorded an overall increase of 1.27% with a total of 5,001,497 barrels of petroleum-based products imported and an average of approximately 13,703 barrels per day. There were increases in the imports of Mogas (gasoline), Avjet (Jet Fuel) and Fuel oil while imports for Gasoil (diesel), Kerosene, LPG (cooking gas) and Avgas (aviation gas) decreased during January to December 2015.

Also, imports for the oil companies recorded a slight decrease of 0.73% during January to December 2015. There were increases in the imports of Mogas (gasoline), Avjet (Jet Fuel) and

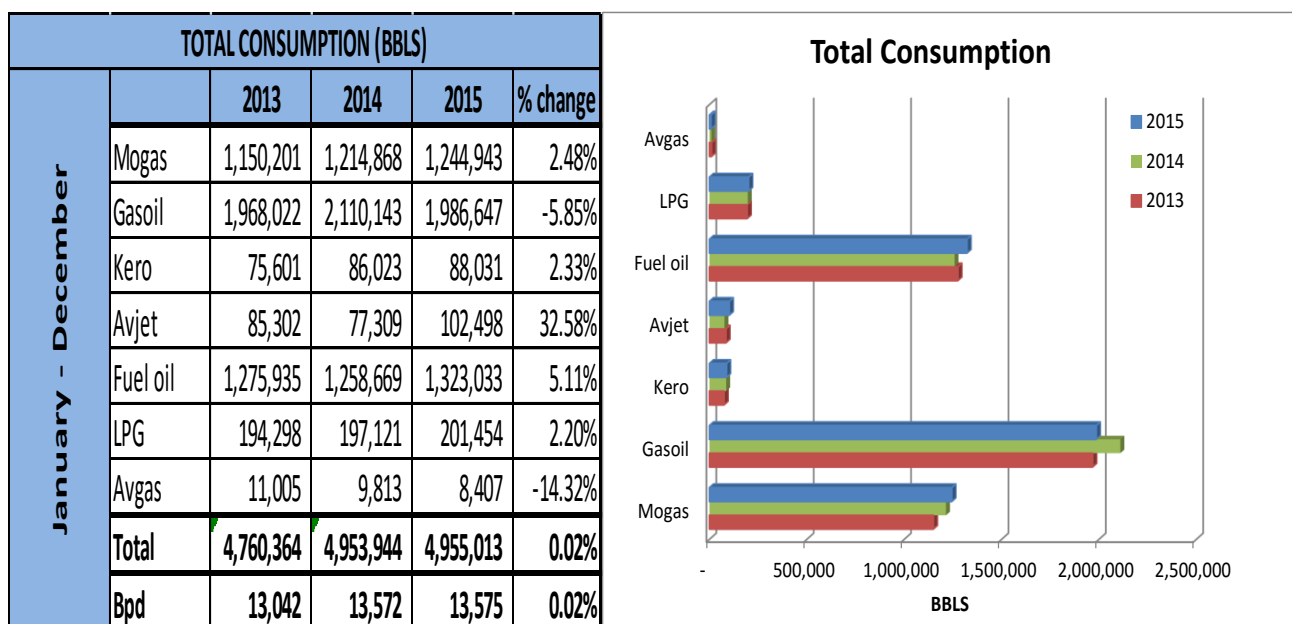
Fuel oil while imports for Gasoil (diesel), Kerosene, LPG (cooking gas) and Avgas (aviation gas) decreased during this period.

## I.2 Consumption of Petroleum Products

Consumption of petroleum products was calculated based on opening stock, closing stock and import volumes for the year.

$$\text{Consumption} = \text{Opening stock} + \text{Import volumes} - \text{Closing Stock}$$

A total of 4,955,013 barrels of petroleum-based products was consumed in 2015 with an average of 13,575 barrels per day. This represents a 0.02% increase when compared to 2014<sup>2</sup>. There were increases in the consumption of all products with the exception of Diesel (Gasoil) and Aviation Gasoline (Avgas).



The increase in gasoline consumption for 2015 can be attributed to an increase in motor vehicle registration while the increases in LPG and Kerosene consumption suggests more use of cooking gas and kerosene. The increase in Fuel oil consumption was predominantly as a result of increased demand by GPL, in keeping with their transition away from diesel based power generation and toward fuel oil. Also, the increase in jet fuel consumption may be indicative of increased flight travel at international airline carriers.

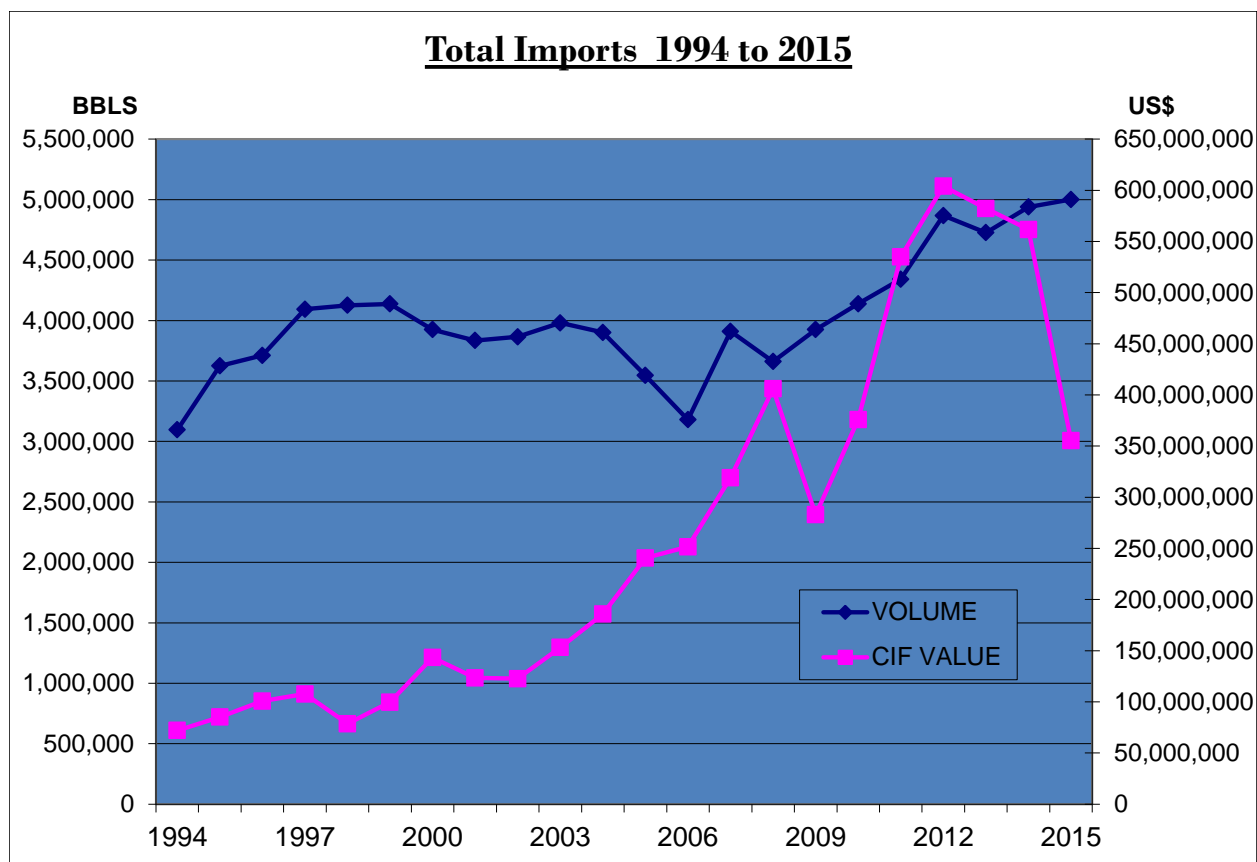
<sup>2</sup> Gasoil and Fuel oil purchased locally by GPL from the oil companies were discounted to avoid double counting.

There was a decline in diesel consumption with decreases from the oil companies and large duty-free consumers. The decrease in diesel volumes can be attributed to a contraction in the bauxite mining and forestry sectors. Avgas consumption have also reduced; particularly, at the market level.

### I.3 Acquisition Cost and Retail Prices

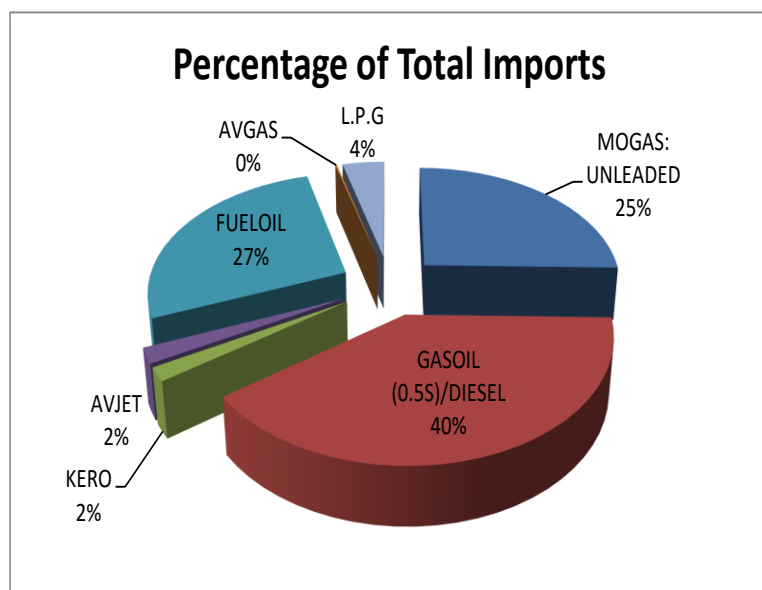
Petroleum imports for 2015, which amounted to 5,001,497 barrels, were acquired at a cost, insurance and freight (CIF) value of US\$355,201,732, representing a decrease of 36.76% from acquisition cost in 2014.

	VOLUME		CIF VALUE
	BBLS	LTRS	US\$
1994	3,095,728	492,181,436	72,067,912
1995	3,624,053	576,178,402	85,161,130
1996	3,711,893	590,143,846	100,696,609
1997	4,093,677	650,842,653	107,727,233
1998	4,125,765	655,944,238	78,539,499
1999	4,137,266	657,772,751	99,704,391
2000	3,924,614	623,963,783	143,277,974
2001	3,834,651	609,660,809	123,373,521
2002	3,865,505	614,566,203	122,643,684
2003	3,980,199	632,801,092	153,193,966
2004	3,901,760	620,330,288	185,702,255
2005	3,546,069	563,779,936	240,663,147
2006	3,179,925	505,567,690	251,594,083
2007	3,910,234	621,677,546	319,122,554
2008	3,660,583	581,986,208	405,960,936
2009	3,924,723	623,981,072	282,909,993
2010	4,137,931	657,878,518	375,951,700
2011	4,341,345	690,218,765	534,982,446
2012	4,867,748	773,910,151	604,000,602
2013 (revised)	4,726,150	751,397,875	582,281,795
2014	4,938,855	785,215,261	561,633,697
2015	5,001,497	795,174,539	355,201,732
<b>TOTAL</b>	<b>88,530,172</b>	<b>14,075,173,061</b>	<b>5,786,390,859</b>



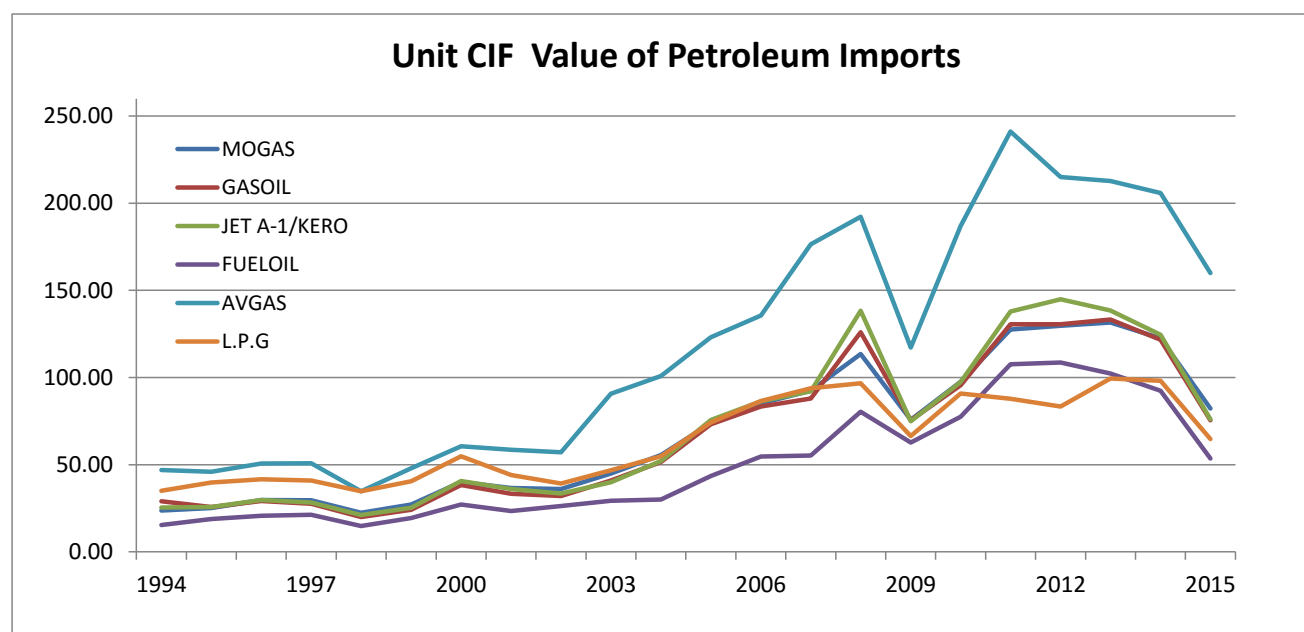
<u>TOTAL IMPORTS BY PRODUCTS FOR THE YEAR</u>			
	<u>2015</u>		
PRODUCTS	VOLUME		C.I.F VALUE
	LTRS	BBLS	US\$
MOGAS: UNLEADED	201,444,677	1,267,049	104,212,712
GASOIL (0.5S)/DIESEL	315,539,776	1,984,685	149,959,410
KERO	14,130,950	88,881	6,604,599
AVJET	16,057,316	100,997	7,829,326
FUELOIL	214,641,510	1,350,054	72,226,538
AVGAS	1,332,401	8,381	13,029,095
L.P.G	32,027,909	201,449	1,340,051
TOTAL	795,174,539	5,001,497	355,201,732

For 2015, Gasoil was the most imported product representing 40% of total imports and a CIF value amounting to 42% of total acquisition expense<sup>3</sup>. Fuel oil and Mogas followed Gasoil reflecting 27% and 25% of total imports respectively with corresponding CIF values amounting to 20% and 29% of total acquisition costs, respectively. The remaining products (Kerosene, Avjet, LPG and Avgas) constituted no more than 8% of total imports and 9% of total acquisition costs.



