Guyana Energy Agency

2020 Annual Report

EXECUTIVE SUMMARY

Petroleum Products

6,626,075 barrels of petroleum-based products were imported in 2020 representing about 18,104 barrels per day, a 4.95% increase when compared to 2019. Petroleum imports for 2020 were acquired at a cost, insurance and freight (CIF) value of US$408,375,386, representing a decrease of 22% compared to the acquisition cost in 2019.

The average cost per barrel of petroleum-based imports decreased from US$82.99 in 2019 to US$61.56 in 2020, a decrease of 25.83%. This downward trend also continued for the average unit CIF value for each petroleum product. There were decreases of 25.25%, 31.29% and 31.33% in the average unit CIF value (US$/bbl) for Mogas (gasoline), Gasoil (diesel) and Jet fuel/Kerosene, respectively. In addition, the average unit CIF value for Fuel oil, Aviation Gasoline (avgas), LPG (cooking gas) and LNG also decreased by 11.83%, 9.46%, 12.10% and 3.38%, respectively.

Retail prices for Mogas (gasoline), Gasoil (diesel) and Kerosene decreased during 2020 by an average of 25.91%. Specifically, average retail price for gasoline decreased by 24.33% and diesel decreased by 23.15%. Also, the average retail price for domestic kerosene fell by 31.03% while the average retail price for cooking gas (LPG) decreased by 3.57%.

Solar Energy

GEA assisted HECI in completing the 400kW Solar Farm at Mabaruma, Region 1. The Solar Farm commenced operation on June 17, 2020, working in a hybrid mode with the existing diesel generators at the Mabaruma Power Plant, allowing residents to receive electricity for 19 hours daily instead of 14 hours.

Contracts for the installation of a 1.5MW Solar Farm for Bartica and 1 MW Solar Farm for Lethem were awarded. Tender and Project documents have already been completed for two additional 0.6MW solar farms for Mahdia and Leguan to be tendered in 2021.

The completion of the installation of a 400kWp solar PV system with storage along with a Building Energy Management System at the Caricom Secretariat building under a Japanese grant was delayed due to the pandemic and subsequent travel restrictions. The installation is expected to be completed in 2021.

A 72 kWp Hybrid Solar Photovoltaic Micro-grid System was installed at Moraikobai to increase the number of hours of electricity supply from 4 hours to 12 hours benefitting 94 households and 376 residents. The system was placed into operation on January 27, 2021.

GEA's solar maintenance programme effected repairs to solar photovoltaic systems at Capoey Nursery/Primary School, Region 2, St. Denny's Health Centre, Region 2, Tapakuma Lake Primary School, Region 2, Abrams Creek Primary School, Region 2, Bethany Primary School, Region 2, St. Monica Health Post, Region 2, Caria Caria Nursery/Primary School, Region 3, Caria Caria Health Outpost, Region 3, La Harmonie Primary School, Region 3, 47 Miles Health Centre, Region 10 and GEA's Base at Berbice, Region 5. GEA therefore conducted repairs and upgrades to 13 solar PV systems with a total capacity of 18.265kWp in 2020.

During 2020, GEA's Engineers completed energy needs assessments at Sebai, Mainstay/Whyaka & Tapakuma/St. Denny's, Capoey Village, St. Monica, Paruima, Waramadong, Kurukabaru, Annai and Ituni. Site visits to prepare energy assessment reports were also completed at another 25 locations during the year.

Hydropower

GEA advanced work on the preparation of tender documents in anticipation of the finalization of a loan from the Islamic Development Bank for small hydropower. Under the revised programme, the Kumu and Moco-Moco hydro projects will be advanced.

GEA's Hydropower engineers provided technical support to HECI for the 150kW Kato Hydro project. Due to delays in finalizing payments for aggregates and other raw materials to the villagers, request for changes to the payment arrangements under the contract and due to the pandemic travel restrictions, it is expected that the project will be substantially completed by the end of 2021.

Despite the pandemic-related challenges in 2020, GEA's Hydropower Engineers were able to install hydrological measurement equipment to help assess the potential for mini and micro hydropower development. Initial measurements have been completed at Paruima, Region 7 and data is currently being collected at Waramadong (Region 7), Amaila (Region 8) and Salboura (Region 8). In 2021, GEA will continue to install hydrological measurement equipment to assess the potential for mini and micro hydropower development at Eclipse Falls (Region 1), Monkey Mountain (Region 8), Chenapau (Region 8), Tumatumari (Region 8) and Tiger Hill (Region 10).

Energy Efficiency

As part of Government's energy efficiency programme, 28,390 LED lights were installed for consumers at Mahdia, Mabaruma, Kwakwani, Port Kaituma, Matthews Ridge and Lethem.

Government's first electric vehicle was procured through a GEA-led initiative. The Nissan Accenta 2019 Leaf has a range of up to 239km on a single charge. The electric car is normally charged from GEA's existing grid-connected solar PV system on Sundays and except for some rainy/cloudy days, is therefore mainly charged from a renewable energy source. Depending on the state of discharge, the charging time is between 3 to 5 hours, once per week. In its current state, the vehicle's battery, with the use of air-conditioner, provides a range of about 215km at 6km per kWh. If energy is purchased from GPL at Government Commercial rate of G$58.83/kWh, the cost per km driven would be about G$10 per km. GEA recommends that Ministries and Government Agencies start considering the purchase of electric vehicles.

TERI

Under a Memorandum of Understanding between the Energy Research Institute of India and the Government of Guyana, experts from India provided support to the Government of Guyana in the last quarter of 2020 in the identification of suitable technology for the solar home systems for Hinterland communities, review of technical specifications of the Mahdia and Leguan solar farms, commencement of a feasibility study on the integration of a rice husk based power gasifier for Leguan, commencement of a feasibility study for the

integration of solar PV at the Cheddi Jagan International Airport, commenced performance evaluation of pump stations for the Guyana Water Inc. and the National Drainage and Irrigation authority.

Licensing Activities

The Agency continued to manage the issuance of Licences for Importing, Importing/Wholesale, Wholesale, Retail, Consumer Installation, Bulk Transportation Carriers and Storage of Petroleum and Petroleum Products. A total of 1,219 Licences were issued in 2020.

Fuel Marking Programme

Under the Fuel Marking Programme, of the 6,079 total site visits conducted during the year, 981 sites were sampled at least once.

There were 9 joint operations with Guyana Police Force (GPF), the Guyana Defence Force (GDF) and the Guyana Revenue Authority (GRA).

4 (1%) of the sites sampled at least once were found with *significant dilution (defined as more than 50%)* in at least one tank. The percentage of sites found with significant dilution in at least one tank has progressively decreased from 34% in 2006 to 1% in 2020.

For 2020, the Agency instituted the charge of possession of illegal petroleum against Nand Narine. At the close of 2020, this matter was ongoing. An action was filed against the Chief Executive Officer of the GEA and the Commissioner General of the GRA by Atlantic Fuels Inc. for the seizure of and refusal to mark a quantity of diesel imported by the company. At the end of 2020, the matter was ongoing. A draft of the revised Petroleum and Petroleum Products Regulations was sent to the Honourable Minister within the Ministry of Public Works for review.

1.0 Energy & Energy Statistics Division

1.1 Petroleum-Based Imports

For the year 2020, the Division facilitated the importation of one hundred and fifty-nine (159) shipments of petroleum-based products on behalf of the oil companies, a decrease from one hundred and seventy-nine (177) shipments in the previous year. About fifty-two percent of the import volume for the oil companies in 2020 were lifted from Trinidad and Tobago; forty-six percent of the shipments were sourced via third parties based in USA, Europe, Jamaica, Antigua, St. Lucia, Dominican Republic and St. Eustatius; and the remaining two percent was lifted from Suriname[1].

TOTAL IMPORTS (BBLS)				
January-December	Product	2019	2020	change
	Mogas	1,375,211	1,505,954	9.51%
	Gasoil	3,013,280	3,140,147	4.21%
	Kero	77,976	80,409	3.12%
	Avjet	160,106	130,861	-18.27%
	Fuel oil	1,450,255	1,504,966	3.77%
	LPG	225,570	247,151	9.57%
	LNG	2,538	9,685	281.59%
	Avgas	8,805	6,903	-21.60%
	Total	**6,313,740**	**6,626,075**	**4.95%**

TOTAL IMPORTS - OIL COMPANIES (BBLS)				
January-December	Product	2019	2020	% change
	Mogas	1,375,211	1,505,954	9.51%
	Gasoil	2,619,530	2,849,055	8.76%
	Kero	77,976	80,409	3.12%
	Avjet	160,106	130,861	-18.27%
	Fuel oil	141,465	111,236	-21.37%
	LPG	212,141	233,008	9.84%
	Avgas	2,249	2,250	0.06%
	Total	**4,588,678**	**4,912,774**	**7.06%**

The total petroleum imports recorded an overall increase of 4.95% in 2020 with a total of 6,626,075 barrels of petroleum-based products imported and an average of approximately 18,104 barrels per day. There were increases in the imports of Mogas (gasoline), Gasoil (diesel), Kerosene, Fuel oil, LPG (cooking gas), and liquid

[1] Shipments relate solely to Mogas, Gasoil, Avjet/Kerosene, LPG, Avgas and Fuel oil.

natural gas (LNG) while imports for Avjet (Jet Fuel) and Avgas (aviation gas) decreased during this period.

Imports for the oil companies also rose by 7.06% in 2020 with a total of 4,912,774 barrels of petroleum-based products imported. There were increases in the imports of Mogas, Gasoil, Kerosene, LPG, and Avgas while imports for Avjet and Fuel oil declined during this period.

1.2 Consumption of Petroleum Products

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

Consumption = Opening stock + Import volumes – Closing Stock

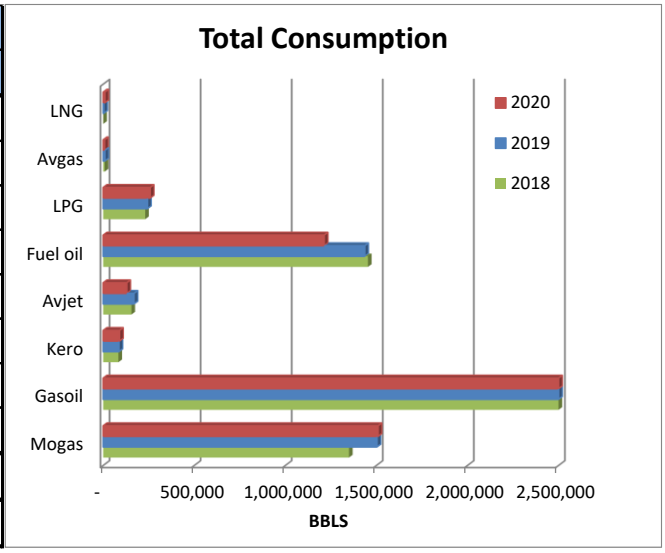
Sales data received from Guyoil, Rubis and SOL as well as consumption data from the Guyana Power and Light Inc. and Bosai Minerals Group (Guyana) Inc. (BOSAI) were also incorporated in the calculation of total consumption. A total of 6,236,352 barrels of petroleum-based products was consumed in 2020 with an average of 17,086 barrels per day. This represents a 3.45% decrease when compared to 2019[2]. There were increases in the consumption of mogas, gasoil, kerosine, LPG and LNG, while fuel oil, jet fuel and aviation gasoline decreased.

The increase in gasoline consumption can be attributed to an increase in motor vehicle registration and the relatively larger increase in LPG consumption suggest greater use of cooking gas over kerosene. In addition, there was a decrease in overall fuel oil consumption which may be attributed to contraction in bauxite production and manufacturing. Moreover, the decrease in jet fuel and aviation gasoline consumption can be attributed to decreased flight travel at international airline carriers and domestic travel respectively, stemming from travel restrictions to address the COVID-19 pandemic.

[2] Gasoil and Fuel oil purchased locally by GPL from the oil companies were discounted to avoid double counting.

There was also a minor increase in diesel consumption. Despite contractions in the sugar, gold and diamond mining, forestry, fishing, manufacturing and service sectors, consumption was generally buoyed by growth in the rice sector and upstream activities. Furthermore, a relatively larger volume of liquid natural gas (LNG) was used by a local beverage company as part of their continued fuel diversification efforts.

