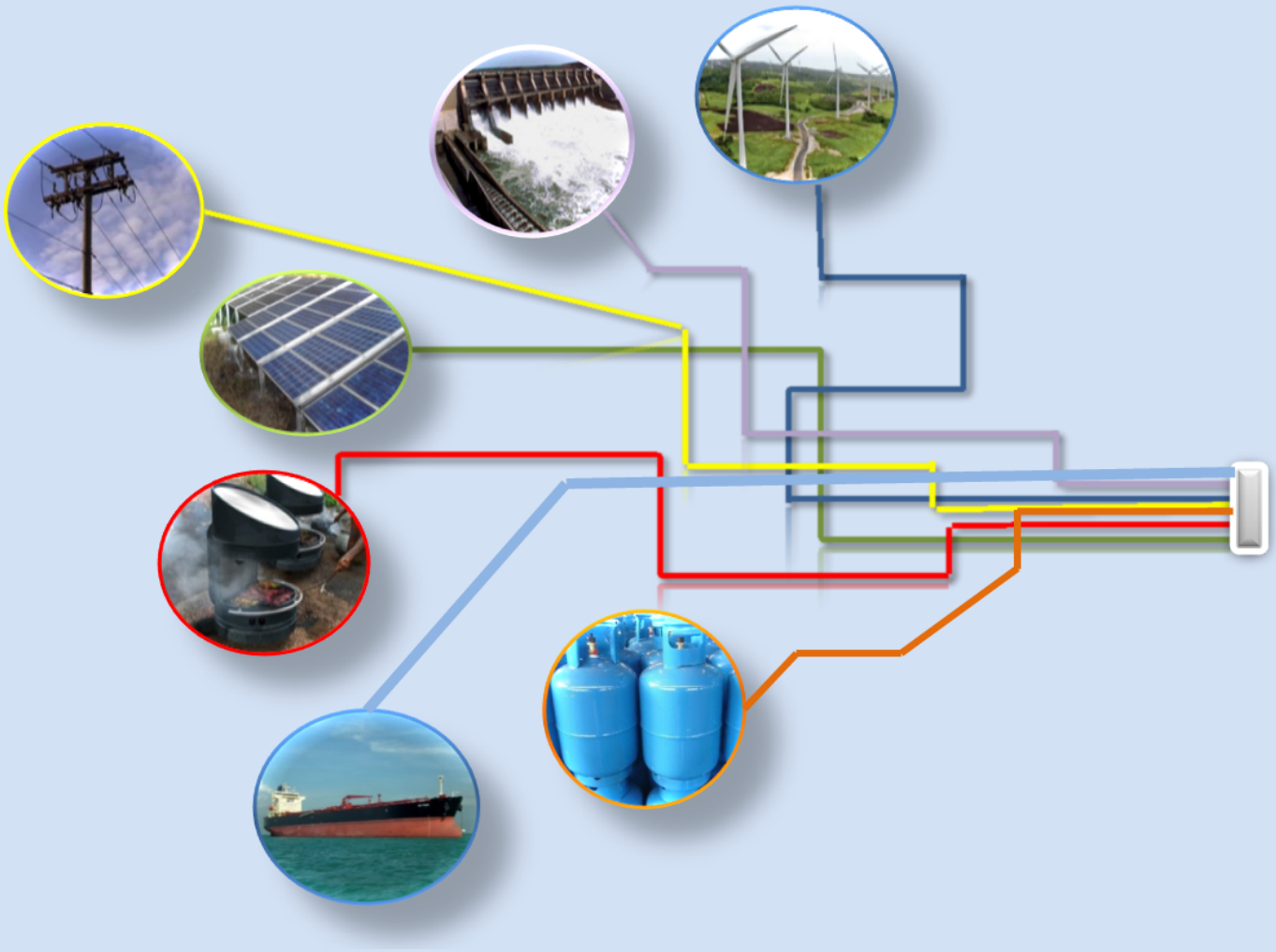


IMPROVING ACCESS TO ENERGY MARKETS – PHASE 1: JAMAICA

Lucid Interpretations
Nov 2014

Contract No. CPSC 034/2014

Between

Latin America Energy Organization (OLADE)

And

Lucid Interpretations Consultants

Title of Consultancy:
Improving Access to Energy Markets – Phase 1: Jamaica

Consultancy Completed By:
Lucid Interpretations
Kingston, Jamaica

ACKNOWLEDGEMENTS

Improved access to energy markets, particularly sustainable energy, presents the possibility to improve a country's level of sustainable development. This will improve its economic competitiveness, generate necessary employment, improve environmental health, and liberate many from the privations of poverty. Clean energy will also make meaningful contributions to the country's programme of climate change mitigation.