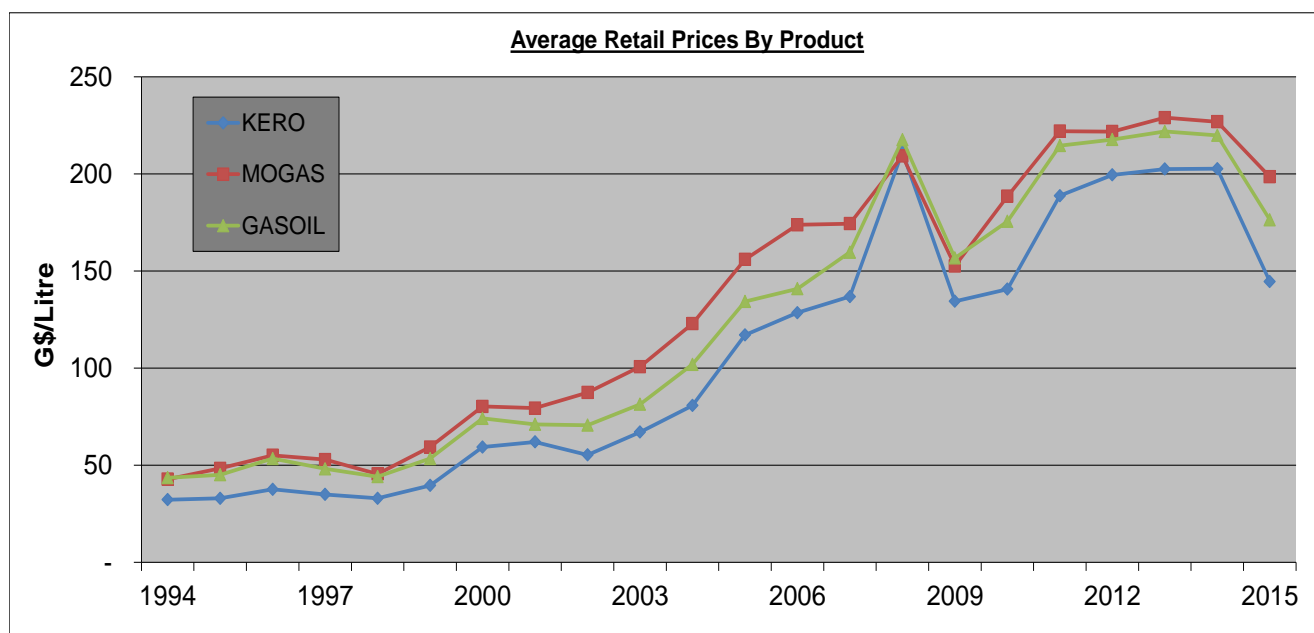
The average cost per barrel of petroleum-based imports decreased from US\$113.72 in 2014 to US\$71.02 in 2015, a decrease of 37.55%. This downward trend also continued for the average unit CIF value for each petroleum product. There were decreases of 32.85%, 37.91% and 38.95% in the average unit CIF value (US\$/bbl) for Mogas (gasoline), Gasoil (diesel) and Jet fuel/Kerosene respectively. In addition, the average unit CIF value for Fuel oil, Aviation Gasoline (avgas) and LPG (cooking

gas) also decreased by 42.08%, 22.31% and 34.13%, respectively.



<sup>3</sup> Gasoil CIF value was estimated for volumes used by the Trawler Association in 2015.

Since the latter half of 2014, oil prices have considerably declined due to contraction in demand along with record growth in non-OPEC supply. The International Energy Agency (IEA) predicts that import prices would remain under US\$80 per barrel for the next 5 years.



Retail prices for Mogas (gasoline), Gasoil (diesel) and Kerosene decreased during 2015 by an average of 20.01%. Specifically, average retail price for gasoline and diesel decreased by 12.49% and 19.78%, respectively. Also, the average retail price for domestic kerosene declined by 28.67% while the average retail price for cooking gas (LPG) decreased by 6.27%.

There were reductions in prices at Guyoil's gas stations during January, August and October, 2015 and the private oil companies later followed suit. Although there was a peak in prices in the month of June, there was a relatively steady decline in prices for the remainder of the year. The decline in global oil prices did directly transfer in the local market to some extent; although this could be attributed considerably to the decisions taken to reduce prices at the Guyoil's stations.

It should be noted that on January 20, 2015, the excise tax was increased from 40% to 50% for Mogas and from 35% to 45% for Gasoil with the rate levied on Gasoil subsequently rising to 50% on October 2, 2015. Prior to these increases and the fall in international oil prices, the excise tax had remained constant 20% and 15% for Mogas and Gasoil respectively between December 11, 2012 and November 4, 2014.

## **I.4 Research**

### **I.4.1 Green Bartica Initiative**

GEA conducted several visits to Bartica based on government's mandate to transform the area into a 'Green Town'. The purpose of the visits was to initiate simple actions that can be implemented beforehand and in accordance with government's mandate. Energy assessments targeted at government building and schools with the aim to reduce energy consumption, assessed the potential for roof top grid tie and standalone solar PV installation were conducted. Also a survey for the installation of LED and solar street lighting were carried out to assess the suitability of using both grid powered LED and standalone solar street lights where applicable. GEA also identified a suitable location to conduct wind measurement and is currently awaiting the relevant approval to install a wind mast.

### **I.4.2 Stand-alone Solar Powered Street Lights for Mocha Access Road**

Street Lighting is an important service that helps to contribute to safety and security of the public, businesses, and residential spaces. Street lights also aide in crime prevention and recreational activities. GEA prepared and submitted a proposal to install sixty-six (66) stand-alone solar powered 40-watt LED street lights.

### **I.4.3 Assessment of Solar PV at Orealla fruit cheese processing facility**

GEA's Energy Engineers visited Orealla to inspect the defunct photovoltaic (PV) installation at the Fruit Cheese Processing Facility. Inspections were done on the various components of the installation where the modules, batteries and remaining components were examined to identify their operational status. A full report was done highlighting the findings, recommendations and associated costs to have the system operationalized

### **I.4.4 Intervention at Ministry of the Presidency**

Energy Engineers conducted a visit at the Ministry of the Presidency to focus on areas of energy efficiency and possible applications of renewable energy within the complex. A report with recommendations and cost estimates was provided to the Permanent Secretary.

### **I.4.5 Refrigerant Replacement Pilot**

Guyana Energy Agency, in collaboration with the National Ozone Unit, commenced a pilot project in 2014 to compare energy efficiency of R-290 with R-22 in air-conditioner systems. The objectives are to assess the:

- economic benefits or non-benefits

- environmental benefits
- effect of the R-290 on energy consumption
- safety factors
- need for building capacity
- challenges to adopting the technology.

In 2015, the second phase of the pilot, the R22 refrigerant was replaced with the R290 refrigerant and operating parameters were recorded.

#### 1.4.6 Arco-Norte Interconnection Project

Officers of GEA and GPL attended a workshop in Brazil to advance the Arco Norte Interconnection Project.

The objective of the Arco Norte Interconnection Project is the assessment of a potential electrical interconnection among the power systems of French Guiana, Guyana, Suriname, and the Brazilian states of Amapá and Roraima (the Arco Norte countries), integrated with an optimal power generation expansion plan, in order to reduce future generations costs and guarantee an adequate level of security of supply while minimizing the overall investment and operation costs and environmental and social impacts.



## 1.5 The Energy Resource Institute of India (TERI)

A technical team from TERI, GEA and HECI visited the Lethem Power Company to review their operational procedures and identify issues that might exist. Some of the issues identified were undersized surge arresters, high neutral to earth voltage, need for capacitor banks, security lights, metering of individual feeders and monitoring of the demand on the transformers.



A meeting with the Chairman, Board of Directors and key personnel from LPC and the visiting team was conducted and the findings and recommendations were discussed in order to improve the operation of the company.

## 1.6 Solar Energy

### 1.6.1 Installation of Photovoltaic Equipment

Throughout 2015, GEA's Engineers actively identified and repaired non-functioning solar photovoltaic installations across Guyana. Below is a summary of the various systems repaired:

Location	Facility	Installed Capacity (W)	Energy Use	GEA's Support
<b>Bethany Primary School, Bethany Village, Region 2</b>	School	750	Lighting and IRI Teaching Programme	Supply and installation of inverter and lightning arrestor. Repairs were also done to correct faulty wiring.
<b>Mabel Sandy Primary School, Wakapao, Region 2</b>	School	250	Lighting and IRI Teaching Programme	Supply and installation of a battery.
<b>Hosororo Primary School, Hosororo, Region 1</b>	School	375	IRI Teaching Programme	Supply and installation of Batteries. Panels were cleaned and minor maintenance was conducted.

<b>Itaballi School, Region 7</b>	<b>Primary Itaballi,</b>	School	280	Lighting and IRI Teaching Programme	Supply and installation of a battery lug.
<b>TOTAL</b>			<b>1655</b>		

### 1.6.2 Documentation of Solar PV Installations

In an effort to track solar photovoltaic installations across Guyana, GEA has been monitoring and recording the various installations. The total documented photovoltaic systems in Guyana is 1,164 kW producing an estimated 2,125 MWh of energy annually.

### 1.6.3 Follow-up Visits

Follow-up site visits were conducted at the locations below to ensure the systems remain operational:

- USAID's IHFI (Improving Health Facility Infrastructure) project which supplied 1200W PV systems to health centers at:
  - o Region 1: Kwebanna, Matthew's Ridge, Arakaka, Baramita
  - o Region 7: Itaballi
  - o Region 8: Paramakatoi and Tumatumari
  - o Region 9: Aishalton and Karasabai
- Bethany Primary School, Region 2: 750W PV System
- Caria Caria Primary School, Region 2, 1,110W PV System
- Kako Heath Centre, Kako, Region 7, 1,608W PV System

### 1.6.4 OLADE's CSR Project

GEA's Engineers assisted OLADE with an Energy Project seeking to:

- implement as a pilot/demonstration, sustainable energy initiatives to enhance and accelerate productivity in three (3) rural communities of Guyana. The pilot projects were defined based on communities' requirements (demand-driven) with focus on generating new income as a condition for sustainability.

- enhance corporate social responsibility (CSR) by fostering interest and support from Guyana's private sector in replicating, advancing and/or expanding the project based on the outcomes and experiences.

After consulting with the Ministry of Indigenous Peoples' Affairs, the following three (3) communities were identified and subsequently consulted:

1. Powaikoru, Region I
2. Moraikobai, Region 4
3. Shulinab, Region 9

During 2015, GEA's Engineers visited the communities to assess the levels of interest and identify suitable projects. A procurement process commenced and installation will be completed in 2016.

#### **1.6.5 Solar-powered LED street lights**

Engineers from the Guyana Energy Agency, during 2015, installed 11 energy efficient LED solar-powered street lights, bringing the total number of installed solar-powered street lights to 13, with resultant annual savings of about G\$800,000 per year.

The first solar powered street light cost G\$278,300 in 2014 while the second unit was installed at a cost of G\$209,800. In 2015, GEA was able to reduce the cost to G\$197,000 installed as a result of reduced prices and improved design and construction.



### **I.6.6 Solar PV Grid Feed-in**

The Guyana Energy Agency, through competitive bidding, procured a 10 kWp solar PV system which will be installed at the Agency's head office in the first quarter of 2016. This will result in additional annual savings of G\$920,000, avoided carbon dioxide emissions of 8.8 tons annually, reduced electricity costs, reduced carbon dioxide emissions and increased utilization of renewable energy. When completed, the 10 kWp PV system along with an existing 8.46 kWp PV system would supply approximately 23,652 kWh of energy annually to the GEA building. With an annual energy requirement of 47,800 kWh at the GEA, approximately 49 % of the energy requirement would be generated from a renewable source. This is in keeping with GEA's plan to become a net producer of energy from renewable resources.

### **I.7 Hydropower**

Recent years have witnessed a boost in the process of creating interconnections between isolated systems or strengthening the link between systems already interconnected to ensure greater reliability and security levels, to increase power exchanges on an economic basis and to increase exploitation of cleaner resources for the production of electricity. The integration process of the national power systems is now influencing the North-eastern part of South America, where the transmission networks of Guyana, Suriname, French Guiana and Brazil are still isolated from each other. All these countries are fast growing with a GDP compound annual growth rate ranging between 2.7% (in Brazil) and 4.5% (in Guyana). The economic development of this region along with the expected increase of electricity customers (about 4.5% per annum in the next fourteen years) prompts remarkable electricity demand growth both in energy and in peak power consumption. To keep up with the electricity demand increase, it is recommended that the Arco Norte countries undertake robust generation expansion plans trying to exploit as much as possible the local primary energy resources (mainly hydro, but also oil and biomass), while minimising the environmental impact. The GEA with support from GPL has been coordinating with other Arco Norte countries to gather information to support an IDB funded pre-feasibility study to explore the possibility of such an interconnection and generation expansion project.