TOTAL CONSUMPTION (BBLS)					
January - December		2018	2019	2020	% change
	Mogas	1,349,687	1,503,160	1,509,019	0.39%
	Gasoil	2,578,600	3,010,868	3,022,700	0.39%
	Kero	83,581	86,221	89,230	3.49%
	Avjet	154,992	168,921	128,935	-23.67%
	Fuel oil	1,453,668	1,435,560	1,213,098	-15.50%
	LPG	230,612	242,878	257,799	6.14%
	Avgas	8,250	8,747	6,801	-22.24%
	LNG	333	2,538	8,769	245.49%
	Total	**5,612,475**	**6,458,893**	**6,236,352**	**-3.45%**
	Bpd	**15,335**	**17,696**	**17,086**	**-3.45%**



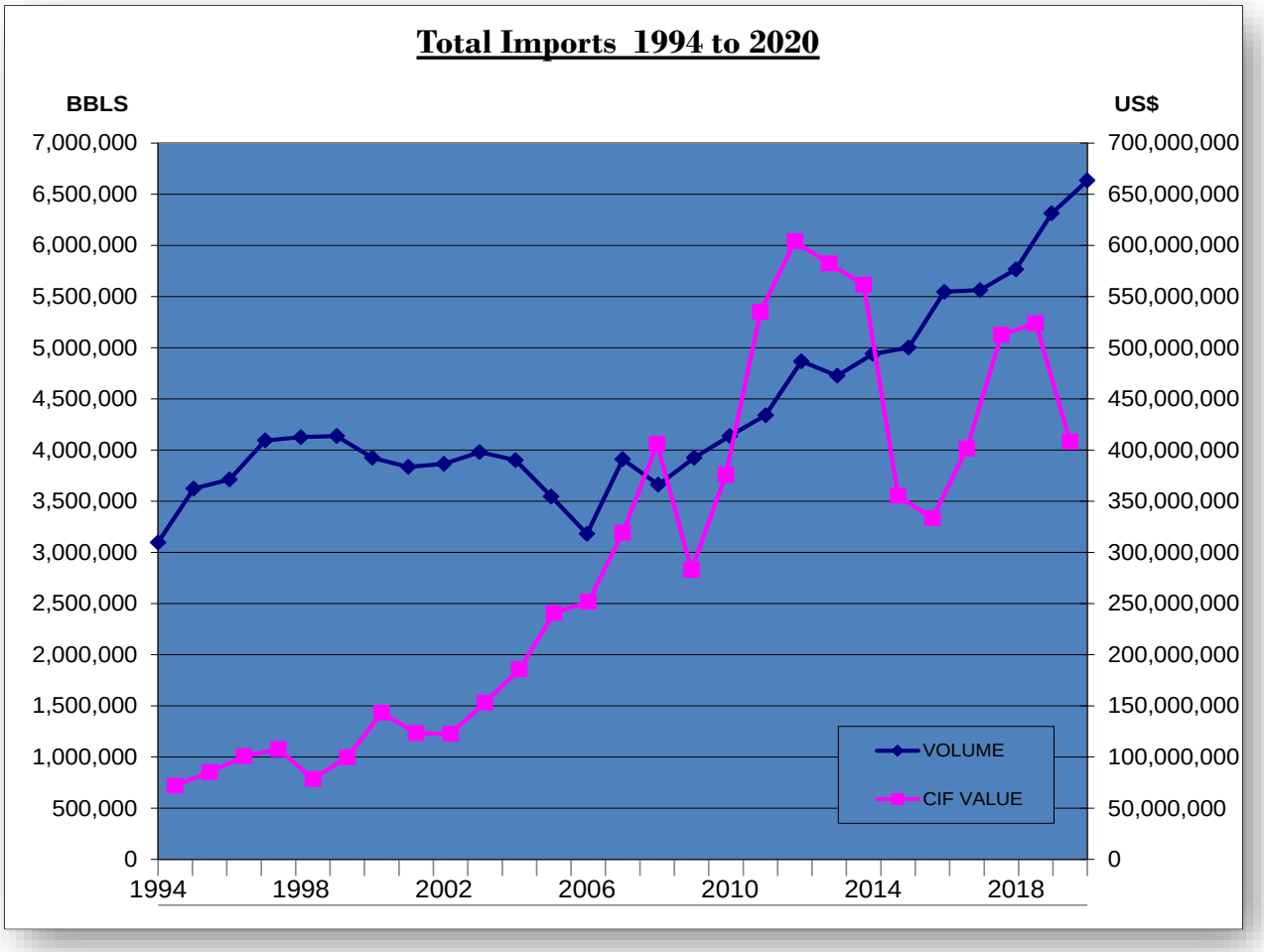
1.3 Acquisition Cost and Retail Prices

For 2020, Gasoil was the most imported product representing 47% of total imports and a CIF value amounting to 48% of total acquisition expense[3]. Fuel oil and Mogas reflected 23% of total imports respectively with corresponding CIF values amounting to 20% and 25% of total acquisition costs, respectively. The remaining products (Kerosene, Avjet, LPG, LNG and Avgas) constituted no more than 7% of total imports and 7% of total acquisition costs.

[3] Gasoil CIF value was estimated for volumes used by the Trawler Association, United Petroleum Inc., China Zhonghao Inc., Atlantic Fuels Inc., SBF Petroleum, and KB Enterprise and Shi Oil in 2020.

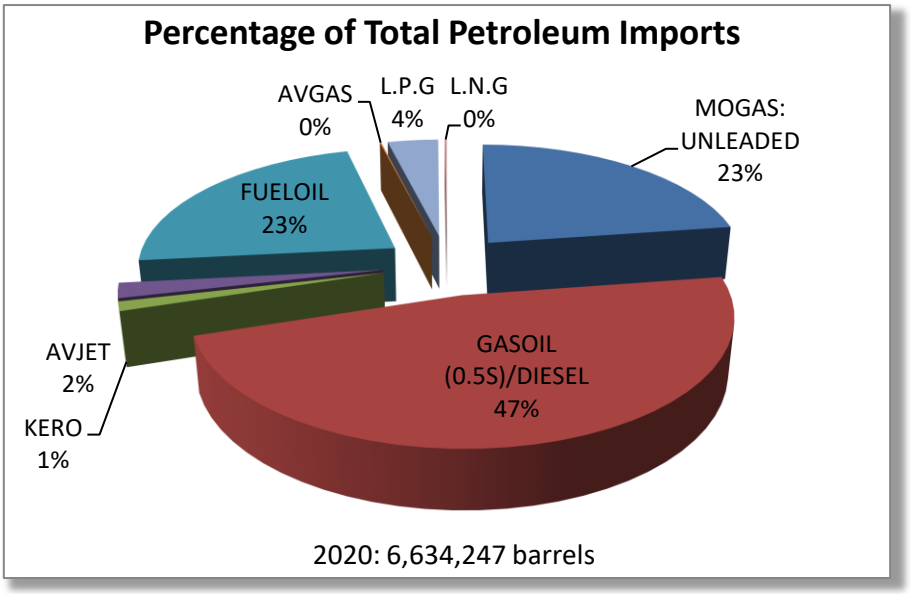
Petroleum imports for 2020 were acquired at a cost, insurance and freight (CIF) value of US$408,375,386, representing a decrease of 22% compared to the acquisition cost in 2019.

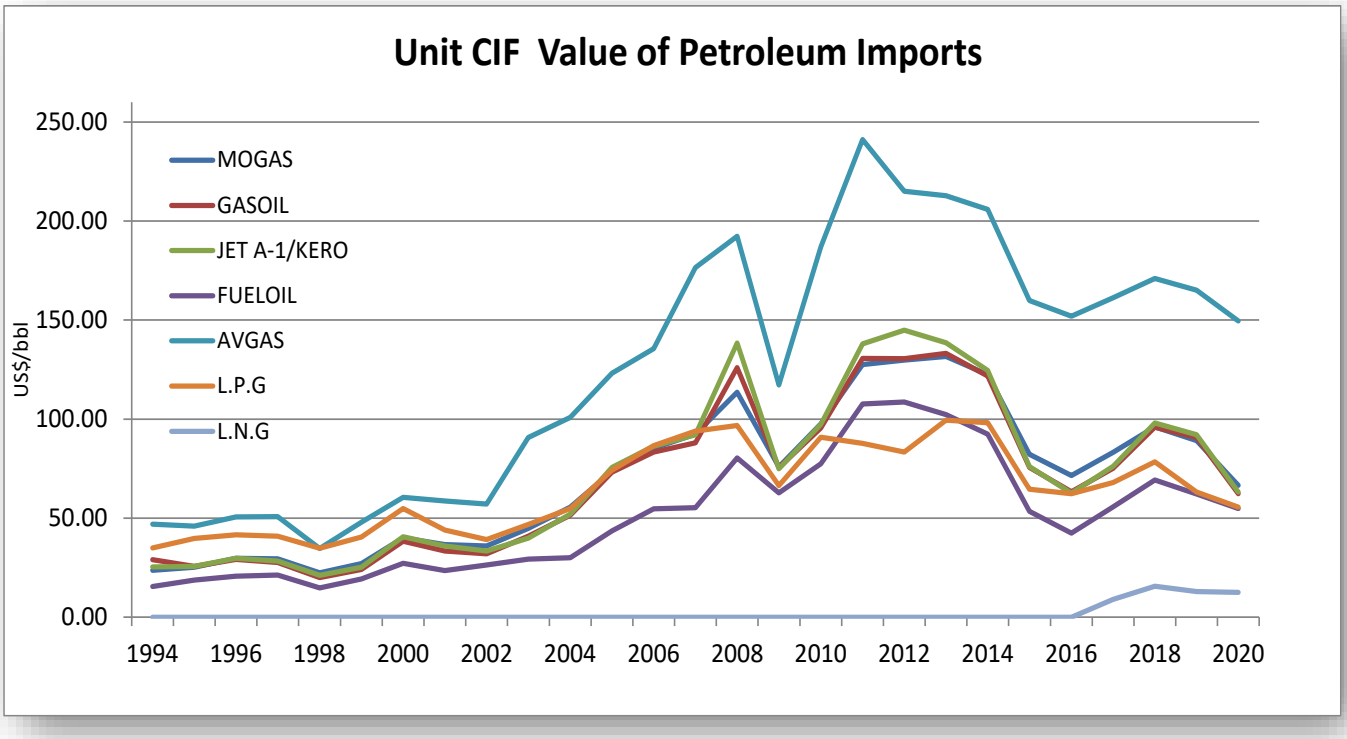
	VOLUME		CIF VALUE
	BBLS	LTRS	US$
1994	3,095,728	492,181,436	72,067,912
1995	3,624,053	576,178,402	85,161,130
1996	3,711,893	590,143,846	100,696,609
1997	4,093,677	650,842,653	107,727,233
1998	4,125,765	655,944,238	78,539,499
1999	4,137,266	657,772,751	99,704,391
2000	3,924,614	623,963,783	143,277,974
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	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
2016	5,547,048	881,910,233	333,248,345
2017	5,563,733	884,562,863	401,521,446
2018	5,766,821	916,851,358	512,707,221
2019	6,313,740	1,003,804,534	523,981,885
2020	6,634,247	1,054,761,050	408,375,386
TOTAL	**118,355,762**	**18,817,063,099**	**7,966,225,142**



TOTAL IMPORTS BY PRODUCTS FOR THE YEAR 2020

PRODUCTS	VOLUME		C.I.F VALUE
	LTRS	BBLS	US$
MOGAS: UNLEADED	239,427,618	1,505,954	100,318,672
GASOIL (0.5S)/DIESEL	500,542,732	3,148,319	196,151,290
KERO	12,784,010	80,409	4,808,469
AVJET	20,805,237	130,861	8,554,597
FUELOIL	239,270,459	1,504,966	82,560,761
AVGAS	1,097,425	6,903	1,031,807
L.P.G	39,293,847	247,151	13,736,713
L.N.G	1,539,722	9,685	1,213,077
TOTAL	**1,054,761,050**	**6,634,247**	**408,375,386**