The authors wish to recognize the assistance received from various sources, including Government of Jamaica (GOJ) institutions, members of the private sector, academia and civil society. Without their data and an insight into their plans and aspirations, it would have been far more difficult to complete this report.

We thank the Latin American Energy Organization (OLADE) for having offered us the opportunity to provide it with our services.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PICTURES

1.0 INTRODUCTION

Jamaica has no commercialized fossil fuel resources. Currently, its renewable energy resources are insufficiently developed and therefore provide less than 10% of its electricity needs. Approximately 93%-95% of Jamaica's annual electricity production for the national grid is produced using imported oil (Ministry of Science, Technology, Energy and Mining; Acres Management Consulting (2007)). Consequently, the economy has no energy security and is fully exposed to oil price volatilities and supply unpredictability, including the international politics that drive energy supply. This situation is made more serious since Jamaica currently has no statistically significant diversity of fuel supply, in respect to electricity generation.

Over 55% of the fossil fuel driven generation capacity has been in service for over 35 years and the efficiency and reliability levels of some of the older units are of concern (Ministry of Science, Technology, Energy and Mining; Acres Management Consulting (2007); Jamaica Public Service Company).

The economy has a high energy intensity index, largely due to the energy intensive alumina manufacturing sector, and the inefficient use of energy, especially in electricity generation. There is significant fear within Jamaica's environmental lobby that similar to the expanding economies of several countries within the Americas, China and elsewhere, the increased use of fossil fuels, particularly coal, for transportation and electricity generation will drive increased greenhouse gas emissions, worsen media pollution, especially air and water, and reduce national health indices, particularly in respect to respiratory diseases. The cumulative impacts will be significant societal and environmental costs that may threaten economic growth. While there may be a basis for this fear, it is the responsibility of the Jamaican government to ensure that it does not materialize.

The bauxite mining and alumina refining sector is a significant component of Jamaica's industrial base and is totally reliant on imported petroleum products for its energy. Energy losses in the Jamaica Public Service Company Limited's (JPSCo) transmission and distribution systems, plus social electricity[1] combined exceed 26% of the power generated and dispatched by the Jamaica Public Service Company Limited (JPSCo) (Jamaica Public Service; Office of Utilities Regulation; Ministry of Science, Technology, Energy and Mining; Acres Management Consulting (2007)).

The current institutional structure for the electric power sector combined with political and commercial factors have resulted in delays in establishing a national electricity plan, changing the existing structure of the electricity market and in implementing the projects needed to address key issues. Some of the latter include the removal of the monopoly on electricity distribution and transmission; improving generation, distribution and transmission efficiencies in line with accepted international standards, and reducing electricity prices as part of a multi-arm platform of measures to improve the country's competitiveness.

[1] Social electricity is a euphemism for the illegal abstraction of electricity from the national electric grid and the non-payment for the utility. Largely a problem in many poor neighbourhoods, it also includes sophisticated 'by-pass' systems constructed by financially capable persons.

Commercial scale renewable energy production constitutes approximately 8% of the energy entering the national electric grid. Independent stand-alone systems in private residences, farms and other commercial operations constitute an estimated 2%. The latter figure has been growing by more than 10% per annum since 2010 (Jamaica Solar Energy Association).

1.1 PROJECT OBJECTIVES AND METHODOLOGY

1.1.1 OBJECTIVE AND DESCRIPTION

The objective of this consultancy was to describe and analyse access to energy markets in Jamaica, with the aim of providing a critical analysis of the existing situation, providing recommendations to improve access and creating an effective and dynamic energy market which responds to national needs and development aspirations.

The consultancy was also aimed at helping the Latin American Energy Organization (OLADE) to better understand the structure of Jamaica's energy market, the factors controlling, guiding and impeding access, and the role that OLADE could play in assisting Jamaica to improve access to its energy market.

1.1.2 METHODOLOGY

The methodology involved an assessment of Jamaica's energy market structures, including an analysis of key documents, organizations and an analysis of important segments of the country's economy and existing and pending projects that are likely to impact its energy market.

Additionally, recommendations were made as to an appropriate institutional framework and structural changes necessary to enhance and expand access to energy markets in Jamaica.