As part of the collaboration between Brazil and Guyana on the development of the Upper and Middle Mazaruni hydroelectric project, with capacities of 3000MW and 1500MW respectively, a team comprising representatives from the GEA and the Ministry of Foreign Affairs visited the Tucuruí hydropower plant found in the state of Pará on the Tocantins River in Brazil. The site was chosen because of its similarities with the Upper and Middle Mazaruni hydroelectric initiative.

### 1.7.1 Hosororo Pico Hydro

Hydropower Support Engineers of GEA commenced preparation of a project for a pico hydropower project at Hosororo, Region 1. The project proposes to install a 15 to 20 kW hydropower plant with the assistance from REETA/GIZ working along with in-house engineers and resources. In an effort to build technical capacities in the field of hydropower development, the GEA and REETA, through consultations, agreed on a TOR for a consultant to work alongside GEA's engineers to develop a small hydropower scheme. The Hosororo site was once considered for development as a micro hydro facility in order to supply an agro industrial project. This was done in 1985 by Terrence Fletcher and Associates Limited. During a recent assessment of the facility and its environs, it was observed that two government establishments, National Agricultural Research Institute (NARI) Turmeric processing facility (under construction) and the Hosororo Primary School exist, which can benefit the development of a micro hydro plant. They are both within one kilometre of the hydro scheme with NARI being the closest. There is also a possibility for tourism near the proposed site.



GEA partnered with the University of Guyana and two students from the Department of Civil Engineering and from Faculty of Earths and Environment were identified to help conduct a Topographic Survey and Environmental Scoping assessment at the site.

GEA and GWI are currently discussing options for shared use of the water resources.

### 1.7.2 Turbine Testing

GEA and Hydromet provided support in the testing of a small hydropower turbine for providing energy to riverine villages and communities around Guyana. It was noted that the unit has a 5kW capacity and needs a velocity of 2 m/s or more to operate at its optimum.

Velocity measurements of the Saint Francis Creek, Moraikobai, Region 5, was done at two points to determine if the Creek can support the hydropower turbine. However, upon completion of the exercise, velocities of 0.3m/s – 0.4m/s were recorded which meant that the characteristics of the river did not support what was required by the turbine.



### 1.7.3 Kumu Falls

Based on a 1977 study by M. Singh, Specialist Engineer (Designs), attached to the Hydropower Division of Guyana Natural Resources Agency (GNRA), Kumu, located in Region 9, may be suited for a small scale hydropower generation with a potential of 0.1MW.

GEA's Hydropower Support Engineers installed a water level logger in 2014 to collect data and prepare a feasibility study for the Kumu Falls. As part of the feasibility study activities, the Hydropower Support Engineers delineated the boundaries of the watershed/catchment area.



### 1.7.4 Hydropower Site Visits

Fifteen (15) visits were conducted at nine (9) potential hydropower sites in Guyana during the year 2015. The Table below depicts the sites visited, their location and the number of visits conducted at each site:

Name of Site	Location	Number of Site Visits
Hosororo	Region 1	4
Fransco Creek	Region 5	1
Tumatumari	Region 8	2
Kumu	Region 9	3
Moco Moco	Region 9	1
Fair View	Region 9	1
Great Falls	Region 9	1
Wamakaru	Region 9	1
Tiger Hill	Region 9	1

As part of the collaboration between Brazil and Guyana on the development of the Upper and Middle Mazaruni hydroelectric project, with capacities of 3000MW and 1500MW respectively, a follow-up visit to Brazil was conducted in April 2015. A team comprising four representatives from the GEA and one from the Ministry of Foreign Affairs represented Guyana. The visit was

focused on the 8,370MW Tucuruí hydropower plant found in the state of Pará on the Tocantins River in Brazil. This site was chosen since it was envisioned that the development of the Upper and Middle Mazaruni would have similar challenges faced during the development and operations of the Tucuruí plant

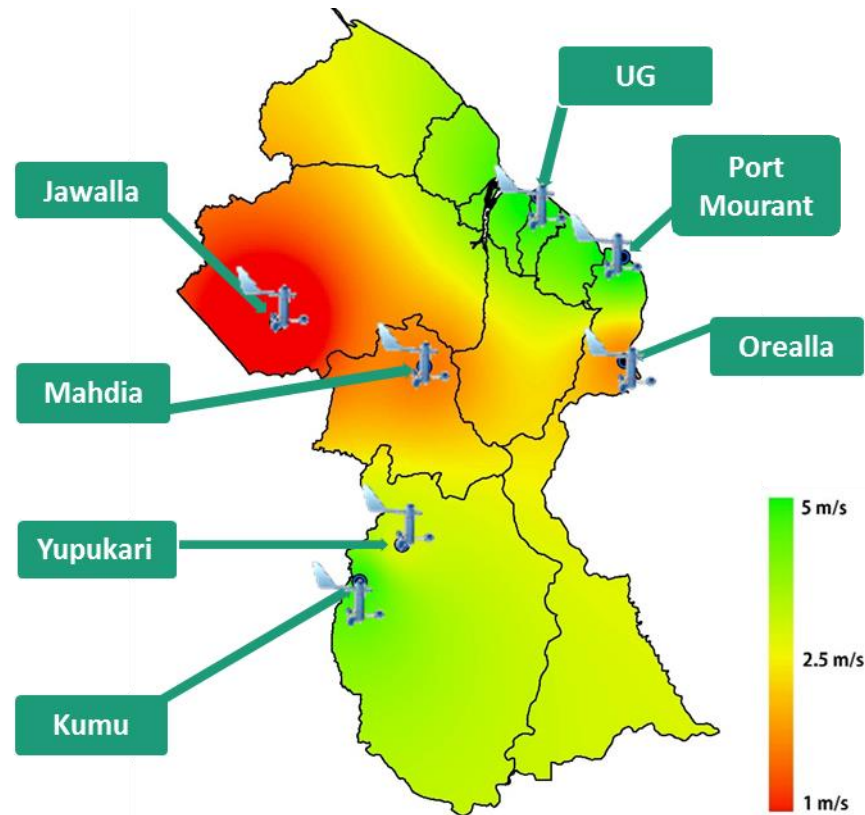


## 1.8 Wind Energy

### 1.8.1 Wind Map for Guyana based on GEA's Measuring Stations

A wind map is a representation of the magnitude and sometimes direction of the winds of a region or country in graphic form, using cartography with a scale and determined symbolism. The objective of the data represented on the wind map is always to reveal or identify the wind potential in an area. A wind map was created by GEA's Energy Engineer using GIS software (ESRI Arcmap) and the average wind speed measurements obtained over the years. During 2015, GEA continued to monitor and record wind data (speed and direction) at four sites (Port Mourant, Kumu, Mahdia, UG) around Guyana to gain better understanding of the available wind resource in different locations. In the coming year, most or all of the measuring towers at these sites will be relocated to new sites.

GEA also assisted the Hinterland Electrification Company Inc. (HECI) in selection and evaluation of fifteen potential wind sites along Guyana's coast where the best four will be chosen to carry out wind measurements.



GEA's Energy Engineer visited Bartica (Region 7) to identify potential sites for the installation of a wind mast (anemometer and data logger) to aid in collection of wind data to understand the wind regime in Bartica. Potential Site selection was done with the assistance of the Regional Democratic Council (RDC) of Bartica and was carried out by visiting locations based on the following criteria:

1. Available government lands and reserves
2. Location elevation (higher preferred)
3. Obstruction free (including trees and buildings)
4. Terrain

GEA has been monitoring and recording wind generators across Guyana. To date, more than 40kW wind power installed capacity has been recorded.

### 1.8.2 IDB-GEF Sustainable Energy Programme: Wind Measurements

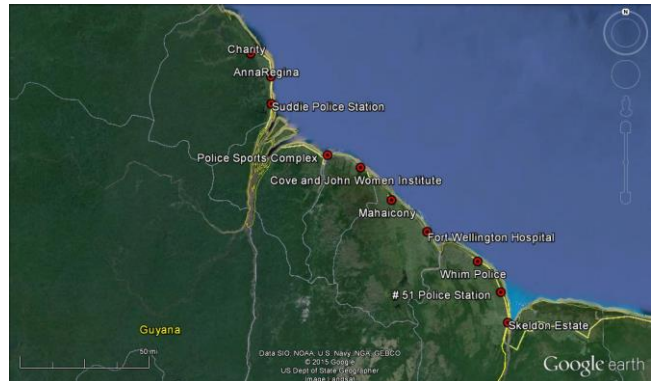
GEA's Energy Engineer assisted the Wind Energy Consultant contracted by the Hinterland Electrification Company Inc. (HECI) to support the IDB-GEF Sustainable Energy Program for Guyana. GEA's Engineer worked along with the consultant in identifying potential wind sites along Guyana's coast using 3TIER wind atlas to determine the windiest sites. At the end of the exercise thirteen (13) sites were agreed on and an itinerary was prepared for subsequent visits to gather more details and to get a better understanding of each site. Visits were conducted over a three-day period where each site was assessed by the consultant in an effort to identify six (6) sites out of the thirteen that were found to have the most wind potential. Sites were also assessed on the availability of land space and ease of access to the utility grid. Wind measuring towers are being procured to evaluate the wind energy potential at the sites.

### 1.8.3 Wind Speed Measurements using E-Governance Towers

GEA's Engineers provided support to the Head of Department of Electrical Engineering, University of Guyana, personnel from Ministry of Infrastructure, E-Governance and the School of Earth and Environmental Sciences on a project funded by the World Bank aimed at assessing the wind potential of Guyana's coastland.

Anemometers will be installed on existing E-governance communication towers along Guyana's coastland to eliminate the cost associated with purchasing and erecting additional masts. GEA was asked for support to identify the best potential locations for installing the anemometers where wind speeds would be most favorable.

GEA identified 10 potential wind sites along the coast of Guyana (from Charity Region 2 to Skeldon Region 6). These sites were selected based on the 3TIER Global wind and solar dataset found on the IRENA Global Atlas and cross referencing the availability/existing E-Government communication towers. GEA also assisted in the selection of appropriate anemometers and data loggers to conduct measurements at the selected sites. UG is currently in the process of procuring the instruments.



## **I.9 Bio-Energy**

### **I.9.1 Biogas**

Throughout 2015 GEA's Engineers provided information and support to farmers and other organizations towards the construction and operationalizing of bio-digesters across the country. Support was provided to farmers of Hague Back Dam, Mahaicony, Soesdyke, New Opportunity Corps (NOC) and the Ministry of Agriculture.



### **I.9.2 Ethanol Plant at Albion Sugar Estate**

The Albion ethanol plant which is capable of producing 1,000 liters per day is functional and producing between 80 - 90 % of its capacity when processing is conducted. The ethanol is being used to supplement the ethanol requirements of the sugar industry. Fuel blending is also carried out on a small scale and one of the company's vehicle, PKK 7473, would utilize the blend.

### **I.9.3 Gasifier: Support from Government of India**

The catalyst for the bilateral cooperation between the Governments of India and Guyana on the Rice Husk Gasifier pilot project stemmed from a visit to India by the Former Prime Minister of Guyana during the International Seminar on Energy Access in 2012. Subsequently, the Government of Guyana extended an invitation for a delegation of scientists from the Ministry of New and Renewable Energy (MNRE), India to evaluate Guyana's renewable energy potential and recommend applicable technologies for biomass resources. In addition to rice husk, sawdust and wood residues were considered.

The rice sector, one of Guyana's main agricultural sub-sectors, generates a by-product in the form of rice husk which is typically burnt as a means of waste disposal because of a lack of appropriate technology to effectively reuse this waste for energy production. Moreover, this burning process results in air pollution through the release of smoke and other particulates. A study conducted by the Guyana Energy Agency found that rice milling factories in 5 different regions predominantly used petroleum-based fuels for their operations. Also, despite some mills utilise the rice husk as fuel for furnaces to facilitate the drying of paddy and to lower operation costs in comparison to an electric dryer, a considerable quantity is discarded or burnt in open fields; thus, further contributing to greenhouse gas emissions.

The welcomed suggestions from the Indian delegation during their visit indicated that biomass based power generation systems were environmentally sound and cost effective; particularly for rice husk and sawdust. In 2015, a grant equivalent to US\$ 100,000 was provided, through the generosity of the Government of India, for the installation of a rice husk gasifier in Guyana. This pilot project aims to demonstrate the opportunities and benefits of utilizing renewable energy from a waste product like rice husk.

#### **1.9.4 Visit to Ramlakhan Rice Mill**

The Ramlakhan and Sons Rice Mill, in 2015, installed a four hundred kilowatt per hour gasification plant from Chanderpur works Pvt, Ltd., Jorian, Yamuna Nagar, Haryana; India. The gasifier was purchased at a cost of US\$125,000 with technical assistance from The Energy and Resources Institute (TERI) of India.

The Guyana Government and The Energy and Resources Institute (TERI) of India signed a Memorandum of Understanding (MoU) on May 25, 2011, to provide support as Guyana implements its climate initiatives and Low Carbon Development Strategy (LCDS). TERI identified that the energy cost component in direct expenses is over 35% in rice mills.

The cost of energy accounts close to US \$15.50 per metric tonne of paddy processed, mainly due to the use of diesel for power generation.



Rice mills should be encouraged to invest in similar technologies to reduce their energy costs and address the environmental hazards associated with the handling and disposal of rice husk.

Energy management and conservation is an important tool to help the rice industry meet its critical objectives for short-term and long-term goals. Enhanced energy efficient technologies for design and retrofits of rice mills have been identified to improve energy efficiency, lower the industry's dependence on fossil fuel, reduce the environmental impact, and reduce carbon emission and lower cost of production.

### 1.9.5 TERI Energy Efficient Wood Stoves

GEA, in continued efforts to promote energy efficient cooking and recognizing the health and environmental impacts that result from inefficient stoves and incomplete combustion, embarked on a pilot distribution of one hundred (100) pre-fabricated/ready-made energy efficient stoves designed by The Energy Resource Institute (TERI) of India.