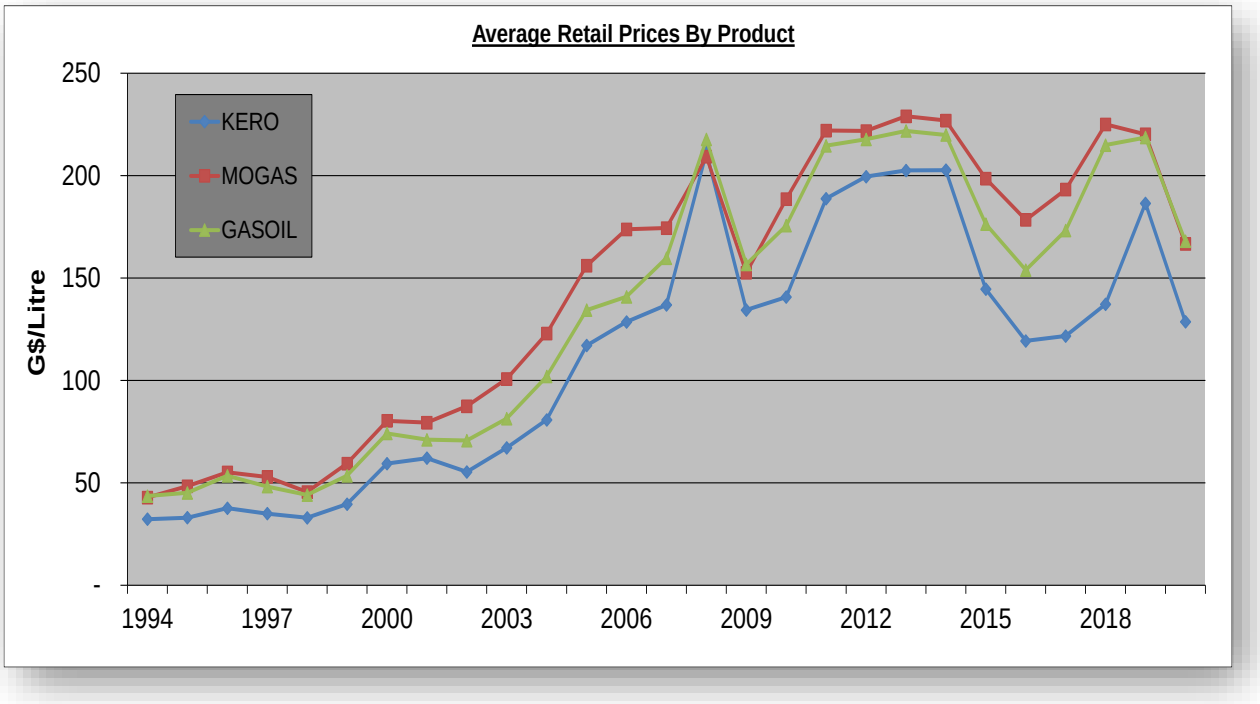


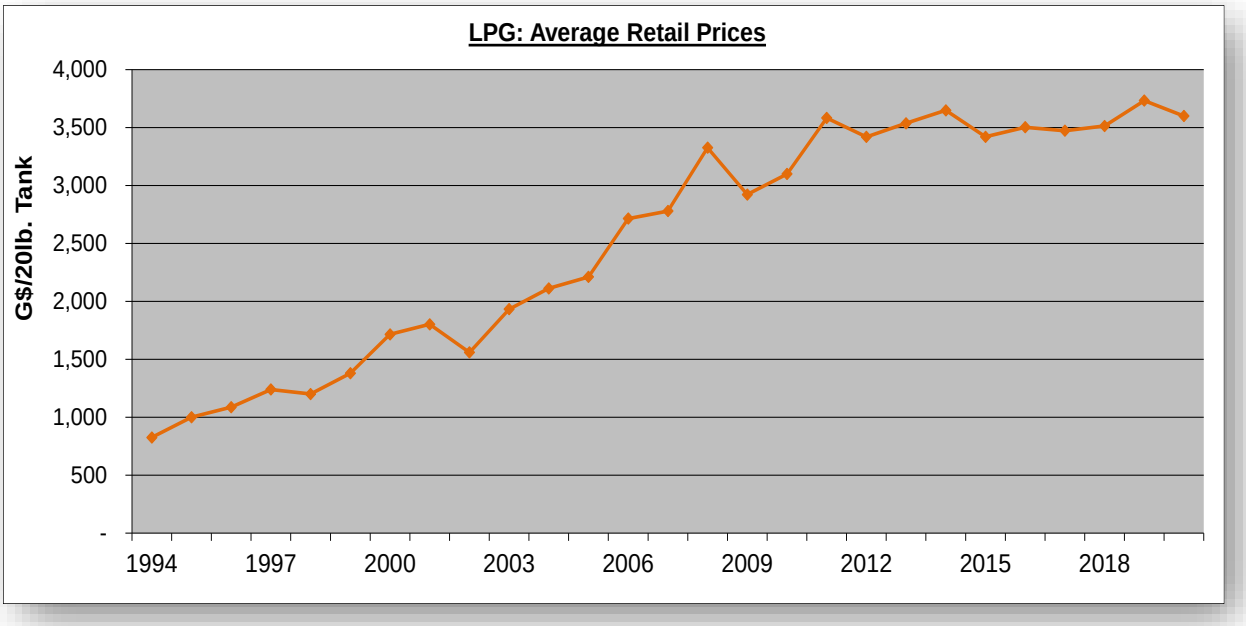


The average cost per barrel of petroleum-based imports decreased from US$82.99 in 2019 to US$61.56 in 2020, a decrease of 25.83%. This downward trend

also continued for the average unit CIF value for each petroleum product. There were decreases of 25.25%, 31.29% and 31.33% 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), LPG (cooking gas) and LNG also decreased by 11.83%, 9.46%, 12.10% and 3.38%, respectively.

Retail prices for Mogas (gasoline), Gasoil (diesel) and Kerosene decreased during 2020 by an average of 25.91%. Specifically, average retail price for gasoline decreased by 24.33% and diesel decreased by 23.15%. Also, the average retail price for domestic kerosene fell by 31.03% while the average retail price for cooking gas (LPG) decreased by 3.57%.





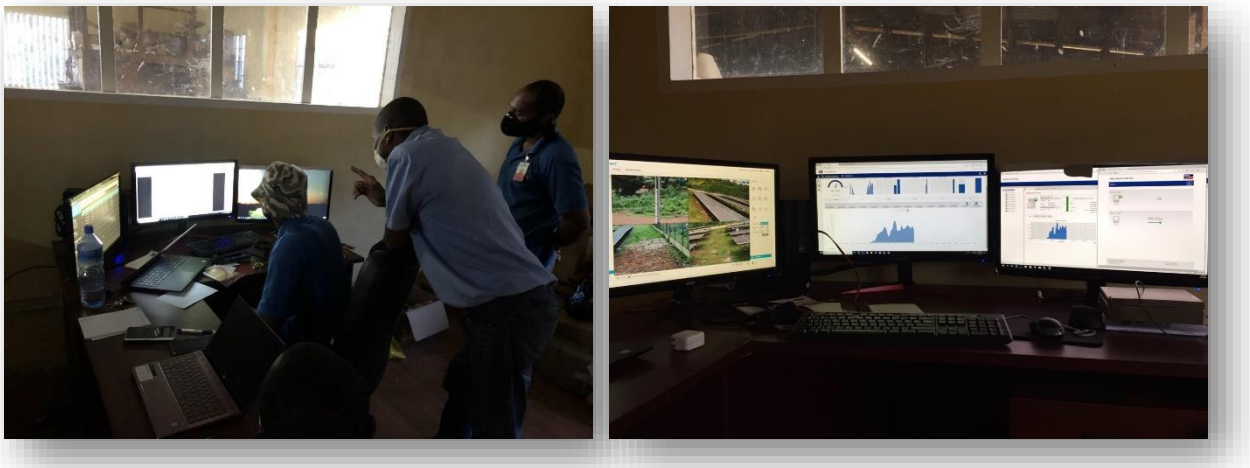
1.4 Solar Energy

1.4.1 **Completion of the Mabaruma 400kWp Solar Farm**

In September 2019, the GEA was delegated by the then Minister of Public Infrastructure to oversee the completion and commissioning of the much-delayed 400kWp Solar PV Farm Project at Mabaruma, Region 1 following the termination of the contract. Work commenced in earnest in October 2019 in this regard. Contracts for the supply and installation of a replacement power transformer and for completion of the Farm were awarded on February 8, 2020 and work commenced immediately after. A subsequent contract for the supply and installation of a 134kWh battery energy system was awarded to the same contractor on April 20,

2020. The Solar Farm commenced operation on June 17, 2020, working in a hybrid mode with the existing diesel generators at the Mabaruma Power Plant, allowing residents to receive electricity for 19 hours daily instead of 14 hours.

After some delay in the manufacturing and shipment of the battery energy storage system due to the COVID-19 pandemic, the system was installed on October 28, 2020. The contractor is awaiting the installation of the synchronising panels for the generators at the Mabaruma Power Company to complete the programming of the hybrid (solar PV generator/battery system/diesel generators) power for automatic operation. Installation of the synchronising panel is being executed by the Mabaruma Power Company.



Monitoring of Solar Farm Equipment Status and Production, Surveillance Cameras from MPC Power Plant

1.4.2 **Project for the Introduction of Renewable Energy and the Improvement of Power Systems in Guyana (Grant Agreement No. 1860260)**

The project is comprised of two components, namely:

a) The Technical loss reduction component aimed at enhancing the power supply reliability and reducing technical loss through the installation of a 10MVAr reactive power compensator at the Canefield substation and the upgrade of four 13.8kV distribution feeders. The materials will be provided to GPL to upgrade the feeders.
b) The installation of a 400 kWp solar PV power generation system with battery storage and a Building Energy Management System (BEMS) to control electricity usage at the CARICOM Secretariat.

The project is funded with a Grant from the Government of Japan in the amount of JPY 1.848 billion based on an Exchange of Notes and Grant Agreement signed on June 27, 2018. An agreement for the provision of consultancy services for implementation of the project was signed on August 29, 2018 with the firm Kansai Electric Power Inc. JV NEWJEC Inc. for the sum of JPY 153 million. Contracts for the two components were subsequently awarded to the Consortium of Mitsubishi Corporation and Takaoka Engineering Co. Ltd. on February 28, 2019 for the sum of JPY 741.3 million (GPL) and JPY695 million (CARICOM), respectively. The completion dates are June 30, 2020 and September 30, 2020. The GEA is the implementing Agency for the Project.

The implementation of this Project commenced in February 2019 with completion dates of June 30, 2020 for the GPL component and September 30, 2020 for the CARICOM component. The Project was on track for achieving the completion dates, however, on March 31, 2020, the contractor issued a notification of the occurrence of Force Majeure, citing the COVID-19 pandemic and the ensuing precautionary measures (such as travel restrictions, closure of international airports, mandatory quarantine of persons travelling from high-risk countries, etc.) implemented by countries to contain the COVID-19 outbreak as the Force Majeure Event. This event prevented the contractor from performing their substantial obligations under the Contract. Specifically, the contractor was unable to dispatch supervisory personnel from the equipment manufacturers in Japan to complete the installation, testing and commissioning of the equipment and provide O&M training for local staff for both the CARICOM and GPL components of the project. The contractor proposed the temporary suspension of Project until the event ceases to exist. The procedures for temporary suspension of the works and project restart condition were subsequently discussed at the

monthly meeting on April 9, 2020. It was agreed that some additional maintenance works were required prior to suspension to secure all materials and equipment at the sites in preparation for resumption. The maintenance works were completed on April 28, 2020 for the GPL Canefield site and on April 30, 2020 at the CARICOM site. Works were temporarily suspended from April 30, 2020 and the key Contractor's staff returned to Japan on May 6, 2020.

The COVID-19 situation was reviewed at the monthly management meetings with a view to determine the earliest possible restart date. At the meeting on May 28, 2020, the Consultant and Contractor reported that due to the increasing number of cases in Japan, the government had issued a Level 3 travel advisory urging nationals not to travel to high-risk countries including Guyana. This advisory remained in effect for the remainder of the year as the country experienced a second and third wave of the pandemic. Hence, at the end of 2020 a restart date was not determined. This matter will continue to engage the attention of all parties including the contractor, consultant, GPL, CARICOM, GEA, JICA, MoFA and the Japanese Embassy to allow for restart in early 2021.