1.2 SCOPE OF WORK

The scope of work included the following:

- Diagnose and analyse the energy matrix and its development over a minimum ten year period.
- Present data map of current and potential energy trade within Jamaica, and outside of the region.
- Review, analyse, summarize and present the regulatory framework for the import and export of energy and energy products in Jamaica.
- Analyse and recommend an appropriate institutional framework for Jamaica's energy sector.
- Collate and present data on the infrastructure of existing and planned facilities for international energy trade.
- Analyse the source of funding and mechanisms for international energy trade.
- Compare global and regional energy prices to Jamaica's.
- Describe and analyse the current state of Jamaica's international energy trade and its potential for expansion or contraction.

1.3 ENERGY MARKETS

Energy markets are a sub-set of commodities markets, which include products such as base metals (aluminium, copper, lead, nickel, tin, zinc), precious minerals and metals (diamonds, zircon, rubies and other gems; gold, silver and platinum); lumber and other forestry products, and agricultural products, including fruits, meat and fish.

An energy market focuses on the trade (demand and supply) in energy (nuclear fuel, oil, gas, coal, biomass, etc.) and energy products (electricity, petrol, ethanol, heavy fuel oil, diesel, etc.), plus the support systems that allow for an efficient and transparent market. It also includes:

i. Exploration and development activities leading to the discovery of energy supplies and bringing new energy products to markets; and

ii. The transportation, transmission and distribution of energy and energy products.

Energy markets are generally products of direct and indirect government policies that encourage, and possibly discourage, the development of an energy industry. They may be market-led (competitive structures), state controlled (limited or no competitive structures) or a combination of both approaches.

PICTURE 1 – STUDENTS STUDY UNDER A STREET LIGHT

*Picture source: Screenshot from documentary **Pools of Light** (http://chicagofilmmakers.org/cf/content/pools-light)*

PICTURE 2 – CHARCOAL POTS FOR COOKING

In 2011, nearly 1.3 billion people worldwide or almost 20% of the world's population lacked access to electricity and more than 2.6 billion relied on the traditional use of biomass for cooking (IEA 2013). For the case of Jamaica, approximately 95% have access to electricity. The Planning and Statistical Institutes of Jamaica estimate that about 90% of Jamaica's households have a gas stove, so only 10% of total households are captive market for charcoal and firewood consumption (PIOJ and STATIN 2010).

To provide electricity to all people globally by 2030, a 2.5% increase in generated electricity is necessary. The provision of full energy access to the world's population (including electricity and clean cooking practices) would only increase global energy demand by 1.1% (IEA 2010). Fossil fuel demand would rise by just 0.8% and CO_2 emissions by 0.7%. If provided, access to clean, modern energy services would radically improve the lives of the poor by fostering access to education, promoting gender equality, supporting environmental sustainability, preventing premature deaths from respiratory diseases, and accelerating global economic growth and prosperity.

2.0 COUNTRY PROFILE

2.1 GENERAL BACKGROUND, TOPOGRAPHY AND CLIMATE

With its main island covering 10,991 km^2, Jamaica, an archipelagic state[2], is located in the centre of the Caribbean at 18.15°N and 77.30°W. Its closest neighbours are Cuba, 140 km to the north and Hispaniola, 82 km to the east. At its widest (north to south) and its longest points (east to west), the island measures approximately 82 km and 235 km, respectively. The highest areas are the Blue and John Crow Mountains in the east, with the highest point, the Blue Mountain Peak, rising to 2,256 m and is the seventh highest point in the Caribbean. Administratively, it has fourteen (14) parishes, each with its own capital. Kingston on the south-east coast is its financial, cultural and administrative capital.

Topographically, Jamaica may be divided into three landform regions: the eastern mountains, the central valleys and plateaus, and the coastal plains.