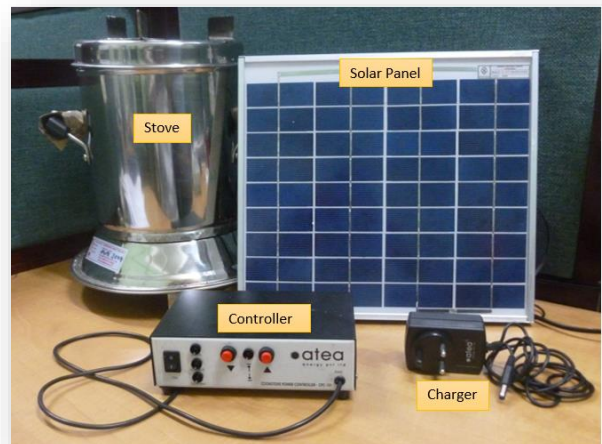
The stoves were distributed and demonstrated at a pilot scale to 10 households in 10 hinterland communities.

Each of the following villages received 10 of the stoves as part of a pilot/demonstration:

Region 1: Smith's Creek, Imbotero, Wanakai, Barcina, Black Water Savanah, Haimaruni, 7 Miles Branch Road.

Region 2: St. Monica, Wakapoa, Akawini.

The objective of this pilot was to observe how well the stoves are adopted and integrated into the villages, and based on the outcome of this pilot, this may or may not be replicated in other villages. To date, all 100 stoves have been distributed to the beneficiaries and mostly positive feedback has been received.



### 1.9.6 Energy Efficient Institutional Stoves



In response to health concerns raised by residents of Paramakatoi and Kato during an outreach to Region 8 regarding the daily excessive smoke produced through the use of traditional stoves at schools, GEA responded through the provision of energy efficient institutional stoves.

A total of ten (10) Stoves were provided to the following schools benefitting more than 1,800 students:

Region 1: Santa Rosa Secondary

Region 7: Waramadong Secondary

Region 8: Paramakatoi Primary, Paramakatoi Secondary, Kato Primary

Region 9: Annai Secondary, Bina Hill Institute, St. Ignatius Secondary and Sand Creek Secondary

The Stoves help address issues, such as, toxins, smoke and particulates that are produced from open cooking fires commonly used within rural homes, schools and other institutions. The institutional-sized stoves use wood as a source of energy and provide 'hot meals' to the students using a very energy efficient design. The stoves enable cooking of large quantities of food in large capacity pots (ideal for schools and institutions).

The technology utilizes a design to significantly improve combustion and reduce waste heat thereby resulting in more efficient heat generation and consequently, as much as 80% reduction in firewood consumption versus the open fire.

## 1.10 Replacement of Photosensors



During 2015, with the support from the Work Services Group, a total of 300 defective photosensors on street lights were replaced as part of GEA's efforts to conserve energy. The replacement efforts result in annual energy savings of about G\$18.2 million since the lights will be now operating for the required 12 hours instead of 24 hours.

The photosensor should automatically switch on the street lamp in the evening as night approaches, and switch it off in the morning as daylight breaks. A defective photosensor, however, can keep the street light lit during

daylight hours resulting in wasted energy, costing G\$60,958 per lamp per year based on current electricity tariffs.

Since the commencement of the photosensor replacement programme, a total of 2,250 defective photosensors on street lights were replaced as part of GEA's efforts to conserve energy. The 2,250 new photocells replaced to date were procured at a unit cost of G\$904 and would translate into annual energy savings of about G\$137 million.

### 1.11 Energy Efficient Street Lights

Over the last four years, GEA has been testing and reviewing Light Emitting Diode (LED) and Induction street lights.



Engineers from the GEA and Ministry of Public Infrastructure replaced 37 high pressure sodium vapour (HPSV) street lamps rated at 250 watts each on the Timehri Highway, between Bounty Farm and the Timehri Police Outpost, with 37 energy efficient Induction Lamps rated at 120 watts each along with one (1) timer control relay to switch lamps ON at nights and OFF during the day. The lamps, when tested, produced an acceptable level of luminous emittance. It is estimated that G\$1,173,000 would be saved annually or 21,000 kWh of energy savings would be achieved from the replacement. It is

projected that 14,747 kg of CO<sub>2</sub> emissions would be avoided. It is also estimated that an induction lamp lifespan is 22 years as compared to 2 years for the HPS, thus, a reduction in the frequency of replacement.

Ten (10) LED lamps were installed on the Railway Embankment with assistance from the Ministry of Public Works. The lamps are rated at 80 watts, 100 watts, and 120 watts and replaced 10 x 250 watts high pressure sodium lamps. The intention of the installation was to determine which wattage of LED lamps are suitable for the different road categories. A reduced wattage and an advanced lighting technology will ultimately lead to reduced energy consumption and an increase in lamps' lifetime.

Sixty-five (65) x 100 watts LED street lamps were procured as part of the Agency's ongoing effort to promote energy efficient street lighting. Due to the timing of the budget and procurement requirement issues, the contract to supply the lamps was awarded later than expected. The lamps are scheduled to be supplied early January and would replace 65 x 250 watts HPSV street lamps.

### 1.12 Energy Assessments/Audits

GEA commenced Energy Consumption Assessments of 20 Government buildings in 2012, expanded this to private sector and schools in 2013, and continued assessments in 2014 and 2015. GEA has completed Energy Consumption Assessments of 70 buildings in the last four years along with the change-out of inefficient lighting at 28 public buildings.

During 2015, as part of GEA's energy conservation drive, energy efficient lighting change-outs were done at the following 9 schools:

1. President's College
2. North Ruimveldt Secondary School
3. East Ruimveldt Secondary School
4. Annandale Secondary School
5. Bishops High School
6. Soesdyke Secondary School
7. St. Joseph's High School
8. Uitvlugt Secondary School
9. Bladen Hall Secondary School



The energy efficient exercise included the change-out of magnetic ballasts rated at 40W with electronic ballasts rated at 32W, replacement of T12 tubes with T8 tubes and replacement of outdoor mercury vapour lamps with energy efficient CFLs.

Six (6) energy assessments were conducted in 2015 at: Teaching Service Commission, World Wildlife Fund, Guyana Oil Company, Bartica RDC Building, Bartica Hospital and GBTI Port Kaituma. The energy conservation assessments were conducted and ratings for all installed equipment and lighting loads were recorded to understand the daily power demand and to make recommendations on energy conservation opportunities. A written report identifying energy conservation opportunities, estimated costs and pay back calculations for the various recommendations was prepared and submitted to the respective entities.

## **Occupancy Sensor**

One of the Guyana Energy Agency's strategy to influence energy efficiency focuses on the area of conservation and careful use of energy through wise equipment choices and circumventing unnecessary energy consumption. In this regard, the GEA's engineers installed occupancy sensors in offices at its headquarters in Georgetown and at schools to reduce energy consumption for lighting by providing lighting only on demand. Each sensor can switch lighting loads of up to 150W and has an adjustable delay from 30 seconds to 30 minutes.

## **Assistance to Pensioner**

The Guyana Energy Agency (GEA) supported the change out of old and inefficient lighting technology to more efficient ones at the home of a pensioner and widow of Eccles, E.B.D. The monthly electricity cost was approximately G\$13,500. According to her, since her husband passed away, she has been using her lights more frequently because it provides a sense of additional security.

Thirteen (13) watts Compact fluorescent lamps (CFL's) were used to replace 2 x 60 watts and 5 X 100 watts incandescent lamps. The fluorescent lamp's 40 watts inductive ballast was replaced by a 32 watts electronic ballast and the T12 tube was replaced with a T8 tube. The refrigerator thermostat was adjusted to mid cool.

These change out and adjustments reduced the home demand to 471 watts or a reduction of 55%. A follow-up visit was conducted which revealed that her GPL utility bill had reduced from G\$ 13,500 to an average of G\$4,150.

Further, GEA partnered with a local supplier, Courts, to donate an inverter type refrigerator to the pensioner. The findings/data collected will be used to validate a project proposal to replicate and enhance energy conservation opportunities to registered pensioners across the country with similar circumstances. GEA's Engineers installed a 13 cubic foot inverter type refrigerator rated at only 125 watts, achieving a 44 % reduction in power demand.

### 1.13 Caricom Energy Week

On January 23, 2015, the GEA held its third Guyana Energy Forum at the International Conference Centre. The Forum, which was scheduled to be held in 2014 as part of the Caricom Energy Week of activities, was postponed due to inclement weather. The primary target audience of the Forum was Secondary school students of Forms 4-6 from 15 Secondary schools. A series of five (5) presentations were made by the diplomatic community, government agencies, students and civil society. This was followed by a question and answer segment which gave students the opportunity to interact with the Presenters and seek clarity on any issue that may not have been clear to them. The presentations sought to highlight various aspects under the theme 'Achieving Climate, Environmental and Economic Resilience through Sustainable Energy'.

In addition to the presentation of trophies and prizes to the 1st, 2nd, and 3rd place winners of the Essay and Art competition, attendees were also treated to a musical rendition which was delivered by two members of the Bishops High steel pan orchestra.



The GEA had launched an Art Competition prior to Energy Week 2014 for students between the ages of 15-19 years. Participants were invited to submit pieces under the theme 'Positively Impacting the Environment through Sustainable Energy'.



The first, second and third place winners of this competition had their trophies and prizes presented in 2015 at the aforementioned National Energy Forum. The agency received a total of seventeen (17) entries from six (6) secondary schools and three (3) winners were selected by a 4-member team of judges.

In addition to the Art competition, the Agency had also launched an Essay Competition in 2014 which targeted Fourth to Sixth Form students from secondary schools across Guyana. Participants were required to discuss 'the Importance of Sustainable Energy in Achieving Climate, Environmental and Economic Resilience in Guyana'. The topic was chosen in recognition of the importance of sustainable energy in a low-carbon economy and its potential for energy diversification, energy security, climate change mitigation and overall sustainability. The Agency received a total of five (5) entries from four (4) secondary schools and three (3) winners were selected by a 4-member team of judges in 2015.

CARICOM Energy Week 2015 (CEW 2015) was observed during the week of November 8<sup>th</sup>-14<sup>th</sup>, 2015 under the theme 'Empowering our Sustainable Development'. The Caricom Secretariat planned a kickoff event for CEW 2015 in the form of a Kilo Walk on Sunday November 8.

#### *POETRY COMPETITION*

The competition was organized in an effort to sensitize youth at a secondary school level on energy use, environmental issues and sustainable development and their inextricable links at the national and international levels. Targeting Secondary school students of forms 1-5, the competition also aimed to promote energy awareness and encourage learning in a creative format. Secondary Schools across Guyana were encouraged to participate in this activity. The first, second and third place winners will be announced in January 2016.

## *EXPRESS YOUR ENERGY*

GEA hosted the Express your Energy Activity at the Transport and Harbours Sports Club in Thomas Lands. Fifty (50) Primary School Students from five (5) schools participated in the activity.

'Express your Energy' was attended by students, between the ages of nine to eleven (9-11) of grades four (4) and six (6), from Grahams' Hall Primary, North Georgetown Primary, West Ruimveldt Primary, St. Agnes and St. Ambrose Primary. The activity involved students being encouraged, at different stations, to convey their interpretation and knowledge of energy sources, sustainability, energy conservation and energy efficiency through artwork/pictorial illustrations, word search and conservation tips.

Planned as a relay activity this year, the students completed energy-based activities at their respective stations before jumping, bunny hopping, running and walking to the next station as their fellow team members loudly showed support.

The teachers present also joined in the fun, coaching the students as they offered energy efficient tips and illustrated energy sources. The activity was non-competitive, therefore, students were not judged or ranked based on their illustrations. Rather, each school (and student) was awarded a 'Certificate of Participation' while each student along with their teachers were awarded a token of appreciation as an honorary 'Energy Champion'. Students and teachers were also treated to energy conservation videos as they interacted in a lively discussion and quiz on their learning from the activity.



#### *RADIO QUIZ DEMONSTRATION AND HAND OVER EXERCISE AT COURTS GUYANA INC.*

GEA collaborated with Courts Guyana Inc. for one of its CEW 2015 activities. The activity involved an Energy Efficiency Demonstration and interaction with Courts' Customer Service Representatives (CSRs) and Customers.

The focus of the exercise was a display of 'inverter type' appliances sold by Courts with a hands on demonstration of the savings that can occur through the use of energy efficient technologies and explanation of how the inverter technology works. GEA's staff also interacted with customers and distributed energy efficiency and conservation brochures.



#### *RADIO QUIZ AND ENERGY CONSERVATION MEASURES*

Radio listeners were given the opportunity to participate in GEA's National Radio quiz during energy week.

Participants were given an opportunity, by radio hosts, to answer questions relating to sustainable energy. Persons were awarded a prize which included one t-shirt, one water bottle and three LED bulbs for providing correct answers.

Energy conservation measures were also publicized in the daily newspapers and via television in the form of infomercials and advertisements in Demerara on NCN Channel 11, Essequibo-Channel 8 and Berbice-Little Rock Television. The adverts commenced from Sunday November 8<sup>th</sup> to Saturday November 14<sup>th</sup>, 2015.



## IN HOUSE QUIZ

The staff of the Guyana Energy Agency (GEA) were not left out in the activities planned to commemorate Energy Week 2015. Planned with the aim of involving employees in the Energy Week celebrations as well as to disseminate energy related information, the activity included two presentations: *'The Science of Climate Change'* and *"Sustainability, Energy Conservation and Efficiency"*. The presentations were preceded by the viewing of a Sustainable Energy Documentary that was



produced by GEA. During the quiz segment employees enthusiastically vied for one of the coveted prizes by answering questions which were based on the presentations made and the content of the Documentary. Amidst much encouragement and support from their fellow colleagues, the Legal and Licensing Division in the end emerged the overall winner, carting off five of the ten prizes that were up for grabs.