The revised completion dates for the project are June 30, 2021 for GPL and September 30, 2021 for CARICOM.

Notwithstanding the challenges, the accomplishments for 2020 were as follows:

GPL Loss Reduction Component

1. Procurement of the 2x5MVAr Reactive Power Compensator (RPC) for GPL's Canefield Substation was completed at the end of March 2020. All materials and equipment were delivered to the site where they are being securely stored. Fortnightly inspections are also conducted to verify the integrity of the storage conditions.
2. Installation, testing and commissioning of equipment:
   The civil and electrical grounding works for the equipment foundation is 95% complete, while the installation of the RPC equipment is about 20% completed.
3. Installation, testing and commissioning of the Reactive Power Compensator and the provision of O & M training will be completed after the resumption of Project activities.

CARICOM Component:

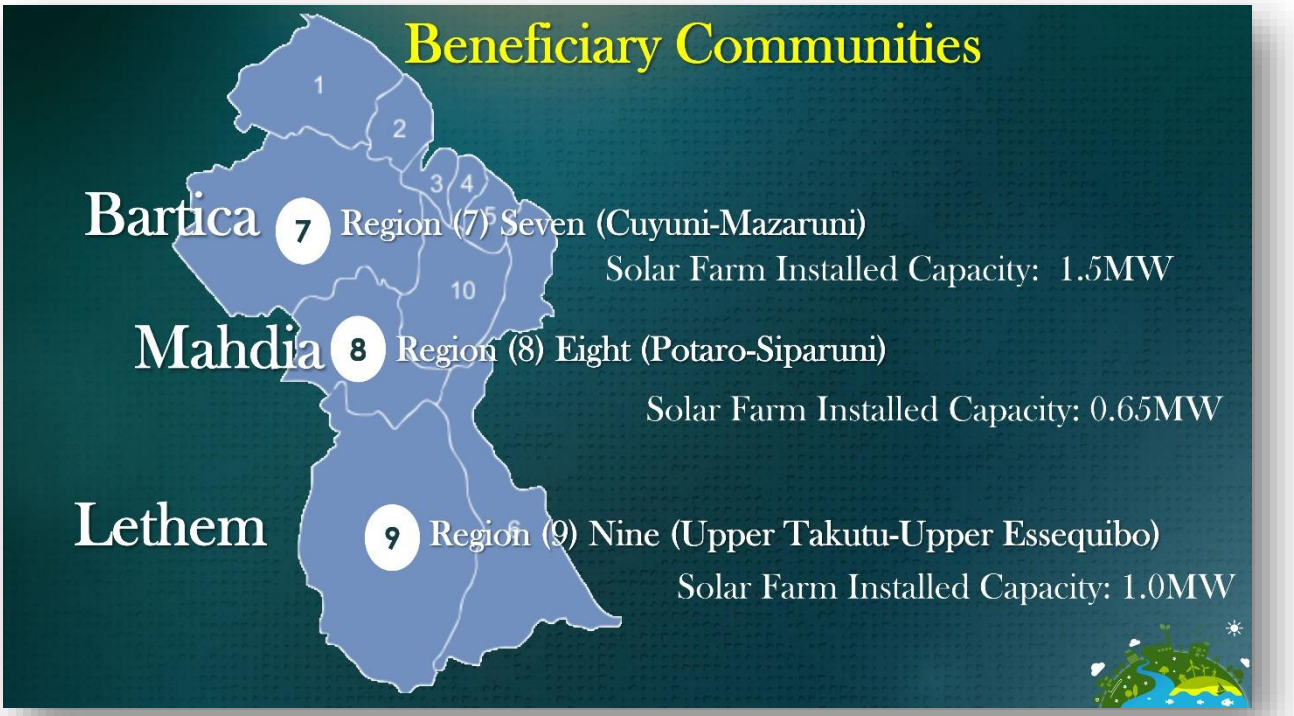
4. Procurement for the 400kWp solar PV system with battery storage and BEMS was completed at the end of May 2020. All materials and equipment were delivered to the site where they are securing stored. Fortnightly inspections are also conducted to verify the integrity of the storage conditions.
5. Installation, testing and commissioning of equipment:
   The civil work for equipment foundation and mounting structures for the PV modules was 20% completed at the end of April 2020.
6. Installation, testing and commissioning of the solar PV system and BEMS and the provision of O & M training will be completed after resumption of Project activities.

Foundation works and materials and equipment Stored at GPL's Canefield site

Materials and Equipment Stored at the CARICOM Site

1.4.3 **Energy Matrix Diversification and Strengthening of the Department of Energy (EMISDE)**

The Government of Guyana received financing in the amount equivalent to US$21,160,000 from the Inter-American Development Bank (IDB) for the Energy Matrix Diversification and Strengthening of the Department of Energy (EMISDE) Project. The EMISDE project was formally launched on February 11, 2019 following the signing of loan Contract agreement.



One of the major components of this project is the Renewable Energy Solutions for the Hinterland at an estimated budget of US$8,600,000, which involves the installation of three Photovoltaic-tied mini-grid systems in Bartica, Lethem, and Mahdia, totalling approximately 3.15 Megawatts and implementation of a storage capacity to manage intermittence of these sources. For its proper execution, certain compliance with the general and special conditions of the loan as required by the funding agency (IDB) were put in place such as: the formation of the Project coordinating unit, procurement of office furniture and equipment for the projecting coordinating unit, opening of local and foreign currency bank accounts, and assignment of authorized signatories to the bank accounts.

The tender process for Bartica and Lethem commenced with the preparation of bid documents, submitted to IDB for No Objection. Following IDB's No objection granted on 11th September 2019 and subsequent NPTAB approval, the Specific Procurement Notice (SPN) was published in the four major local newspapers, and also online on the United Nations Development Business website. In addition, CD copies were also made available to local bidders. Following an addendum issued on November 15, 2019 the deadline for submission and opening of bids was amended from November 26, 2019 to January 7, 2020.

Contracts for the installation of a 1.5MW Solar Farm for Bartica and 1 MW Solar Farm for Lethem were awarded in 2020. The Contract Agreement for the execution of the engineering, procurement, construction and installation and commissioning of solar photovoltaic power plants including Battery Energy Storage Systems for the hinterland at Bartica and Lethem in two lots, was signed on November 11, 2020 between the Guyana Energy Agency and Farfan & Mendes Limited and SOVENTIX Caribbean S.R.L. The contract amount for Lot 1 (Bartica) was G$ 625,493,907 and Lot 2 (Lethem) G$ 472,851,004 totaling G$ 1,098,344,911.

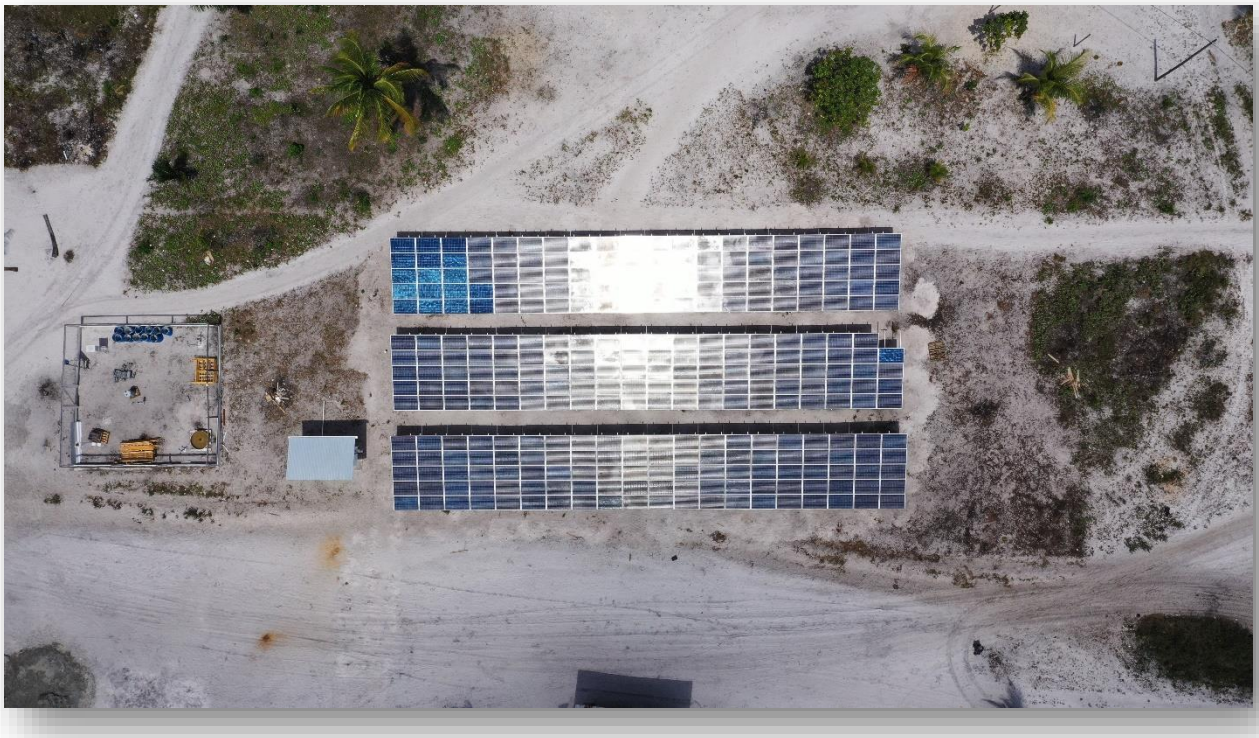
Tender and Project documents have already been completed for two additional 0.6MW solar farms for Mahdia and Leguan to be tendered in 2021.

The Revegetation Plan for Bartica

The contract agreement for the reparation of the Revegetation Plan for the Bartica Solar PV Site was signed on March 31, 2020 between the Guyana Energy Agency an Dr. Patrick Chesney for a Contract Amount of $35,350 (US) Dollars. The final approved version of the Revegetation Plan for the Bartica Solar PV Site was completed and submitted on September 16, 2020.

1.4.4 **Solar Micro-Grid at Moraikobai**

During 2019, a Contract was awarded for the installation of a 72kWp solar micro grid in Moraikobai, Region 5, which will provide electricity from a renewable energy source to supply approximately 270 households (approximately 1,000



persons). The project will allow an increase in the duration of daily electricity supply from 4 hours to 12 hours, avoid annual CO_2 Emissions of 70,199.57 kg and

will generate about 97.36 MWh of energy annually. The system was expected to be operational by the second quarter of 2020 but due to travel and other restrictions as a result of the Covid-19 pandemic, the installation was delayed with substantive completion in December 2020. During the testing and commissioning phase a defective motorized breaker was identified which is expected to arrive in January 2021 after which the system will be commissioned.

1.4.5 **Repairs to Existing Solar PV Installations**

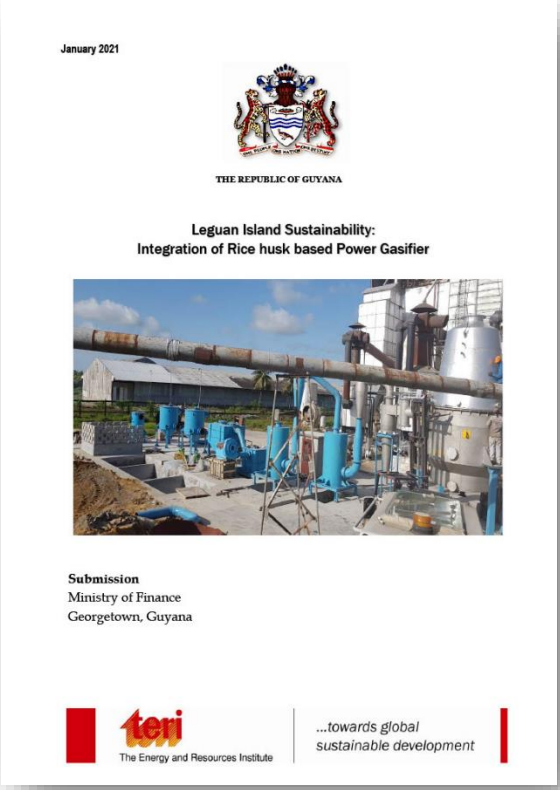
GEA's solar maintenance programme effected repairs to solar photovoltaic systems at :

- Capoey Nursery/Primary School, Region 2
- St. Denny's Health Centre, Region 2
- Tapakuma Lake Primary School, Region 2
- Abrams Creek Primary School, Region 2
- Bethany Primary School, Region 2
- St. Monica Health Post, Region 2
- Caria Caria Nursery/Primary School, Region 3
- Caria Caria Health Outpost, Region 3
- La Harmonie Primary School, Region 3
- 47 Miles Health Centre, Region 10
- GEA's Base at Berbice, Region 5

GEA therefore conducted repairs and upgrades to 13 solar PV systems with a total capacity of 18.265kWp in 2020.

1.4.6 **TERI**

Under a Memorandum of Understanding between the Energy and Resources Institute of India (TERI) and the Government of Guyana, experts from India provided support to the Government of Guyana in the last quarter of 2020 in the identification of suitable technology for the solar home systems for Hinterland communities, review of technical specifications of the Mahdia and Leguan solar farms, commencement of a feasibility study on the integration of a rice husk based power gasifier for Leguan, commencement of a feasibility study for the integration of solar PV at the Cheddi Jagan International Airport, commenced performance evaluation of pump stations for the Guyana Water Inc. and the National Drainage and Irrigation authority.


January 2021

THE REPUBLIC OF GUYANA

Leguan Island Sustainability:
Integration of Rice husk based Power Gasifier

Submission
Ministry of Finance
Georgetown, Guyana

teri
The Energy and Resources Institute

...towards global sustainable development

1.4.7 **Technical Support**

- The Guyana Energy Agency provided technical support to the Embassy of the Federative Republic of Brazil in the implementation of a 46.23kWp grid connected solar photovoltaic system. The equipment comprising the solar photovoltaic system was completed at the Embassy on November 25, 2020.

It is anticipated that energy generation from the solar PV system will be over 5MWh monthly.

- The Guyana Energy Agency provided technical support to the Georgetown Public Hospital in designing a grid-connected solar photovoltaic system for the south block of the GPHC compound. The proposed solar photovoltaic system was designed catering to a daily energy demand of 1,207.08 kWh and will utilize the roof of the maternal block. Installation of a 217 kWp of grid-connected solar photovoltaic systems on the maternal block at the GPHC would:
    - cost about G$45 million
    - generate about 268 MWh of energy annually
    - save G$13,587,030 in electricity charges annually, resulting in a simple payback of 3.4 years
    - avoid 178 tons of carbon dioxide emissions annually

- The Guyana Energy Agency provided technical support to the Food and Agriculture Organization (FAO) of the United Nations on the design of a proposed PV system at its new office building located at La Bonne Intention on the East Coast of Demerara. A photovoltaic system having an array size 32,000 watts peak (32.00 kWp) was recommended. A system of this size will likely cost about G$7,118,443. This system will likely utilize about 194 m2 of space on the roof. A system of this size will produce about 44,134 kWh of energy annually. The estimated energy which is expected to contribute about $2,596,403 yearly in electricity costs. The avoided CO2 emissions will be 29,879 kg annually. The simple payback on this investment will be 4.2 years.

- During 2020 Guyana Energy Agency:
  - Conducted an Energy Assessment of the Guyana National Shipping Corporation Ltd. office at 5-9 Lombard Street.
  - Made recommendations on energy efficient practices, and designed a renewable energy system (Solar PV system) to reduce the cost of utility bills and CO_2 emission for the GNSC.
  - Drafted a Memorandum of Understanding (MOU) and tender documents to commence implementation of the solar PV system.
  - Provided 540 (five hundred and forty) 4 feet energy efficient LED tubes for installation at the GNSC office.

- The Guyana Energy Agency provided technical support to the GPL and CARICOM in their Integrated Utility Service (IUS) project through the installation of the agency's energy monitoring system at UMAMI Incorporated. UMAMI Incorporated manufactures a range of value added, high quality agro-processed food commodities to include sauces, seasonings, and condiments. The agency's instrument was installed for a duration of one (1) week at the mains utility supply at the factory to capture the following details:
  - Power demand in kW

- Voltage (V) and current (I) measurements at supply circuit
- Energy measurements in kWh at mains supply circuit

FLUKE Energy Monitoring System at mains supply

- The Guyana Energy Agency provided technical support to the University of Guyana towards a solar energy research project currently conducted between the Faculty of Engineering and Technology and the Faculty of Health Sciences. This collaborative effort serves to bridge the gap between the medical imaging field and the renewable energy field. The proposed and approved research topic for the Medical Imaging students is titled 'Application of Solar Energy in a Diagnostic Radiological Facility within Guyana'. The research is based around powering a Mobile X-ray unit with solar energy, it is a first of its kind attempt in Guyana and can prove to be invaluable in aiding medical facilities across the entire country. The Guyana Energy Agency had supported the project through the procurement, installation and testing of the alternative energy system. An illustration of the system is provided below.

Alternative Energy System for demonstration project

This unit was located at the St. Joseph's Mercy Hospital for about one (1) week where over 60 x-rays were conducted. The X-ray machine was successfully powered by the alternative energy system during these tests.

- The Guyana Energy Agency provided support to the Ministry of Public Infrastructure through the procurement of one hundred and ninety-four (194) solar runway and edge lights along with six (6) handheld remote controllers. These lights are planned for installation at six hinterland runway/air strips namely:
  1. Mabaruma
  2. Port Kaituma

3. Mahdia
4. Bemichi
5. Paramakatoi
6. Baramita

- During the month of February, the Guyana Livestock Development Authority (GLDA) contacted the GEA in relation to a recurring fault at their main office at Agriculture Road. The complaint was that there was a fluctuation on the mains supply which was causing major flickering of the lights and affecting other electrical equipment.

  GEA's Engineers visited the facility and connected one of the Energy Data Loggers to the mains circuit to determine the source of the fault and variation in the electrical parameters that were being caused. It was observed that there was an imbalance on the line currents which indicates that the loads are not distributed evenly on the power supply cables. GEA provided a number of recommendations to GLDA to address the problem.

- The Guyana Olympic Association request GEA's assistance to analyse the quotations they had received from suppliers for the installation of outdoor lighting at the Guyana Olympic Association Turkeyen. The analysis was done and a report was prepared and submitted.

- The Guyana Energy Agency supported the Basic Needs Trust Fund Implementation Agency by providing technical support in the implementation process of the BNTF9 Sub-Projects which entails the installation of renewable energy systems at the following 11 locations:
    - Suddie
    - Dartmouth
    - Anna Catherina
    - Supply Primary School
    - Kuru Kururu Primary School
    - Yarrowkabra Primary School
    - One Mile ECDC
    - Ithaca ECDC
    - Ann's Groove ECDC
    - John the Baptist Primary School
    - Paramakatoi Primary School

1.5 Hydropower

1.5.1 **Small Hydropower Project for the Cooperative Republic of Guyana (GUY1015)**

During 2020, GEA received approval to advance the rehabilitation and construction of the Moco Moco (700 kW) and Kumu (1.5MW) in Region 9. The project aims to support the Government's renewable energy drive by providing affordable and reliable electricity to hinterland communities, using indigenous energy sources and reducing fossil fuel consumption and carbon dioxide emissions for electricity generation.

Key Project Milestones accomplished in 2020 are shown in the table below.

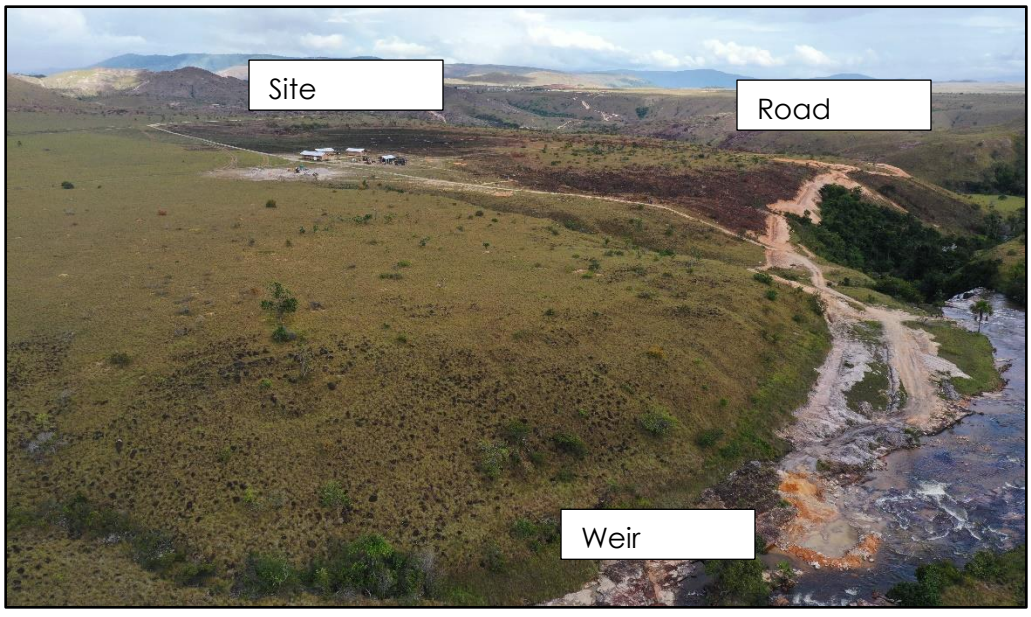
Signature of the Financing and Agency Agreements	Agreements signed on June 8, 2020
Effectiveness of the Financing Agreement	The financing agreement was ratified by the current administration in November 2020 and the legal opinion issued by the AG on December 9, 2020. Approval was also received from the Village Council of Kumu/Quarrie/St Ignatius and Tashao of Moco Tasha Village in 2019. Outstanding is the letter from the MoF confirming that the concerned department charged with servicing external debt has been instructed to make payment of the Payment Installments on the due dates. This is expected to be completed before the end of March 2021.
Launch of General Procurement Notice	The GPN was advertised on January 18, 2020
Hiring of Procurement Specialist for the PMU	The procurement process commenced on October 17, 2020. The closing date for applications was December 1, 2020. The evaluation report was submitted for IsDB review and no objection on December 30, 2020. Other staff such as the Project Manager, Finance Specialist, Civil/Hydropower Specialist and

	Monitoring Assistant will be assigned to the PMU.
Topographic survey for Kumu	Survey was completed in August 2020
Geological and geotechnical investigation or Moco Moco	Contract was awarded in December 2020 for a duration of 3 months.
Bidding documents for Procurement of EPC Contract for Kumu and Moco Moco plants.	Draft bidding documents submitted for IsDB's review on November 25, 2020

Implementation of the project will commence in 2021 after the effectiveness of the Financing Agreement.

1.5.2 Kato Hydropower Project

GEA's Hydropower Engineers supported the Hinterland Electrification Company Inc (HECI) with the advancement of the 150kW Kato Hydropower Project. The Kato 150kW Hydropower Plant Construction which was awarded in 2019 and commenced in 2020, faced many challenges with the most detrimental being the impacts of the Covid-19 pandemic.



In the year 2020 after mobilization, the contractor would have completed approximately 33% of works. The aspect of works which constitute this percentage are engineering designs, site establishment, surveying works, harvesting and stockpiling, surge tank, weir, conveyance & penstock pipeline and access roads. The contractor would have established the site by ensuring the main facilities are in place to provide accommodation and some level of comfort given its remote location. The construction of living quarters, kitchen annex, sanitary annex and a storage annex were 100% completed.

Throughout the year the contractor continuously carried out stock piling of timber, aggregates and laterite on the site which would be readily available when needed. In addition, surveying activities were also continuous on site. Surveying works were carried out on the coffer dam, access road and conveyance & penstock alignment and is approximately 74% completed.

Clearing and grubbing, followed by excavation works, were executed for the surge tank and access roads to the weir and powerhouse locations, which is estimated at 100% and 50% completed, respectively. The conveyance and penstock alignment were fully set out and excavated to the required depth to achieve the design slope. The contractor was able to execute steelworks preparation which are 63% completed for the anchor blocks and 45% completed for the penstock pedestals, 35% completed for the weir and 100% completed for the surge tank.