## I.14 Information Dissemination and Awareness Activities



GEA participated and facilitated many information dissemination and awareness activities which enabled interaction with members of the public, students and various organizations to provide lectures, seminars, information brochures, press releases, newspaper pull-outs, radio and TV infomercials with energy conservation tips.

School presentations are a key component of GEA's strategic plan to disseminate information. It provides secondary school students with a practical understanding of energy and energy related issues, encourage interest, and behavioral changes, in relation to energy efficiency and conservation. As of December 2015 GEA conducted forty-three (43) school presentations in 7 of Guyana's 10 Administrative

Regions (Regions: 2, 3, 4, 5, 6, 7, and 10). The presentations are done in the form of viewing a ten-minute documentary followed by a power point on Sustainable Energy Initiatives and Conservation Practices. Each presentation concludes with a question and answer segment where students are given the opportunity to engage GEA Officers in discussions on energy and energy related issues. Questions pertaining to the presentation are asked by GEA's representatives and students are rewarded with tokens for correct answers.

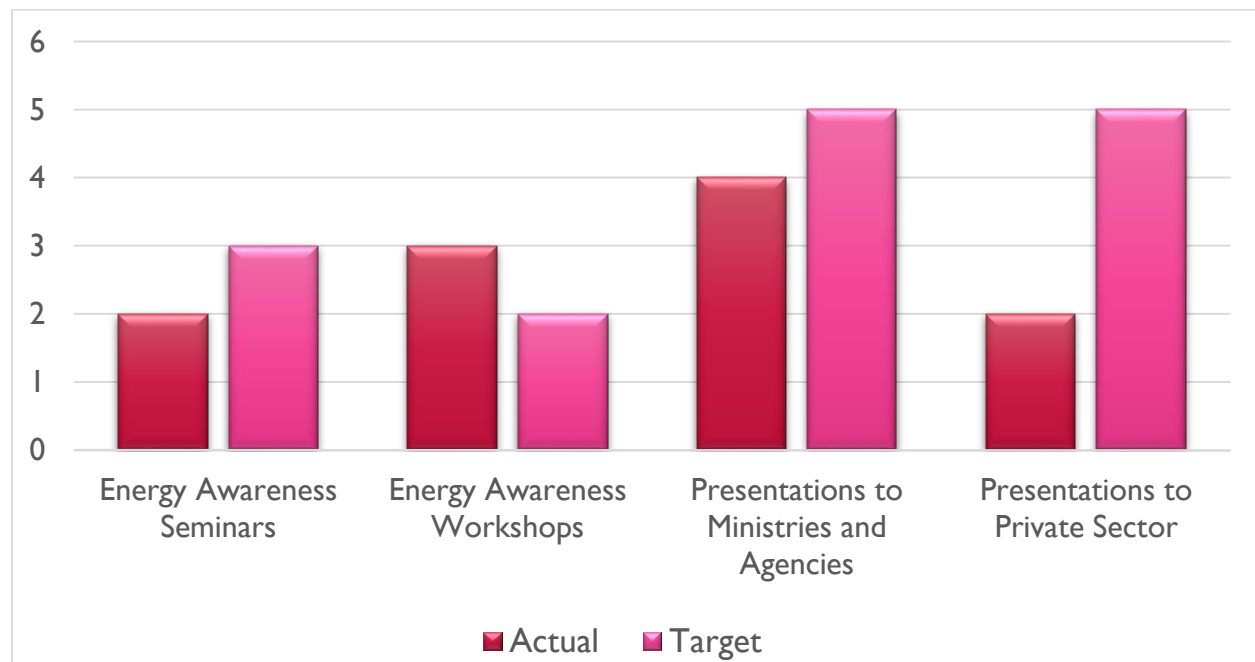


8 Seminars/workshops were conducted during 2015. The Agency facilitated the design of 9 new energy conservation and efficiency adverts for newspapers and one for television. For the period January-November 2016 GEA aired 822 Radio Adverts, broadcasted 168 Television adverts and published 121 print adverts for both Fuel Smuggling and Energy Conservation and Efficiency measures/tips. While a combined total of 2,707 infomercials and documentaries were aired (free coverage by the Learning Channel and CNS Channel 6 significantly contributed to this figure). For the same period the following distributions were made:

- 1) Brochures: 7,160
- 2) Booklets: 494
- 3) Posters: 300



During 2015, a number of seminars, workshops and presentations were conducted:



#### Energy Awareness Seminars:

1. Hydropower Seminar: Applied Engineering for Small Hydro Power Projects: Practical Tips for Small Hydro Power Practitioners
2. Presentation to Students of Queen's College

#### Energy Awareness Workshops:

1. Solar PV Workshop: Mahaicony Technical and Vocational Training Centre.
2. Solar PV Workshop: Guyana Industrial Training Centre (GITC): 2 Presentations were done.

#### Energy Awareness Presentations:

1. World Wild Fund (WWF) Guyana.
2. Presentation to the Staff of Courts
3. NCERD: Climate Change Education for Sustainable Development National Orientation Workshop: Presentation to two groups
4. Presentation to the staff of GEA
5. University of Guyana's annual 'Career Day' exercise which was celebrated under the theme 'Building blocks for a strong foundation'.

*Summary of Advertisements and Brochures*

Description	Actual	Target
<b>Number of Fuel Smuggling Ads in the Newspapers</b>	65	65
<b>Number of Fuel Smuggling Ads on the radio</b>	550	550
<b>Number of Fuel Smuggling Ads on TV</b>	71	15
<b>Number of Energy/Conservation ads in the Newspapers</b>	60 <sup>4</sup>	50
<b>Number of Energy Conservation ads on TV</b>	97 <sup>5</sup>	50
<b>Number of Energy Conservation ads on the radio</b>	600	600
<b>Number of brochures printed</b>	15,800	8,000
<b>Number of booklets printed</b>	1000	1,000
<b>Number of posters printed</b>	2,089	100
<b>Number of brochures distributed</b>	7,160	5,000
<b>Number of booklets distributed</b>	500	1,000
<b>Number of posters distributed</b>	1,300	150
<b>Number of infomercials</b>	2,340 <sup>6</sup>	50
<b>Number of documentaries</b>	677 <sup>7</sup>	40
<b>Number of Energy Awareness Seminars</b>	1	3
<b>Number of Energy Awareness Workshops</b>	3	2
<b>Number of Presentations to Ministries and Agencies</b>	3	5
<b>Number of Presentations to Private Sector</b>	1	5
<b>Number of Presentations to Schools</b>	43	45
<b>Number of Visits to GEA's Website</b>	17,185	30,500

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<sup>4</sup> Ten (10) Full Page Adverts were published during Energy Week funded by CARICOM

<sup>5</sup> Fifty Seven (57) Adverts were aired during Energy Week (Sponsored by CARICOM)

<sup>6</sup> CNS Channel 6 airs the animated Infomercials six (6) times per day free of cost; while the Learning Channel airs them twice per day.

<sup>7</sup> CNS Channel 6 and the Learning Channel airs the 10 minutes 'Sustainable Energy' documentary once per day free of cost.

## I.15 Inter-Agency Collaboration

- I. **Measurement Needs with Respect to Climate Change and Energy Efficiency:**  
GEA supported the Guyana National Bureau of Standards (GNBS) in relation to this workshop that was held in Jamaica. Information on equipment used for energy assessments and data collection from the different renewable energy sources were supplied to GNBS. Also highlighted were needs for testing facilities to verify the authenticity of the different equipment used for renewable energy applications e.g. solar panels, wind turbines etc. and the testing of light outputs and patterns from different light sources.

## 2.0 Legal & Licensing Division

The Legal & Licensing Division serves to execute a primary function of the GEA through 'monitoring the performance of the energy sector in Guyana, including the production, importation, distribution and utilisation of petroleum and petroleum products' (**s. 5(2)(c) GEA Act cap 56:05**). This is exercised through the corroboration of the **Petroleum and Petroleum Products Regulations 2014** permitting the issuance of licences of the various categories (*import, wholesale, retail, bulk transportation carrier, storage, export, consumer installation*) and site and vehicle inspections to ensure safety and environmental compliance.

The total number of licences issued in 2015 was 1,351 compared to 1,451 in 2014, representing a 7% decrease.

		2015													2014 YTD	Total Growth %
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD		
Importing Wholesale		2	1	3	3	3	0	2	1	6	6	4	0	31	24	29%
	Export	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0%
Wholesale		1	1	0	1	0	1	1	0	1	5	5	0	16	14	14%
Retail	Petrol Filling Stations	8	9	6	21	9	1	8	6	11	20	15	15	129	190	-32%
	Others	12	30	17	25	13	20	23	42	58	33	28	30	331	302	10%
Consumer Installation		2	6	6	4	39	5	7	14	27	65	57	6	238	293	-19%
Bulk Transportation Carrier	Road Tanker Wagons	12	8	3	27	6	20	9	8	9	7	8	6	123	124	-1%
	Trucks	26	60	37	42	35	48	39	25	32	27	29	23	423	427	-1%
	Fuel Barges	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0%
	Boats	8	2	1	3	5	10	5	7	3	8	3	3	58	76	-24%
Total		72	117	73	126	110	106	94	103	147	171	149	83	1351	1451	-7%

Table illustrating Licences issued from January to December 2015

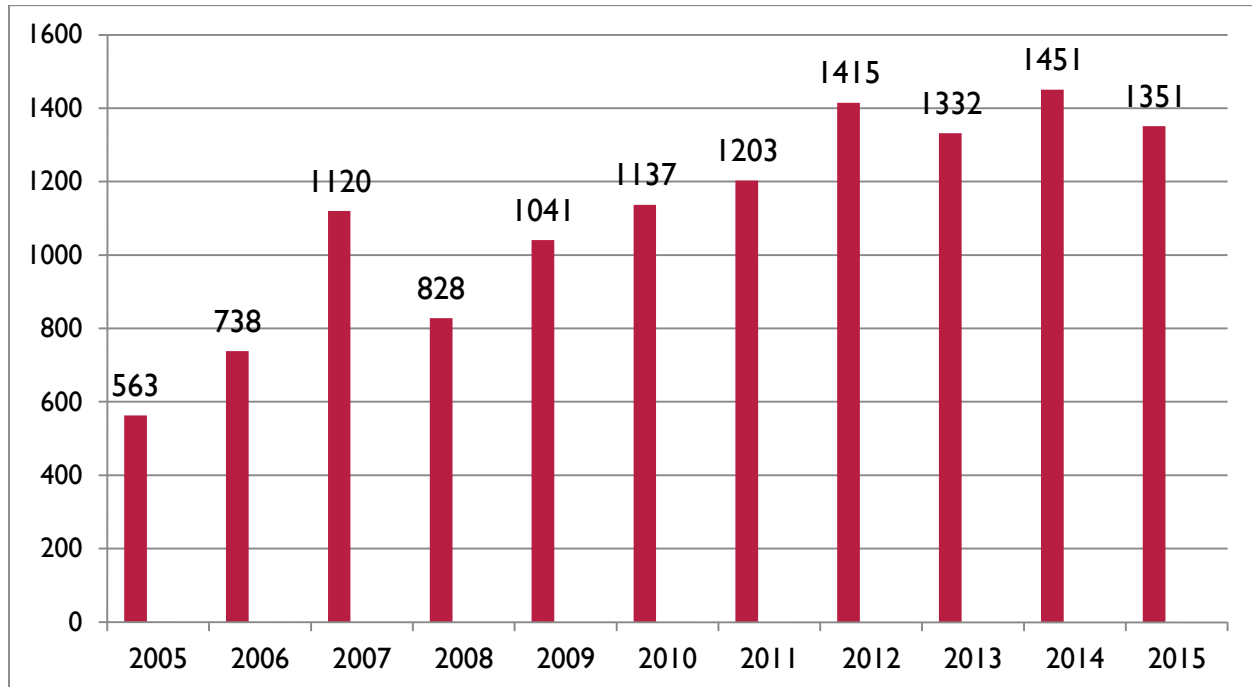
The practical effect of the enactment of the **Petroleum and Petroleum Products Regulations 2014** was evidenced throughout this year through the defined procedures for the granting of bulk transportation carrier licences (as included) along with the provision of the Export Licence. Further, the revised Regulations legally permitted the submission of documents electronically, which proved efficient for customers in completing the licensing process.

This year, there was significant outreach across the country as a result of increased site inspections and field visits, (959 sites visited in 2015 compared to 882 in 2014), which is expected to be a continued feature for 2016 in terms of targeting remote areas and including follow up visits to sites.

Licensing Officers continued the quarterly inter-agency meetings with the Environmental Protection Agency and Guyana Fire Service to ensure continued communication and joint co-operation in addressing the concerns of the Agencies and licence applicants. Licensing officers benefitted from internal and external training courses and workshops, including but not limited to training courses offered by Public Service Management, internal training on the revised Regulations conducted by GEA's Legal Officers and simulation exercises regarding customer service and communication.

This year, with the completion of construction of the addition to GEA's Head Office, the Licensing Department was relocated, thereby facilitating a more customer-friendly environment and increased space for additional Licensing Officers in the upcoming year.

Below is a summary of licences issued from 2005 to 2015:



### 3.0 Review of Activities: Fuel Marking Division

Since implementation of the Fuel Marking Programme in 2003, the Division has, in keeping with the legislative mandate, utilised a marking system to add markers to petroleum products imported by every person under an import licence or import wholesale licence for the purpose of identifying such petroleum and petroleum products as having been legitimately imported.

Legally imported fuel was bulk marked, a total of 221 bulk markings:

- 157 at the Georgetown terminals
- 50 at the Berbice terminal
- 14 at the Linden terminal.

The Authentix representative provided the following oversight functions:

- Verifying marker concentrate received by GEA
- Supervision of the decanting of marker concentrate from drums
- Reconciling marker concentrates
- Auditing marker concentrates/ marking operations
- Assist in repairing/maintaining the injectors
- Training in the SOPs

Samples of petroleum and petroleum products were collected from a number of sites throughout Guyana and tests were conducted to determine the presence or proportion of the markers in the respective samples of petroleum products.