Stock Piling of materials in Kato

Steel Bending works

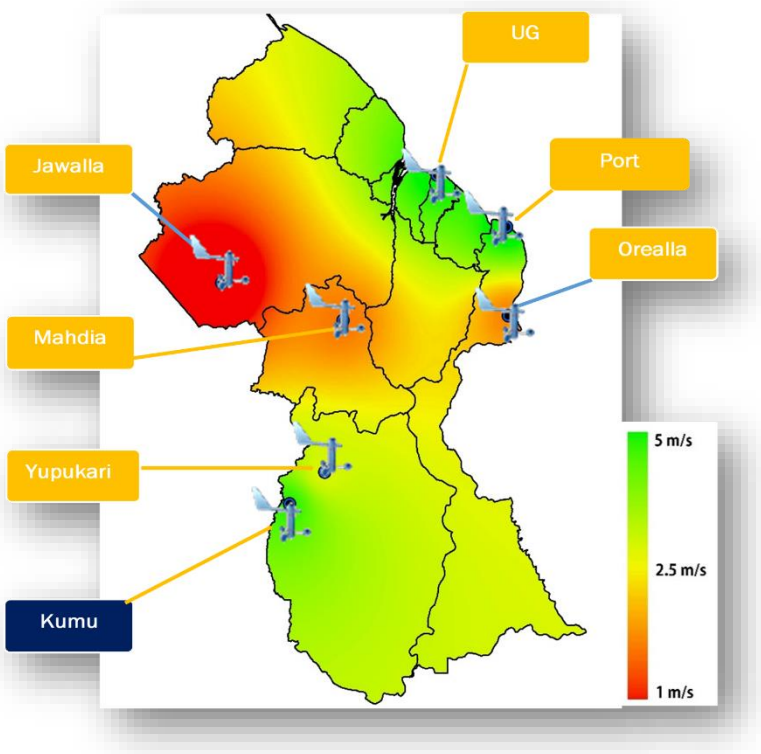
1.5.3 Hydrological Measurements

Despite the pandemic-related challenges in 2020, GEA's Hydropower Engineers were able to install hydrological measurement equipment to help assess the potential for mini and micro hydropower development. Initial measurements have been completed at Paruima, Region 7 and data is currently being collected at Waramadong (Region 7), Amaila (Region 8) and Salboura (Region 8). In 2021, GEA will continue to install hydrological measurement equipment to assess the potential for mini and micro hydropower development at Eclipse Falls (Region 1), Monkey Mountain (Region 8), Chenapau (Region 8), Tumatumari (Region 8) and Tiger Hill (Region 10).

1.6 Wind Energy

1.6.1 Wind Sites Prospecting

GEA identified 7 potential locations/sites along Guyana's Coast to conduct detailed wind resource assessment and consequently the development of utility scale (grid connected) wind farms. GEA has since advanced efforts in having these areas zoned for Wind Farm Development.



GEA has concluded wind speed measurements at: Orealla, Jawalla, Mahdia, Yupukari, Kumu, Quarrie, UG Turkeyen, Port Mourant and the Georgetown Sea Wall.

GEA:

- is currently conducting wind speed measurements at Kato (Region 8) and Quarrie (Region 9).
- is assisting the HECI in siting and wind speed assessments at Onverwagt and other locations along the Coast of Guyana.
- will commence conducting wind speed assessments at Kurukubaru (Region 8), Annai (Region 9) and Leguan (Region 3) during 2021.

1.7 Energy Efficiency Interventions

1.7.1 **Hinterland LED Lighting Programme**

GEA completed the Hinterland LED Lighting Programme which replaced 28,390 inefficient lights with energy efficient LED lamps benefitting 2,715 households & businesses within 6 Hinterland Communities.

The programme's cost was G$33.3 million and based on the energy efficiency savings, has an estimated payback of 1.2 years. During 2019, household level surveys and sensitization programmes were conducted and with the support of HECI and GEI, electricians were trained, certified and employed. Procurement of the lamps and their installation were completed in December 2020. The following provides a breakdown of the quantities of lights installed at the various locations.

	LED Tubes Installed	LED Bulbs Installed
Port Kaituma, Region 1	533	2,852
Mabaruma. Region 1	552	3,599
Matthew's Ridge, Region 1	70	1,004
Mahdia, Region 8	315	2,673
Lethem, Region 9	768	3,458
Kwakwani, Region 10	290	4,866
Total	**2,528**	**18,452**

1.7.2 **Energy Efficiency Interventions**

The Guyana Energy Agency has effected energy efficiency initiatives at a number of government buildings in 2020 through facilitating the changeouts of approximately seven thousand three hundred and fifty-two (7,352) fluorescent lights rated at 40 watts with Light Emitted Diode (LED) tubular lamps rated at 18 watts. The list of the beneficiaries under this initiative are identified in the table below:

Buildings	**Location**	**Quantity**
Capoey Health Post & Teacher's Quarters	Capoey Village, Essequibo Coast	13
Capoey Primary School		2
Capoey Nursey School		9
Anna Regina Fire Station	Anna Regina	48
St. Monica Health Center	St. Monica Village, Essequibo Coast	6
Tapacuma Lake Primary School	Tapacuma Village, Essequibo Coast	2
Regional Health Office	West Coast Demerara	3,750
Guyana National Shipping Cooperation	5-9 Lombard Street, Georgetown	540
Disability Commission	Croal Street	20
Guyana Revenue Authority	Camp Street	2,763
Guyana National Bureau of Statistics	Camp Street	75

Transport & Harbours	Kingston	8
Skeldon District Hospital	Skeldon, East Berbice, Corentyne	100
GEA Base	Bartica	4
Kartabo Primary School	Kartabo Village, Cuyuni Mazaruni	12
Total		**7,352**

LED lights are advantageous since they do not contain any toxic materials and are durable and longer lasting. The likely savings from this intervention is estimated to be about **300.5 MWh** translating into savings of about G**$17,677,940** annually in electricity costs. This initiative is anticipated to result in the reduced demand for power by about **161.74k W** and the avoidance of over 198 tons of CO_2 emissions. The simple payback on this investment will be about 1.4 years.

1.7.3 **Energy Assessments**

During 2020, GEA completed energy needs assessments at the following locations:

1. Sebai, Region 1	8. Whyaka, Region 2

2. Karaburi, Region 1	9. Loo Creek, Region 4
3. Government buildings in Region 1	10. Waramadong, Region 7
4. Tapakuma, Region 2	11. Paruima, Region 7
5. St. Monica, Pomeroon Region 2	12. Kurukabaru, Region 8
6. Mission Capoey, Region 2	13. Annai, Region 9
7. Lake Top Capoey, Region 2	14. Iwokrama, Region 9

The energy assessments were completed to aid in the design of suitable solar photovoltaic mini-grids to supply sustainable energy to the respective communities. The designs will be used to prepare submissions for Budget 2021.

Site visits to prepare energy assessment reports were also completed at another 25 locations during the year:

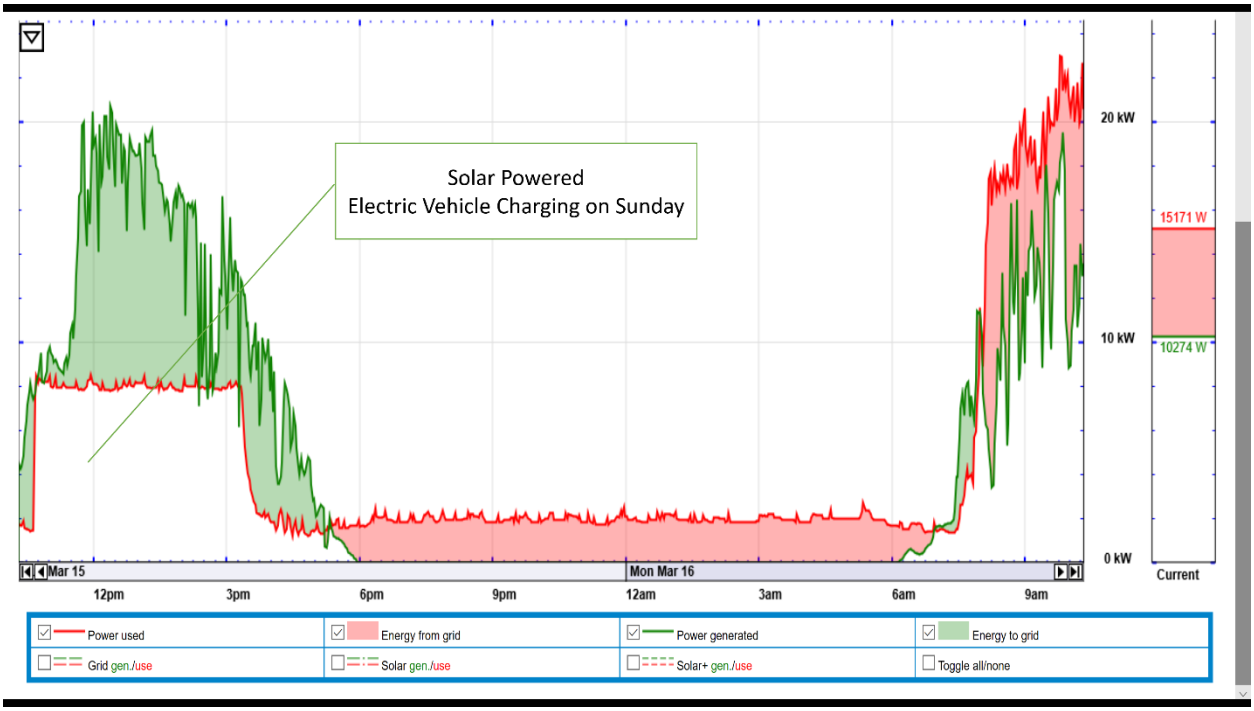
	Name of Village	**Region**
1	Akawini	2
2	Karawab	2
3	Bethany	2
4	Mashabo	2
5	Saxacalli	3
6	Santa Aratack/Santa Mission	4
7	Vevay	5
8	Wikki/Calcuni	6
9	Jawalla	7
10	Kako	7
11	Batavia	7

	Name of Village	**Region**
14	Quebanang	7
15	Imbaimadai	7
16	Kambaru	7
17	Kabakaburi	8
18	Princeville	8
19	Karasabai	9
20	Sand Creek	9
21	Aishalton	9
22	Potarinau/Ambrose	9
23	Shulinab	9
24	Rockstone	10

12	Omaniak	7	25	Great Falls	10
13	Karrau	7			

1.7.4 **Electric Mobility**

Government's first electric vehicle was procured through a GEA-led initiative. The Nissan Accenta 2019 Leaf has a range of up to 239km on a single charge. The electric car is normally charged from GEA's existing grid-connected solar P V system on Sundays and except for some rainy/cloudy days, is therefore mainly charged from a renewable energy source. Depending on the state of



discharge, the charging time is between 3 to 5 hours, once per week. In its current state, the vehicle's battery, with the use of air-conditioner, provides a range of about 215km at 6km per kWh. If energy is purchased from GPL at Government Commercial rate of G$58.83/kWh, the cost p er km driven would be about G$10 per km.

1.8 CARICOM Energy Month

On November 27th, 2020 The Guyana Energy Agency (GEA) held its Award Ceremony for the winners of its recently concluded Art Competition. Under the theme 'My Vision for a Smart City/Town in Guyana in the Year 2040', the aim of the art competition was to create interest among young people about a sustainable energy future for the country.

The prize-giving ceremony of the Art Competition was organized as one of the activities to commemorate CARICOM Energy Month 2020 which is being observed across the Caribbean from November 1-30, under the theme 'A RE-silient Community: Energy at the Centre'. The competition was launched in March 2020 and a total of forty-three (43) entries were received from students across Guyana. In addition to the first, second and third place entries, ten (10) additional pieces were selected for inclusion in the design of the Agency's 2021 Calendar.