The Task Force on Fuel Smuggling and Contraband, under the chairmanship of the Minister of Home Affairs, provided a framework to foster cooperation and coordination among the following key enforcement entities: Guyana Police Force, Guyana Revenue Authority, Guyana Defence Force and Customs Anti-Narcotics Unit. GRA rendered assistance to the GEA in relation to the disposal of illegal fuel. The coordination efforts of the Task Force have positively influenced the efforts to combat fuel smuggling.



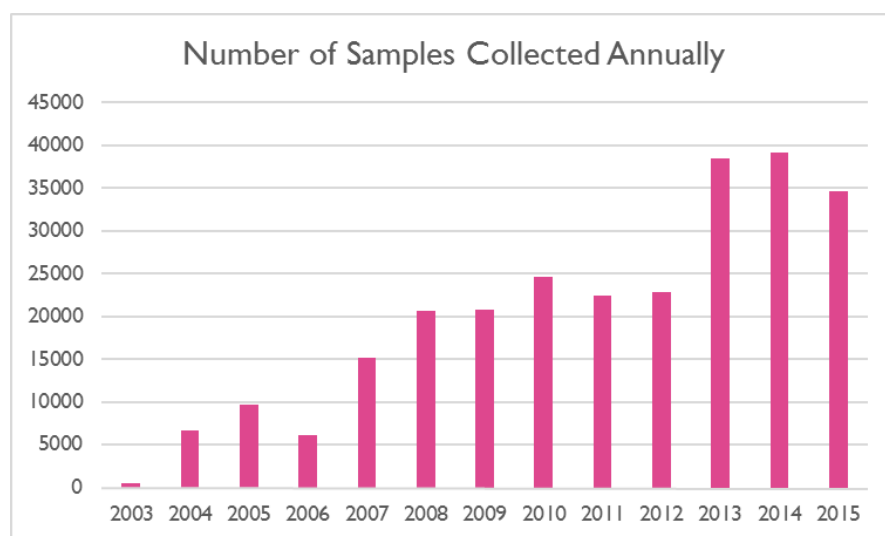
Expanded and regular deployment of fuel inspectors across the country was very beneficial for the inspection unit to be better able to craft strategies for combating fuel smuggling. Some main areas covered were Eteringbang, Port Kaituma and Kumaka both in Region 1, landings along the Cuyuni River up to and including Aranka in Region 7, Mahdia and Lethem. There was a strong presence as well by staff in other areas such Bartica, the Pomeroon River and Essequibo Coast, and Linden – locations where the agency has bases. Efforts along the coast also continue to be strong to combat fuel smuggling.

The GEA continues to receive support from the public in getting information that supports its cause to combat fuel smuggling. 17 specific tips were sent and officers from the inspection unit were able to check on all of them. Hundreds of gallons of fuel were seized as a result of this public support.

There have been 27 joint operations with members of the task force for the year. This is similar to what was done for the previous year. This collaboration between the Guyana Police Force (GPF), Guyana Defence Force (GDF), the Guyana Revenue Authority (GRA) and GEA has been very beneficial. It has allowed the GEA to extend its reach particularly on the waterways where the Agency has limited or no coverage at all.

### 3.1 Sample Analysis

The number of fuel samples collected/logged each year:



The year has recorded a drop in samples collected from sites visited by about 12%. While there has been a noted decline at the Linden outpost of 19%, there has been an increase of 10% in the other areas primarily as a result of added operations viz. in Bartica.

The table below shows the breakdown of analyses by Region. 34,906 analyses were done in 2015 compared to 42,403 analyses in 2014.

Number of Quantitative Analyses by Region												
Region	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	10	79	40	1,134	157	20	55	59	273	0	20	41
2	777	4,130	1,557	870	613	1,173	1,920	1,408	1,673	2,250	1,894	1,261
3	496	1,188	908	1,473	3,386	3,927	3,741	2,419	3,479	4,167	2,727	1,926
4	823	1,183	1,111	809	2,212	1,848	4,420	3,289	4,595	5,291	5,189	3,866
5	111	403	225	151	354	420	1160	827	1479	1,274	710	500
6	599	1,596	165	476	618	376	627	829	931	1,167	919	659
7	140	338	195	290	561	170	286	140	295	354	377	1,982
8	33	11	61	227	95	76	130	12	135	25	62	72
9	25					5	93	1	64	0	53	94
10	42	168	744	9,457	12,457	12,236	15,839	15,858	12,770	24,671	30,452	24,505
<b>Total</b>	<b>3,056</b>	<b>9,096</b>	<b>5,006</b>	<b>14,887</b>	<b>20,453</b>	<b>20,251</b>	<b>28,271</b>	<b>24,842</b>	<b>25,694</b>	<b>39,199</b>	<b>42,403</b>	<b>34,906</b>

### Number of Quantitative Analyses by Region

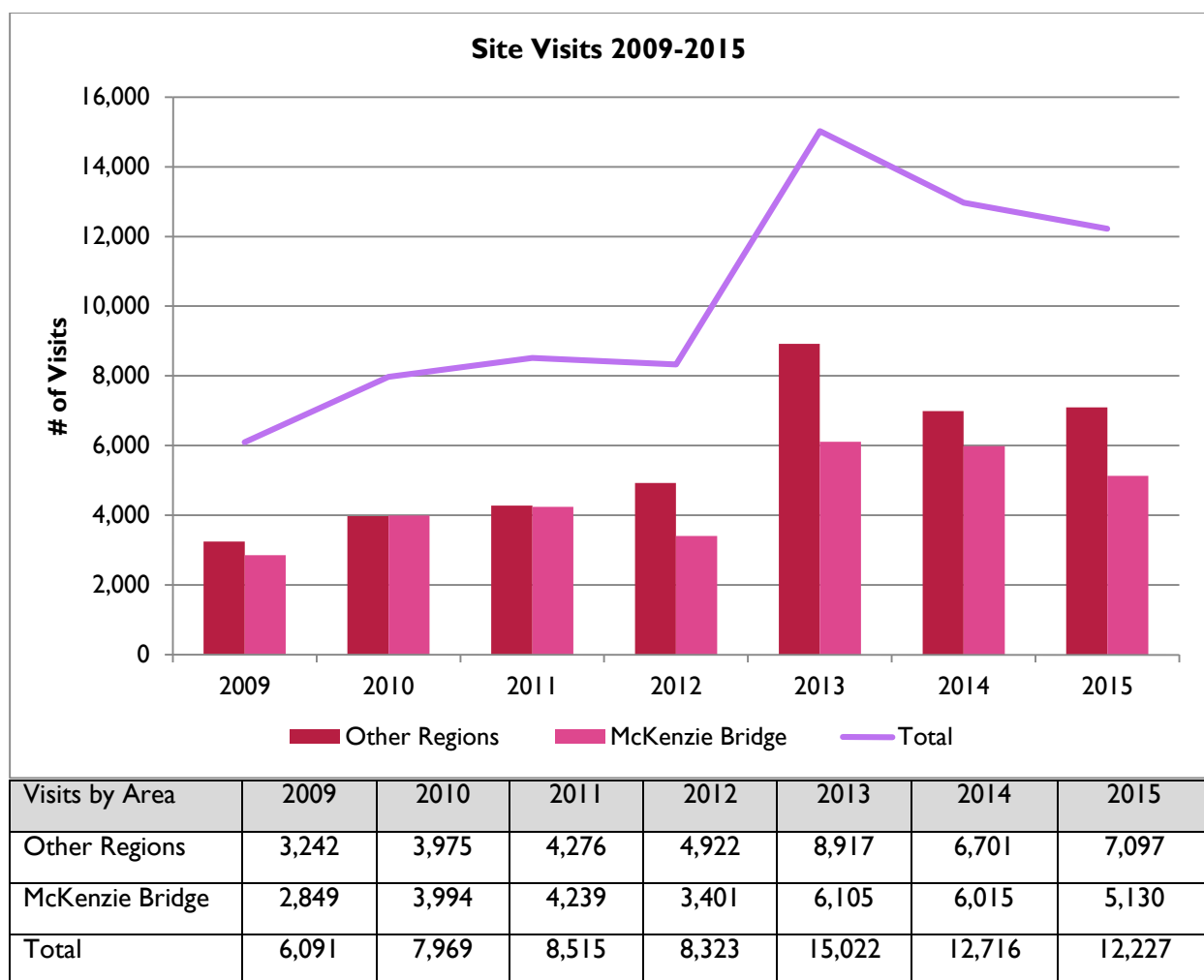
Notes:

1. Database to track analyses was installed in July, 2004. Figures were not representative of ALL samples analysed for that year.
2. Sampling for 2006 and 2007 was focused on smuggling “hot spots”
3. Sampling on a 24-hr basis commenced in 2007 at the McKenzie, Linden Bridge

Quantitative analyses done shows a peak in 2014 but has dropped by 18% for 2015. While quantitative analyses have been consistently increasing over the years for Region 10 as well, it has recorded a comparable fall for 2015 by 20%. On the other hand, there was more than a 4-fold increase in analyses done for Region 7.

### 3.2 Analysis by Site

12,227 site visits were recorded during 2015. Summary of site visits from 2009 to 2015 is illustrated below:



Sites visited by the inspection unit have remained relatively the same for the last two years after a sharp rise in 2012 to 2013. There has been a generally upward trend in site visits being recorded since 2009. Despite the decline recorded in site visits in 2015, when compared to 2009, 2015 has seen more than a doubling of such visits. The decline in sites visited is in part due to the extensive trainings afforded to inspectors by the Agency, as well as time spent conducting more surveillance type activities with support from members of the Task Force on Fuel Smuggling and Contraband.

Of the 12,227 total site visits conducted during the year, 1,446 sites were sampled at least once. 37 (3%) of the sites sampled at least once were found with *significant dilution (defined as more than 50%)* in at least one tank. From 2006 to 2015, the percentage of sites found with significant dilution in at least one tank has progressively decreased from 34% in 2006 to 3% in 2015.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
No. of Sites samples at least once	573	763	656	566	592	1,202	1,313	1,179	1,648	2,146	2,200	1,446
No. of Sites found with significant dilution in at least 1 tank	72	240	220	128	57	73	45	21	13	35	51	37
% of Sites found with significant dilution in at least 1 tank	13%	31%	34%	23%	10%	6%	3%	2%	1%	2%	2%	3%

Sites found with significant dilution in at least one tank remained relatively unchanged since 2010. Further, samples with readings up to 70% account for less than one percent of total analyses.

### 3.3 Analysis of Test Results

The “Test Results” (*Quantitative Analyses*) refer to the percentage of marker concentrate detected when the sample was analysed. A “correctly marked” sample should be at 100%. The results of samples analyses over the years are categorized in the following four ranges:

*0 to 50% : Significant dilution*

*51 to 70% : Some dilution*

*71 to 90% : Suspected dilution*

*91% and more : Legal*

The table below shows that during the assessment phase (2003), 12% of the samples analysed were found to be significantly diluted. This decreased to 6% in the post-assessment phase and throughout 2004. From 2005 to 2007, the testing strategy was focused on areas with a high incidence of illegal activity. For this three-year period, the percentage of significantly diluted samples fluctuated from 9% to 15% and then to 8%. It is believed that this fluctuation was a direct result of the strategy used for sampling and would have a direct relationship with the number of samples analysed and the focus on areas with a high incidence of smuggling. The year 2008 can be characterized as a mixture of focused, planned and random sampling. The percentage of samples found with significant dilution was maintained at 3% in 2009. The year 2010 set another record with significant dilution reported as 2%, indicative of sustained reduction in the percentage of significantly diluted samples analysed. In 2011 and again in 2012, *significant levels of adulteration (defined as more than 50%)* were detected in only 1% of the samples analysed. With the analysis of 64% more samples in 2013, 1% of the samples analysed were found to be significantly diluted. While an increased number of samples were analysed in 2014, levels, of adulteration remained below 2%. Significant levels of adulteration were detected in 2% of the 32,893 samples analysed in 2015. Sites found with significant dilution in at least one tank remained relatively unchanged since 2010. Further, samples with readings up to 70% account for less than one percent of total analyses.

Test Results (Quantitative Analyses)	03 Dec 2003 (Assessment Phase)		27 Jan 2004 (Post- Assessment)		2004		2005		2006		2007		2008	
0 – 50%	42	12%	28	6%	196	6%	855	9%	764	15%	1,169	8%	593	3%
51 – 70%	59	17%	32	7%	275	9%	1,234	14%	223	4%	343	2%	254	1%
71 – 90%	67	19%	89	19%	475	16%	2,576	28%	928	19%	8,204	55%	8,593	42%
91%	188	53%	329	69%	2,110	69%	4,431	49%	3,091	62%	5,171	35%	11,013	54%
Total	356	100%	478	100%	3,056	100%	9,096	100%	5,006	100%	14,887	100%	20,453	100%
Test Results (Quantitative Analyses)	2009		2010		2011		2012		2013		2014		2015	
0 – 50%	701	3%	511	2%	167	1%	259	1%	303	1%	186	<1%	141	<1%
51 – 70%	767	4%	372	2%	164	1%	128	1%	137	1%	46	<1%	74	<1%
71 – 90%	12,654	62%	10,834	45%	10,990	49%	10,491	49%	29,734	79%	30,440	76%	25,003	76%
91%	6,129	30%	12,612	52%	11,171	49%	11,867	49%	7,252	19%	9,270	23%	7,675	23%
Total	20,251	100%	24,329	100%	22,492	100%	22,745	100%	37,426	100%	39,942	100%	32,893	100%

Qualitative analyses have been improving year on year since 2012. For the last two preceding years there has been a 26% increase in analyses conducted.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Qualitative Analyses	35	375	1,825	1,180	307	887	1,259	113	452	710	961	1,215

## Test Results of Samples Analysed

Note: Duplicate quantitative analyses removed

## 3.4 Incidents of Illegal Fuel

Incidents of illegal fuel recorded by the agency for the last two years continue to be more than 3 per month. This year had a total of 37.