The first-place prize of G$75,000 and a trophy went to Devanjali Ramkellawan of Abram Zuil Secondary School. The second-place prize of G$55,000 and a trophy went to Ntini August, while Shakira Rahaman copped the third prize of $30,000 and a trophy. Ten additional trophies were conferred to Emille Outram, Maitri Vathada, Nerissa August, Arantxa English, Teanna Mentore, Michael Hing, Lathica Kandavel, Ema Gangadin, Kathryn Hamilton, and Annie Joseph for their outstanding pieces. Awards were presented by the Honorable Prime

Minister, Brigadier (ret'd) Mark Phillips, and Dr. Mahender Sharma, Chief Executive Officer of the Guyana Energy Agency.

Also, at the event, the Agency's "Green My Life" Booklet was also launched and is currently available for download on GEA's website: www.gea.gov.gy.

BOOKLET, BROCHURE AND CALENDAR DISTRIBUTION

As part of CEM 2020 activities the GEA distributed a quantity of the "Green My Life" booklet; the "What is Energy?" activity booklet; the "Guideline to Energy Efficient Homes" booklet along with the Agency's 2021 Calendar and seven (7) of the Agency's brochures. This distribution was done at the Art competition award ceremony.

INFORMATION DISSEMINATION THROUGH PRINT, BROADCAST AND TELEVISED ADVERTS

During Energy Month information on sustainable energy, renewable energy technologies, and energy conservation and efficiency measures were broadcasted. A full-page advertisement was placed in all four (4) of Guyana's newspaper outlets informing of CARICOM Energy Month, the theme and planned activities for Guyana. For television, a total of one hundred and fourteen (114) ads were aired in the form of adverts, infomercial and/or notifications.

LAUNCH OF SOCIAL MEDIA PRESENCE

During Energy Month the Guyana Energy Agency launched social media presence on Twitter and Instagram.

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 implementation of the provisions 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.

Despite the challenges of the Covid pandemic, the Licensing Division issued at total of 1,219 licences in 2020. To comply with the Government's Covid-19 emergency measures. while still continuing operations, the Agency accepted applications through its online hub as well as through email and WhatsApp. Additionally, payments for licences were accepted through the Agency's account to reduce the need for customers to visit the Agency to complete the licensing process. Penalty fees were waived for a period as licence holders experienced difficulties in obtaining supporting documents in a timely manner due to the closure or limited operations of sister Agencies.

Table Showing Licences Issued in 2020

Licences Issued		2020													2019	Total
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD	YTD	Growth
Importing Wholesale		2	3	1	0	3	4	0	6	4	8	3	4	38	40	-5%
	Export	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Wholesale		0	4	0	0	0	0	0	2	5	0	0	3	14	14	0%
Retail	Petrol Filling Stations	2	4	3	0	0	0	4	9	10	17	17	11	77	68	13%
	Others	20	48	24	4	2	28	24	67	49	63	83	43	455	521	-13%
	Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-100%
Consumer Installation		1	8	12	3	8	15	16	9	25	8	12	6	123	165	-25%
Bulk Transportation Carrier	Road Tanker Wagons	21	24	9	2	2	9	15	20	31	17	16	16	182	204	-11%
	Trucks	25	18	29	1	2	15	26	29	37	32	32	23	269	321	-16%
	Fuel Barges	0	0	0	0	0	0	0	0	0	3	0	0	3	6	-50%
	Boats	5	6	5	0	3	1	2	8	8	8	7	5	58	66	-12%
Total		76	115	83	10	20	72	87	150	169	156	170	111	1219	1406	-13%

The Division recorded a 39% decrease in the number of sites inspected from 812 in 2019 to 495 in 2020 as the Agency sought to limit employees' physical interaction with others. Despite the decrease in inspections, applicants and licence holders were required to submit photographs of their sites prior to licences being issued. Additionally, the Division commenced conducting virtual inspections to ensure compliance by licence holders.

Type of Inspection	2020													2019	Growth
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	YTD	YTD	
Petrol Filling Stations	3	12	6	0	0	0	61	51	8	16	4	1	162	158	3%
Others	24	95	17	0	0	0	0	1	0	0	20	0	157	334	-53%
Consumer Installations	1	13	13	0	0	0	0	0	0	0	5	0	32	62	-48%
Road Tanker Wagons	13	17	11	0	0	0	1	5	1	3	0	2	53	82	-35%
Trucks/ Canters	18	15	10	0	0	0	4	6	3	1	8	2	67	157	-57%
Barges	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
Boats	10	0	0	0	0	0	0	0	0	0	0	0	10	11	-9%
Imports	0	2	2	0	0	0	0	0	0	1	1	0	6	3	100%
Wholesale	0	1	2	0	0	0	0	2	0	0	0	3	8	5	60%
Total	69	155	61	0	0	0	66	65	12	21	38	8	495	812	-39%

Table Showing Inspections Conducted in 2020

3.0 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.

Marking Officers supported a total of 340 bulk marking operations in 2020 compared to 399 for 2019.

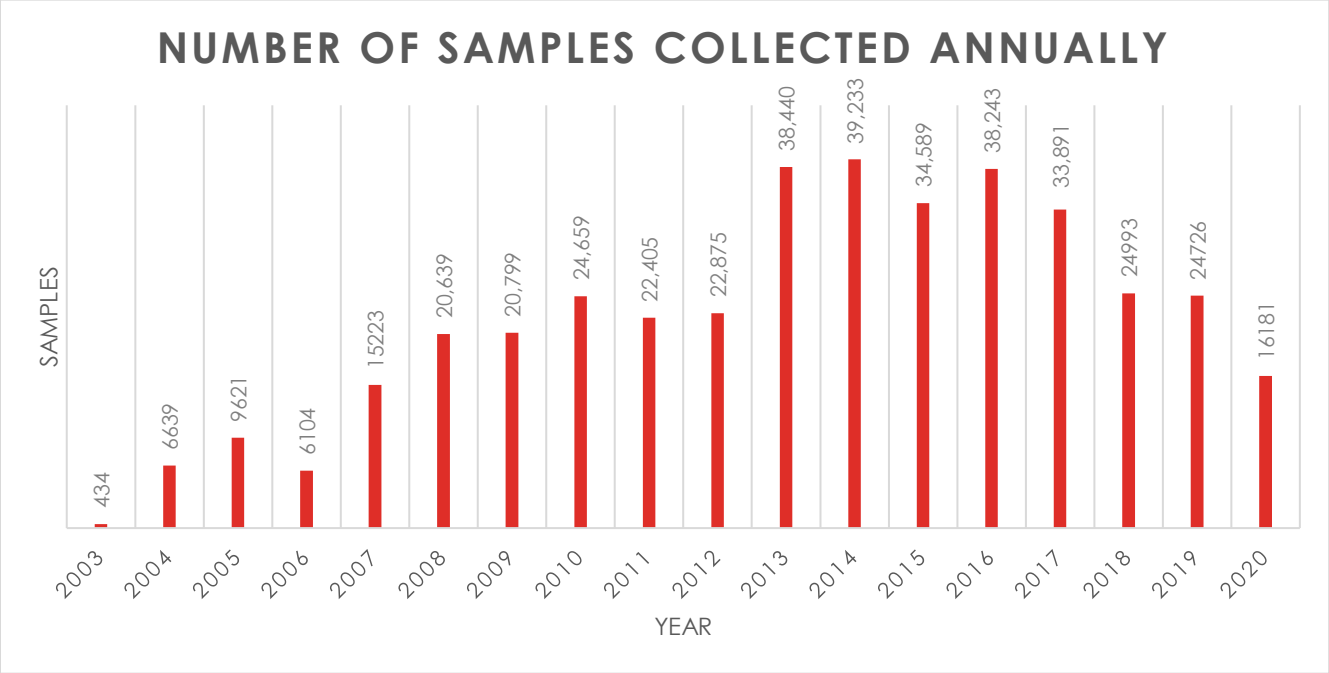
The Authentix Country Manager Liaison and Quality Manager provided the following oversight functions:

- Monitoring, verification, assessment, reconciliation and projections for marker concentrate received and used by GEA
- Assistance in repairing/maintaining the injectors
- Training of new staff - bulk marking and daily marking
- Training of staff to repair and service the bulk marking injectors
- Training and recertification of Inspectors
- Assisting and supporting the implementation of a quality management system for the laboratory and the development of new procedures for ISO/ IEC 17025 Accreditation.

3.1 Sample Analysis

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 number of fuel samples collected/logged each year:



Owing to the impacts of the pandemic in 2020, the number of samples collected during the year reduced by 35% compared to 2019.

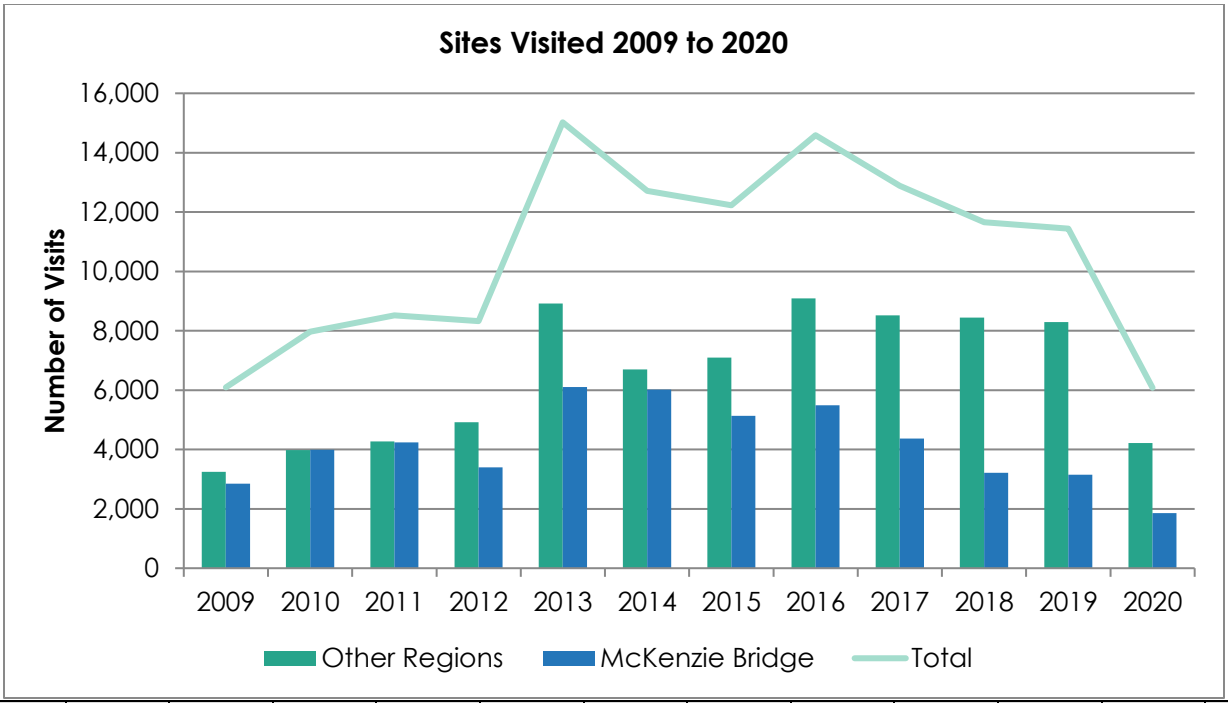
Region	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	20	55	59	273	-	20	41	2	3	0	0	2
2	1,173	1,920	1,408	1,673	2,250	1,894	1,261	2,663	1,502	1,569	1,572	1,111
3	3,927	3,741	2,419	3,479	4,167	2,727	1,926	2,582	2,524	2,112	1,509	1,307
4	1,848	4,420	3,289	4,595	5,291	5,189	3,866	6,112	6,011	5,672	3,860	3,138
5	420	1,160	827	1,479	1,274	710	500	1,134	870	920	657	329
6	376	627	829	931	1,167	919	659	1,673	1,078	850	436	540
7	170	286	140	295	354	377	1,982	2,279	2,369	1,527	2,949	2,046
8	76	130	12	135	25	62	72	77	36	89	28	71
9	5	93	1	64	-	53	94	122	93	68	15	50
10	12,236	15,839	15,858	12,770	24,671	30,452	24,505	26,517	22,008	14,581	14,344	9,137
Total	**20,251**	**28,271**	**24,842**	**25,694**	**39,199**	**42,403**	**34,906**	**43,161**	**36,494**	**27,388**	**25,370**	***17,731***

Number of Quantitative Analyses by Region

Samples tested using the quantitative methodology have declined by nearly 30% in 2020 from the previous year. While there is a trend of decline since 2016, three administrative regions have recorded increases for 2020 – Regions 6, 8 and 9.

3.2 Analysis by Site

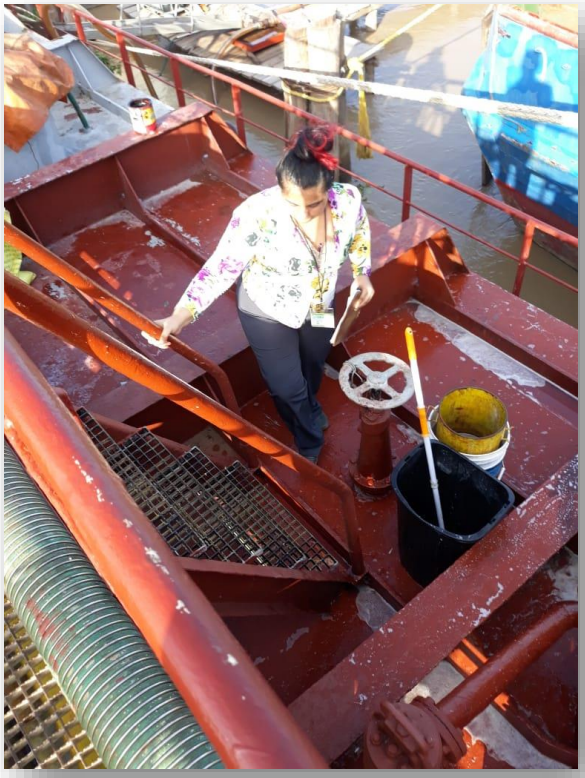
There has been a 47% decline in site visits in 2020 from the previous year mainly on account of the COVID-19 pandemic. Essentially from March to October 2020 inspectors were grounded and sampling kept to priority sites – more so focusing on the major terminals whenever marked during this period. Limited sampling exercises were conducted in the interior locations of Region 1, 7, 8 and 9. Two operations were conducted at Lethem and Mahdia respectively during the course of 2020. Barring no major disruption to the work programme in 2021 site visits are expected to increase for the year.



Visits by Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
McKenzie Bridge	2,849	3,994	4,239	3,401	6,105	6,015	5,130	5,488	4,364	3,215	3,148	1,860
Other Regions	3,242	3,975	4,276	4,922	8,917	6,701	7,097	9,095	8,518	8,440	8,290	4,219
Total	6,091	7,969	8,515	8,323	15,022	12,716	12,227	14,583	12,882	11,655	11,438	6,079

Of the 6,079 total site visits conducted during the year, 981 sites were sampled at least once.

4 (1%) of the sites sampled at least once were found with *significant dilution (defined as more than 50%)* in at least one tank. The percentage of sites found with significant dilution in at least one tank has progressively decreased from 34% in 2006. The incidence of fuel smuggling continues to be low as the number of sites found with significant dilution in at least one tank remains relatively low.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
No. of Sites samples at least once	763	656	566	592	1,202	1,313	1,179	1,648	2,146	2,200	1,446	2,253	1,852	1,874	1,551	981
No. of Sites found with significant dilution in at least 1 tank	240	220	128	57	73	45	21	13	35	51	37	27	29	26	10	4
% of Sites found with significant dilution in at least 1 tank	31%	34%	23%	10%	6%	3%	1.8%	0.8%	1.6%	2.3%	2.6%	1.2%	1.6%	1.4%	0.6%	1%

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 less than 2% of the samples analysed. Significant levels of adulteration were detected in less than 1% of sampled collected from 2013 to 2020.

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% & Over	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% & Over	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%
Test Results (Quantitative Analyses)	*2016*		*2017*		*2018*		*2019*		*2020*					
0 – 50%	357	<1%	254	<1%	272	1%	93	<1%	55	<1%				
51 – 70%	73	<1%	52	<1%	29	<1%	109	<1%	37	<1%				
71 – 90%	30,322	78%	19,332	58%	15,219	62%	15,511	64%	8,454	51%				
91% & Over	8,141	21%	13,807	41%	8,872	36%	8,486	35%	7,882	48%				
Total	38,893	100%	33,445	100%	24,392	100%	24,199	100%	16,428	100%				

3.4 Incidents of Illegal Fuel

The Division recorded a total of 4 Incidents of Illegal fuel in 2020.

Annual Incidents Recorded by Month 2009 – 2020													
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
2016	3	2	2	2	3	3	4	2	5	1	0	0	27
2017	0	1	4	7	3	3	0	5	0	5	0	1	29
2018	2	4	1	0	1	3	5	3	1	5	1	0	26
2019	2	3	1	0	0	1	0	0	0	2	1	0	10
2020	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**4**

Joint Operations

Despite the pandemic-related challenged and the availability of functioning equipment from sister agencies, a total of nine joint operations were conducted during the year.

Month	2020				2019				2018			
	GPF	***GDF***	***GRA***	***Total***	***GPF***	***GDF***	***GRA***	***Total***	***GPF***	***GDF***	***GRA***	***Total***
Jan	-	-	-	-	-	-	1	1	4	-	2	6
Feb	2	1	-	3	1	-	-	1	2	1	-	3
Mar	-	-	-	-	2	-	-	2	3	1	-	4
Apr	-	-	-	-	-	-	-	-	3	-	2	5
May	-	-	-	-	1	-	-	1	1	-	1	2
Jun	1	-	-	1	-	-	-	-	3	1	-	4
Jul	1	-	-	1	-	-	2	2	-	-	-	-

Aug	-	-	-	-	-	-	-	-	3	-	1	4
Sep	1	-	-	1	1	-	-	1	2	-	1	3
Oct	1	-	-	-	-	-	-	-	-	-	2	2
Nov	-	-	-	-	-	1	-	-	-	-	-	-
Dec	-	-	2	2	-	-	-	-	2	-	-	2
Total	**6**	**1**	**2**	**9**	**5**	**1**	**3**	**9**	**23**	**3**	**9**	**35**

Key:

GPF - Guyana Police Force
GDF - Guyana Defence Force
GRA - Guyana Revenue Authority

3.5 Quantity of Illegal Fuel Seized

Total Fuel Seized Annually (UK GAL) 2005 – 2020							
2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
3,011	8,001	21,793	33,560	33,443	21,242	10,273	6,004
2013	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
2,931	3,785	6,200	19,721	11,355	13,929	1,932	21,725

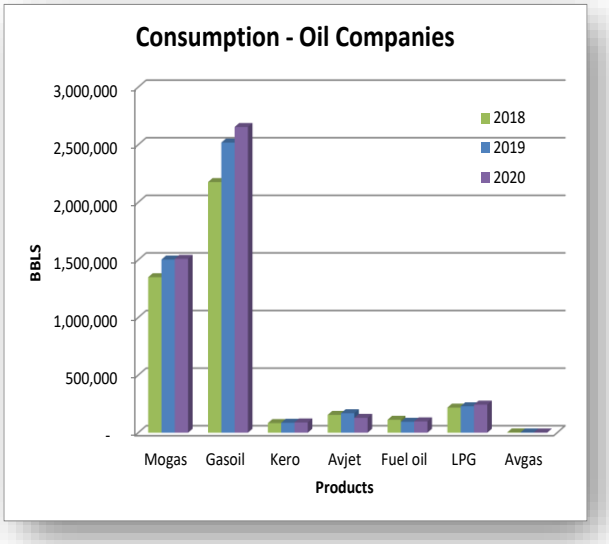
Despite the pandemic a shipment of illegal fuel was detected in the Essequibo River which contributed significantly to reported figure.

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 (except for large duty-free consumers).

TOTAL CONSUMPTION - OIL COMPANIES (BBLS)					
January - December		2018	2019	2020	% change
	Mogas	1,349,687	1,503,160	1,509,019	0.39%
	Gasoil	2,175,671	2,518,440	2,653,662	5.37%
	Kero	83,581	86,221	89,230	3.49%
	Avjet	154,850	168,921	128,935	-23.67%
	Fuel oil	112,299	94,834	98,491	3.86%
	LPG	217,898	229,440	243,656	6.20%
	Avgas	2,438	2,191	2,149	-1.92%
	Total	4,096,423	4,603,207	4,725,142	2.65%
	Bpd	11,192	12,612	12,946	2.65%

For the oil companies, 4,725,142 barrels of petroleum-based products were sold in 2020 with an average of 12,946 barrels per day. This represents a 2.65% increase when compared to 2019[4]. There were increases in the consumption of gasoline, diesel, kerosene, cooking gas and fuel oil while consumption of jet fuel and aviation gasoline declined for the year.



The increase in gasoline consumption for 2020 can be attributed to an increase in motor vehicle registration and the relatively larger increase in LPG consumption suggests greater use of cooking gas over kerosene.

There was also a minor increase in diesel consumption. Despite contractions in the sugar, gold and diamond mining, forestry, fishing, manufacturing and service sectors, consumption was generally buoyed by growth in the rice sector and upstream activities. It may also

[4] Gasoil and Fuel oil purchased locally by GPL from the oil companies were discounted to avoid double counting.

presumably result from decreased availability of smuggled fuel due to the success of the monitoring and enforcement activities of the Fuel Marking Programme.

3.7 Prosecutions

For 2020, the Agency instituted the charge of possession of illegal petroleum against Nand Narine. At the close of 2020, this matter was ongoing.

An action was filed against the Chief Executive Officer of the GEA and the Commissioner General of the GRA by Atlantic Fuels Inc. for the seizure of and refusal to mark a quantity of diesel imported by the company. At the end of 2020, the matter was ongoing.

A draft of the revised Petroleum and Petroleum Products Regulations was sent to the Honourable Minister within the Ministry of Public Works for review.

4.0 Administration and Human Resource Division

The Agency commenced the year with a staff complement of one hundred and seven (107) employees and ended the year with one hundred and twelve (112) employees.

The following positions were filled during the year:

- 3 Inspectors
- 1 Manager, Marking Section
- 1 Senior Marking Officer
- 2 Electricians
- 1 Head Admin/HR
- 1 Energy Engineer
- 2 Hydropower Support Engineers

Resignations:

- 1 Marking Officer
- 1 Head Admin/HR
- 1 Driver/Office Assistant
- 1 Public Communications Officer
- 1 Admin/Procurement Officer

Terminations:

- 2 Inspectors

4.1 Professional Development

		Actual Training for 2020
Organize and install suitable capacity building and professional development programmes to provide employees with requisite knowledge and skills.	Number of training programmes	28
	Number of Officers trained	72

Training Summary

	Dates	Facilitator	Aim	Participants	Cost
1	January 21-25, 2020	Office of Climate Change, Duke Lodge	Building Technical Capacity to update Guyana's National Determined Contribution	Rosshanda Bagot	Free
2	January 29-30, 2020	Pegasus Hotel	Workshop on business models for Renewable Energy projects in Guyana. workshop is part of the GCF Readiness project "*Enhancing Guyana's Access to GCF to Transition to Renewable Energy*	Rosshanda Bagot, Shevon Wood, Mahender Sharma	Free
3			GGGI Concept Note Training	Damion and Latchman	Free
4	Feb 27	Ministry of Foreign Affairs	National Workshop for Stakeholders Engagement on the Legally Binding Instrument for Conservation & Sustainable use of Marine Biological Diversity of areas beyond National jurisdiction	Orlando Arno	Free
5	Oct 5-9, 2020	Ministry of the Presidency	Customer Service	Greganne Garnett	Free
6	October 12,2020	Ministry of the Presidency	Capacity Building NABCEP PV Associates and Inspector Training	Brian Constantine, Rosshanda Bagot, Kenny Samaroo, Cyril Ohanwusi	Free
7	November 3, 2020-present	Office of the Prime Minister	Online Cyber Resilience for Development Training	Tracy Brammer, Shareefa Baksh Toolsiram	Free
8	November 9-13, 2020	Ministry of the Presidency	Supervisory Management	Alecia Horne, Ryhan Stephens	Free

5.0 Finance Division

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.

Appendix: Legislation, Mandate and Overview of the Divisions

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 Minister of Public Infrastructure 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.