### Annual Incidents Recorded by Month 2009 - 2015

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2009	1	3	3	1	6	4	7	6	6	4	3	2	46
2010	6	2	3	3	5	3	6	3	2	2	3	10	48
2011	7	0	2	3	1	1	2	1	1	2	1	0	21
2012	1	0	0	0	0	3	0	3	1	1	2	2	13
2013	1	2	3	3	7	2	3	2	6	0	3	4	35
2014	2	2	1	3	2	1	0	3	2	3	11	21	51
2015	14	1	0	2	1	4	5	1	2	2	1	4	37

### *Joint Operations*

The last two years recorded the same number of joint operations taking place between GEA and other members of the Task Force on Fuel Smuggling and Contraband. In 2015, five operations were done with the Guyana Defence Force, three with the Guyana Police Force and nineteen with the Guyana Revenue Authority. These operations were both scheduled and unscheduled and yielded positive results that, in some instances, led to seizures of fuel, transporting vehicles and other items used in smuggling operations.

Month	2015				2014			
	GPF	GDF	GRA	Total	GPF	GDF	GRA	Total
Jan	1	-	1	2	-	-	-	0
Feb	1	-	-	1	1	-	3	4
Mar	1	-	1	2	1	-	-	1
Apr	-	1	-	1	-	-	-	0
May	-	-	-	0	1	-	-	1
Jun	-	-	1	1	-	-	-	0
Jul	-	2	5	7	-	1	-	1
Aug	-	-	1	1	1	-	-	1
Sep	-	-	-	0	-	1	-	1
Oct	-	1	4	5	4	-	1	5
Nov	-	-	4	4	4	2	1	7
Dec	-	1	2	3	-	1	5	6
<b>Total</b>	<b>3</b>	<b>5</b>	<b>19</b>	<b>27</b>	<b>12</b>	<b>5</b>	<b>10</b>	<b>27</b>

### 3.5 Quantity of Illegal Fuel Seized

2015 recorded the most fuel seized in four years. The table below compares the volume (UK gallons) of illegal fuel seized from 2005 to 2015:

Total Fuel Seized Annually (UK GAL) 2005 – 2015										
2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
3,011	8,001	21,793	33,560	33,443	21,242	10,272.6	6,004	2,931	3,785	6,199.5

### 3.6 Volume Analysis

An additional metric to evaluate the performance of the Fuel Marking programme is a measure of gasoline, diesel and kerosene consumption (excluding large duty-free consumers). For the oil companies, it is estimated that 3,358,356 barrels of petroleum based products were sold in 2015 with an average of 9,201 barrels per day. This represents a 0.80% decrease when compared

TOTAL CONSUMPTION - OIL COMPANIES (BBLs)					
January - December		2013	2014	2015	% change
	Mogas	1,150,201	1,214,868	1,244,943	2.48%
	Gasoil	1,621,640	1,734,780	1,654,201	-4.64%
	Kero	75,601	86,023	88,031	2.33%
	Avjet	81,584	77,166	94,927	23.02%
	Fuel oil	73,596	80,997	83,775	3.43%
	LPG	190,806	187,526	191,853	2.31%
	Avgas	6,000	4,236	625	-85.24%
	<b>Total</b>	<b>3,199,428</b>	<b>3,385,595</b>	<b>3,358,356</b>	<b>-0.80%</b>
	<b>Bpd</b>	<b>8,766</b>	<b>9,276</b>	<b>9,201</b>	<b>-0.80%</b>

to 2014<sup>8</sup>. There were increases in the consumption of Mogas, Kerosene, Avjet, Fuel oil and LPG while consumption of Gasoil and Avgas declined for the year.

The increase in gasoline consumption for 2015 can be attributed to an increase in motor vehicle registration while kerosene consumption suggests more use of kerosene as a fuel for lighting and cooking. Also, the decrease in diesel consumption can be attributed to a contraction in the bauxite mining and forestry sectors.

<sup>8</sup> Gasoil and Fuel oil purchased locally by GPL from the oil companies were discounted to avoid double counting.

### 3.7 Prosecutions

For the year 2015, the Fuel Marking Programme recorded 9 convictions. Five new charges were filed in comparison with 17 being filed in 2014. Two matters were dismissed of which one was appealed. At the end of 2015, there was one matter continuing before the Sparendaam Magistrate's Court. Compensation was accepted from eight individuals under *Section 33A Guyana Energy Agency Act 1997* as amended by *Section 8 Guyana Energy Agency (Amendment) Act 2011*.

In January, 2015, the then Chief Justice the Honourable Ian Chang delivered a ruling on an application by Mr. Surrindra Etwaroo for the release of a seized vessel and fuel. The Applicant claimed that the vessel was contracted to transfer the diesel from Venezuela to Suriname and was anchored for diverse reasons. On January 22<sup>nd</sup>, 2015, the Honourable Ian Chang, Chief Justice (ag.) ruled that the decision to seize and detain the vessel and petroleum cargo was unlawful and *ultra vires* the statutory authority of the CEO of the GEA and the orders of certiorari and mandamus were made absolute. The crux of the decision was that there was no evidence that the fuel on board M.V. Ocean Runner was imported or intended for domestic use therefore causing no need for it to be marked; marking is a prerequisite not for importation but rather for domestic distribution. As a result, the definition of illegal petroleum, though literally referring to *inter alia* fuel that does not contain the required concentration of marker, is intrinsically linked to the marking process and unless it can be shown that the fuel is intended for domestic use, the fuel is not illegal for the purposes of the Act. While the decision has created operational difficulties for the early interception of fuel smuggling activities, it clarified the mandate and role of the Fuel Marking Programme under the GEA Act.

In November, 2015, the Full Court of the High Court allowed an appeal filed by GEA in April, 2014 following the dismissal of charge of storage of illegal petroleum contrary to *Section 5BA(1) Guyana Energy Agency Act* against Mr. Looknarine Persaud. On November 12<sup>th</sup>, 2015, the appeal was heard by the then Honourable Chief Justice Ian Chang and the Honourable Justice Rishi Persaud. The Court in allowing the appeal ruled that the Prosecution was not required to prove that the Respondent knew that what he had stored was an illegal substance- liability was strict with regard to that element of the offence. This was a pivotal ruling for the GEA as the uncertainty in the law on this issue resulted in Magistrates delivering conflicting rulings on the point.

## **Training**

For the year, two refresher sessions were conducted with some of the Inspectors of the Fuel Marking Division to reinforce specific portions of the Standard Operating Procedures- Testing and Sampling Sites through interactive role plays. In March, a training session was conducted with the Inspectors of the Legal and Licensing Division on the *Petroleum and Petroleum Products Regulations 2014*. The session focused on the revisions that affect the day to day operations of the Division such as the increased validity period of licences and new requirements for and responsibilities of licence-holders. Another training session was conducted in June: an Introductory Training Session conducted with five of the newly hired Inspectors. It covered the Standard Operating Procedures, maintaining the chain of custody of potential court exhibits, statement writing and giving evidence in Court.



## **GPS training with Inspectors**

The inspectors of the Fuel Marking Division, on a regular basis, will visit petroleum dealers to verify that fuel being sold is legal. As such, they would collect and verify relevant information on every inspection such as name and address of the dealer inspected. In an attempt to add a new component to the data collected, five (5) GPS units were procured in 2015 to allow Inspectors to gather the coordinates of all sites visited.

GEA's Hydropower Support Engineer facilitated an interactive training session to demonstrate how the GPS should be utilised.



## 4.0 Review of Activities: Administration and Human Resource Division

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At the beginning of 2015, the Agency had a staff complement of ninety-eight (98) employees and ended the year with ninety-three (93) employees.

The following 11 positions were filled during the year:

- 7 Inspectors
- 3 Marking Officers
- 1 Cleaner

The following 2 new positions were filled during the year:

- 1 Driver/Office Assistant
- 1 Cleaner

Resignations were received from the following 8 persons:

- 1 Cleaner
- 2 Making Officers
- 3 Inspectors
- 2 drivers/Office Assistant

The services of persons who filled the following positions were terminated:

- 2 Inspectors

The following positions were not renewed:

- 3 Inspectors

## 4.1 Professional Development

		Actual Training for 2015	Target for 2015
Organize and install suitable capacity building and professional development programmes to provide employees with requisite knowledge and skills.	Number of training programmes	42	20
	Number of Officers trained	182	100

### Training Summary

Dates	Facilitator	Aim	Participants	Cost
January 20-22, 2015	Winston Steal, Hydropower Support Engineer – GEA	Understanding the draft Petroleum Standard for bulk transport and tanker wagons.	Deochand Boodhoo, Dale London, Shankar Ram, Shannamay Daniels – King and Dhanamatie Shyamraj	Free
January 30, 2015	Diana Maxwell, Senior Database Management Officer	Understanding and Correctly completing the Site Visit Form.	Bernard Rodrigues, Cindy Williams, Earicka Richards, Steffon George, Jonquil Croker, Kareem Naughton, Kissina Fitzallen, Koreen Gittens, Mowshani Lekhray, Nicholae Leacock, Nikita Shung, Quasen Nedd, Rolin Wilson, Ryan Dowden, Simeon Butcher	Free
February 16-20, 2015	Intelliguard Specialist Security Service Inc.	Investigation and Intelligence Gathering	Nikita Shung, Quasen Nedd, Kareem Naughton and Sherry Jagarine	\$240,000
February 27, 2015	Thandiwe Benn – Legal Officer, GEA	Field Visits Simulation	Devon Brummell, Ryan Dowden, Steffon George, Koreen Barron, Cindy Williams, Kareem Naughton, Nikita Shung and Mowshani Lekhray	Free
February 2015	International Renewable Energy Agency (IRENA)	IRENA Global Atlas for Renewable Energy. IRENA's Global Atlas is today the world's largest global database on	Kenny Samaroo	Free

		renewable energy potentials		
February 18-Mar 11, 2015	OLADE Webinar	Energy and Society Course entitled, "Technical, economic and environmental management of biofuels."	Winston Setal	Free
March 10-13, 2015	PSM	Principle of Supervisory Management – Module I	Shanamay Daniels-King, Rowena Wilson-Wray, Ramish Amyan, Maurice Cave & Ivan Wlaters	Free
March 12, 2015	OLADE	Energy Statistical Capacity Building in the Caribbean	Shevon Wood	Free
April 5-18, 2015	UNIDO	Sustainable Energy Leadership Programme (SELP)	Shevon Wood	Free
April 22, 2015	GAAP	Building the Organization through personal growth – Professionalism in the office, and expanding minds.	Terance Ram	\$15,000
April 21-24, 2015	PSM	Communication in the Office	Sherry Jagnarine, Dwayne Edwards, Earicka Richards, Steffon George, Nicholae Leacock, Cindy Williams	Free
May 12-14, 2015	PSM	Improving Services of the Customer Care Professional	Jonquil Croker, Abigail Bijader, & Dhanomattie Shymraj	Free
May 19-22, 2015	PSM	Principle of Supervisory Management – Module II	Rowena Wilson-Wray, Ramish Amyan & Ivan Walters	Free
May 27, 2015	GNBS	Promoting Standards and Quality in Laboratories.	William Holder and Yota Burgess	Free
May 28-29, 2015	PSM	Principles of Professional Secretarial Practice – Module II	Nominee Ram	Free
June 9-11, 2015	GEA	Aviation Fuel Handling	Abigail Bijader, Jonquil Croker, Dale London, Dhanomattie Shyamraj and reps from 10 sector agencies/ministries	USD6500
June 9-12, 2015	PSM	Human Resource Development – Module II	Terance Ram	Free
June 23-24, 2015	PSM	Office Assistance	Abdul Ali	Free
June 30, 2015	GEA	Review of Inspector's Guidelines	Quasen Nedd, Nikita Shung, Kareem Naughton, John Rawlins, Vijay Hussein, O'Neal Hopkings, & Doron Charles-Julien	Free
July 8-9, 2015	PSM	Occupational Safety & Health	Nicholae Leacock	Free
July 13-17, 2015	Intelliguard Specialist Security Service Inc.	Investigation and Intelligence Gathering - Level 2	Vijay Saif Hussein, Doron Charles-Julien, O'Neal Hopkinson and John Rawlins	\$260,000

July 14-16, 2015	PSM	Preparation for Retirement	Terance Ram	Free
July 27-29, 2015	GDF	Floating Base Oritention	Quasen Nedd, Vijay Saif Hussein, Doron Charles-Julien, O'Neal Hopkinson, Bernard Rodrigues and Steffon George	Free
July 27-Aug 19	OLADE	Management of Wind and Solar Projects	Winston Setal, Dolwin Khan and Kenny Samaroo	Free
August 4-7, 2015	PSM	Communication in the Office	O'Neal Hopkinson, Doron Julien-Charles, Vijay Hussain and Quasen Nedd	Free
August 7, 2015	GRPH	Sexual Harassment in the Workplace	Fifty three employees attended	\$134,520
August 17-21, 2015	Office of Climate Change	Use of Caribbean Climate online risk and adaptation tools	Taiwo Wilson-Williams	Free
August 21, 2015	GEA & GIZ	Hydropower Seminar	Dolwin Khan, Winston Setal & Everard Rampersaud	Free
August 25-28, 2015	PSM	Principles of Professional Secretarial Practice – Module I	Monica King	Free
September 1-30, 2015	GPF	Investigative Procedure	Qusean Nedd and Devon Brummell	Free
September 10 - 11, 2015	Institute of Internal Auditors, Guyana Chapter	Transparent Governance, Fiscal Management, and Risk Control	Yasoda Matabadal, Ryhan Stephens and Valmiki Ramtahal	\$75,000
September 11, 2015	Junior Chamber International Guyana	Defensive Driving	Adrian Bascom and Noel Waddell	\$30,000
September 16	Ministry of Agriculture	Ceremony -International Day for the Preservation of the Ozone Layer	Winston Setal	Free
September 23-October 14	OLADE	Energy Efficiency in the Transportation, Industrial and Construction Sectors	Shevon Wood	Free
October 2	Haukes Group of Companies	Business Presentation	Winston Setal	Free
October 6 & 7		Fundamentals of Offshore Oil and Gas, Sound in Marine Environment	Kiran Mattai, Leon DeSouza, Shevon Wood, Winston Setal, Thandiwe Benn	Free
October 12-16, 19-23	Ministry of Public Infrastructure	National Electrical Code	Everard Rampersad, Leon DeSouza	Free
October 5-Nov 13	University of Technology, Jamaica	Diploma Certificate on Energy Development and Social Inclusion	Dolwin Khan	OLADE
October 29-30	Aruba	VI Energy Efficiency Policy Dialogue	Leon DeSouza	Sponsor

Nov 18-19	Brazil	Arco Norte Interconnection Project workshop	Mahender Sharma, Leon DeSouza	IDB
November 25-26	Guyana	Seminar towards practical, global and focused perspective on public policy analysis and practice which will provide guidance in moving the resource development for the extractive industry forward	Kiran Mattai, Shevon Wood, Thandiwe Benn	University of Calgary & GoG
September 8-November 17	Guyana	Sustainable Energy Information Management Program”	Shevon Wood	OLADE (online)

## 4.2 Administration and Infrastructural Enhancement

During the year, the Division facilitated the procurement of goods and services based on the budget and workplan.

The following main infrastructural works commenced in 2014 and were completed in 2015:

- Extension to the Northern Section of the GEA’s building at Quamina Street.
- Extension to the Southern Section of the GEA’s building at Quamina Street.



Maintenance works to the Agency's boats, outboard engines and vehicles were done. Buildings and compound at outlying locations were also maintained.

A new boat was built to replace one of the aging ones previously used. The Agency now has a two boats and engines for deployment from Charity and Supenaam in Essequibo, Region 2. The Agency has already procured an engine for use in Bartica and plans are in place to have a boat and accommodation constructed during 2016 to establish a base of operations in Bartica.

A new vehicle was also procured in 2015, bringing the total operational vehicle fleet to nine (9). Steps are being taken to have some of these vehicles retired due to age and high maintenance costs.



The Agency procured a new colour copier with printing and scanning capabilities to enhance document management within the Agency. The new machine also reduced the cost of printing from G\$9 to G\$1 per page.

## 5.0 Review of Activities: Finance Division

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The activities of GEA are financed from Government subventions and from revenue generation. Revenue was generated by the Agency from administrative fees (Agency Fees) for the marking and handling of fuel and from the issuance of licences to import, sell, store and transport petroleum and petroleum products. Due to the project-based self-financing nature of the Fuel Marking Programme, separate accounts are kept for its income and expenditure.

The GEA facilitated payments for fuel purchased under the PetroCaribe Agreement by the oil companies. The payments for fuel purchased from Venezuela were facilitated by the GEA and were captured in the accounts to ensure that payments are made according to contractual obligations.

A number of audit exercises were performed for the year 2015. Monthly reviews of key areas within the Agency, mainly in the Accounts Division, have continuously improved in the areas of efficiency and effectiveness.

## Appendix: Legislation, Mandate and Overview of the Divisions

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### Legislation

The GEA, a body corporate, was established in 1997 by the **Guyana Energy Agency Act 1997 (Act No. 31 of 1997)**. The GEA Act has been amended over the years to foster harmonization, increased monitoring, better regulation and greater enforcement in the energy sector.

The GEA falls under the purview of the Prime Minister as the Minister responsible for energy and electricity. GEA's organization structure consists of a Board of Directors, Chief Executive Officer, Deputy Chief Executive Officer, Secretariat and the following five Divisions:

- i) Energy & Energy Statistics Division,
- ii) Legal & Licensing Division,
- iii) Fuel Marking Division,
- iv) Administration/Human Resource Division, and
- v) Finance Division.

The GEA's organization structure was revised during 2010 to accommodate the following new positions: Energy Economist, Energy Engineer, Hydropower Support Engineer, Licensing Administrator, Internal Auditor, Public Communications Officer, Human Resource Officer, [additional] Legal Officer, Field Operations Coordinator, Senior Investigator and Investigator.

The mandate and activities of the Guyana Energy Agency (GEA) are governed by the following legislation:

- Guyana Energy Agency Act 1997,
- Energy Sector (Harmonisation of Laws) Act 2002,
- Guyana Energy Agency (Amendment) Act 2004,
- Guyana Energy Agency (Amendment) Act 2005,
- Guyana Energy Agency (Amendment) Act 2011,
- Petroleum and Petroleum Products Regulations 2014,
- Hydroelectric Power Act and Regulations 1956,
- Hydroelectric Power (Amendment) Act 1988,
- Electricity Sector Reform Act 1999,

- Public Utilities Commission Act 1999,
- Electricity Sector Reform (Amendment) Act 2010, and
- Public Utilities Commission (Amendment) Act 2010.

The GEA Act of 1997 established the Guyana Energy Agency (GEA) as a body corporate. On March 31, 2004 the **GEA (Amendment) Act 2004** was assented to and published in an Extraordinary Issue of the *Official Gazette* which made provisions for the implementation of the fuel marking system, creation of offences and also for the grant and issue of the various classes of licences, viz- Import Licence; Wholesale Licence; Importing Wholesale Licence; Retail Licence; Bulk Transportation Carrier Licence; Storage Licence; and Consumer Installation Licence.

The core functions listed in section 5 of the principal Act are:

- to advise and make recommendations to the Minister regarding any measures necessary to secure the efficient management of energy and the source of energy in the public interest and to develop and encourage the development and utilisation of sources of energy other than sources presently in use;
- to develop a national energy policy and secure its implementation;
- to carry out research into all sources of energy including those sources presently used in Guyana for the generation of energy, and securing more efficient utilization of energy and sources of energy;
- to monitor the performance of the energy sector in Guyana, including the production, importation, distribution and utilization of petroleum and petroleum products;
- to disseminate information relating to energy management, including energy conservation and the development and utilization of alternative sources of energy;
- to grant and issue licences relating to petroleum and petroleum products, including import licences, wholesale licences, importing wholesale licences, retail licences, bulk transportation carrier licences, storage licences and consumer installation licences;
- to utilise a marking system to add markers to petroleum and petroleum products imported by every person under an import licence or import wholesale licence for the purpose of identifying such petroleum and petroleum products as having been legitimately imported;
- to take samples of petroleum and petroleum products from any person at random throughout Guyana and carry out tests and examinations to determine the presence or level of the markers in the samples of the petroleum and petroleum products;
- to perform the necessary tests to determine whether the marker(s) is (are) in the required proportion and any further test necessary to determine whether the petroleum

and petroleum products have been lawfully obtained, stored, possessed, offered for sale, blended or mixed with any substance that is not approved;

- to prosecute in the Magistrates' Courts persons who are in possession of petroleum and petroleum products bearing no markers or at a concentration contrary to that required;
- to prosecute in the Magistrates' Courts persons who import petroleum and petroleum products without an import licence or wholesale import licence;
- to prosecute in the Magistrates' Courts persons who purchase, obtain, store, possess, offer for sale, sell, distribute, transport or otherwise deal with illegal petroleum.

Section 6 of the Act further outlines several advisory functions of the Agency:

- to study and keep under review matters relating to the exploration for, production, recovery, processing, transmission, transportation, distribution, sale, purchase, exchange and disposal of energy and sources of energy;
- to report thereon to the Minister and recommend to the Minister such measures as the Agency considers necessary or in the public interest for the control, supervision, conservation, use and marketing and development of energy and sources of energy;
- to prepare studies and reports at the request of the Minister on any matter relating to energy or any source of energy, including research into alternative sources of energy, or the application of such research, and to recommend to the Minister the making of such arrangements as the Agency considers desirable for cooperation with governmental or other agencies in or outside Guyana in respect of matters relating to energy and sources of energy;
- to advise the Minister or assigned authority on matters relating to the administration and discharge of the functions of the *Electricity Sector Reform Act 1999*.

The Fuel Marking Programme was charged with the responsibility of ensuring that all gasoline, diesel and kerosene are properly marked at a known concentration at all legitimate import points and also collecting and testing samples of fuel from various parts of the country including wholesalers, retailers, distributors, transporters, commercial consumers and any person in possession of fuel for the relevant marker(s).

Energy & Energy Statistics Division

The Division's duties and responsibilities are:

- to ensure that petroleum products are readily available in the country;
- to manage the purchase and importation of petroleum and petroleum products;
- to facilitate payment arrangements between the Oil Companies, the Bank of Guyana and other petroleum importers;
- to collaborate with sector agencies on energy and related matters;
- to develop Guyana's Energy Policy and revise as necessary;
- to study and review matters relating to the exploration for, production, recovery, processing, transmission, transportation, distribution, sale, purchase, exchange and disposal of energy and sources of energy within and outside Guyana;
- to prepare studies and reports at the request of the Minister on any matter relating to energy;
- to develop and execute projects relating to alternative sources of energy;
- to update the country's energy data with respect to acquisition prices, wholesale prices and retail prices;
- to prepare and analyse energy demand and supply data;
- to supply petroleum information and analysis of the relevant energy data as required;
- to supply the **CEIS** and **OLADE** databases with energy information.

## Legal & Licensing Division

The Division's duties and responsibilities are:

- to inspect all sites, motor vehicles, machinery and equipment for which a licence may be required under the Regulations;
- to grant/issue the relevant licences pertaining to-
  - importation of petroleum or petroleum products;
  - bulk transportation of petroleum or petroleum products;
  - storage of petroleum or petroleum products;
  - wholesale of petroleum or petroleum products;
  - retail of petroleum or petroleum products;
  - storage and own-use of petroleum or petroleum products.

- to suspend, cancel, cease licences in accordance with the regulations made under the **Guyana Energy Agency Act 1997** as amended by the **Guyana Energy Agency (Amendment) Acts 2004, 2005 and 2011**;
- to ensure that files for prosecution are completed promptly and dispatched to the Office of the Director of Public Prosecutions for advice;
- to oversee and coordinate the assignment of cases for prosecution;
- to prosecute in the Magistrates' Courts persons who are in possession of petroleum and petroleum products bearing no markers or at a concentration contrary to that required;
- to prosecute in the Magistrates' Courts persons who import petroleum and petroleum products without an import licence or wholesale import licence;
- to prosecute in the Magistrates' Courts persons who purchase, obtain, store, possess, offer for sale, sell, distribute, transport or otherwise deal with petroleum without the relevant licence (s);
- to coordinate the representation of the Agency in civil litigation;
- to prepare Amendments to the Legislation as required and work in collaboration with the Drafting Department of the Ministry of Legal Affairs regarding same;
- to provide management with the necessary legal guidance in execution of the Agency's overall mandate and in relation to other stakeholder agencies, where necessary.

## Fuel Marking Division

The Division's duties and responsibilities are:

- to utilise the respective marking system to add markers to petroleum and petroleum products imported by every person under an import licence or import wholesale licence for the purpose of identifying such petroleum and petroleum products as having been legitimately imported, whether domestic or duty-free;
- to add the relevant covert proprietary chemical markers to petroleum and petroleum products at the concentration determined by the Minister by notice in the Gazette;
- to maintain the integrity of the marking system;
- to test the accuracy and monitor the effectiveness of the marking system;
- to take samples of petroleum and petroleum products from any site at random throughout Guyana and carry out tests and examinations to determine the presence or level of the markers in the samples of the petroleum and petroleum products;

- to perform the necessary laboratory tests to determine whether the marker(s) is (are) in the required proportion;
- to determine the composition and grade of petroleum and petroleum products and determine whether same have been blended or mixed with any substance that is not approved;
- to give testimonial evidence in the prosecution of offences under the Act;
- to provide, through the Analyst's Certificate, expert/scientific evidence as proof of the legality of petroleum and petroleum products.

#### Administration and Human Resource Division

The Division's duties and responsibilities are:

- to maintain and update the Agency's personnel files and other records;
- to aid in the recruitment, selection, replacement and continuous professional development of staff;
- to address staff concerns related to wages and salary administration, contract negotiation and separation procedures;
- to improve staff morale through cogent policies and remuneration;
- to manage and maintain the Group Pension, Group Life, Medical and National Insurance Schemes while ensuring that claims, benefits and queries are processed expeditiously and to the satisfaction of the staff;
- to handle all grievance procedures with the objective of reaching mutually acceptable solutions;
- to ensure that office supplies, equipment, and vehicles are adequately provided and maintained;
- to ensure that the Agency's edifices, facilities and compound are kept clean and properly utilized and maintained;
- to monitor the security services for reliability and adequacy in the execution of their duties;
- to develop and enforce the Agency's Policy Manual and Disciplinary Code;
- to provide general support services to the officers of the Agency in the execution of their duties;
- to ensure adherence to health and safety regulations in the work environment;
- to manage the procurement, receipt and issue of stationery, stocks, office equipment and assets of the Agency and monitor use of same to prevent abuse of the Agency's resources.

## Finance Division

The Finance Division is tasked with the responsibilities of the day to day management of the Agency's financial resources. The Division's duties and responsibilities are:

- to advise management on the Agency's financial matters, and where necessary, other agencies;
- to manage and maintain the Agency's income and expense accounts and all other accounting records;
- to prepare the Agency's financial statements;
- to prepare the Agency's budget documents;
- to prepare monthly wages and salaries and other allowances;
- to process payments;
- to ensure that goods and services procured by the Agency are so procured in compliance with the **Procurement Act** and other relevant guidelines;
- to verify the accuracy of bills and receipts provided and investigate suspicious or fraudulent bills/receipts;
- to maintain and update the Agency's asset register.

## ORGANISATIONAL STRUCTURE FOR THE GUYANA ENERGY AGENCY