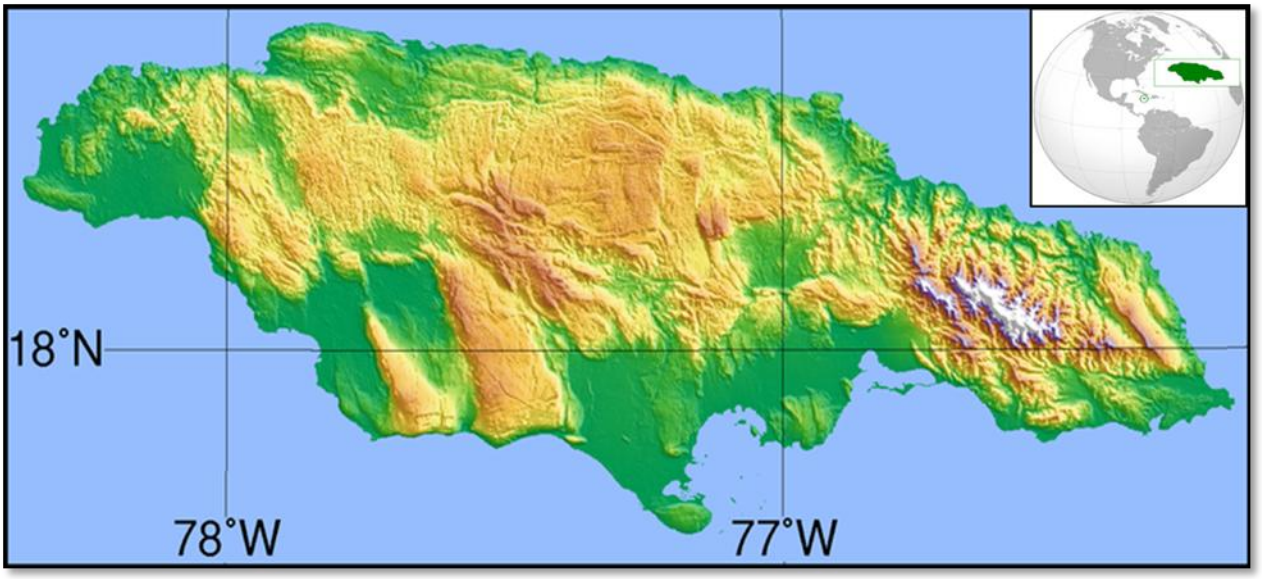
Lying at the edge of the colliding Caribbean and American plates, the landmass of volcanic origin is geologically young and subjected to significant tectonic forces that have created a pronounced series of east – west trending mountains forming a 'backbone' through its centre. Several secondary mountain systems are largely north to south trending with several plains on the south. These systems create a rugged topography, which influence the cost of laying out and maintaining parts of the island's energy infrastructure, especially the electric grid and the road network along which fuel is moved by tank wagons. They also influence an intricate natural drainage system, which is of signal import especially during the hurricane season. As the country lies at the edge of the hurricane track, it usually experiences significant storm damage, most recently between 2004 and 2009.

The climate is tropical with average temperatures between 25.5°C in the winter months and 28°C in the summer. The topography dictates a pronounced upland tropical climate in the mountainous and plateau regions and on the windward side of the mountains, and a predominantly semiarid climate on the leeward side of mountains and coastal plains.

The country experiences two distinct rainfall periods, with the heaviest occurring between May - June and September - October, with peaks in May and October. The average rainfall is 196 cm per year. Rainfall is much greater in the mountain areas facing the north and east where it exceeds 508 cm per year. Since the south-western half of the island lies in the rain shadow of the mountains, it has a semiarid climate and receives fewer than 76 cm of rainfall annually.

[2] Jamaica is generally referred to as a single island. This, however, is incorrect as there are numerous cays and banks within its territorial waters, albeit many of them are unoccupied.

FIGURE 1 - MAP OF JAMAICA



2.2 DEMOGRAPHIC, SOCIO AND MACROECONOMIC OVERVIEW

In 2012 the country's population was estimated at 2.7 million. Of this total, approximately 70% live in urban areas while the remaining 30% reside in the rural areas. The household size generally consists of an average of 3.1 persons per dwelling (STATIN 2013).

The labour force grew to about 1.26 million in 2012 with the participation rate averaging 62.7%. The rate of unemployment, however, has grown to 13.7% after recording 9.8% in 2007 (see Table 1).

TABLE 1: KEY DEMOGRAPHIC, SOCIO AND MACRO-ECONOMIC INDICATORS: 2007-2012

Indicators	2007	2008	2009	2010	2011	2012
Population ('000 persons)	2,667.2	2,676.7	2,686.1	2,695.5	2,709.3	2,711.5
Labour Force ('000 persons)	1,276.9	1,299.6	1,269.8	1,249.7	1,251.3	1,259.7
Unemployment Rate (%)	9.8	10.6	11.4	12.4	12.6	13.7
Rate of Electrification (%)	92	92	93	94	95	96
Real Growth Rate (%)	1.4	-0.8	-3.5	-1.5	1.3	-0.3
Inflation Rate (%)	16.8	16.8	10.2	11.7	6.0	8.0
Average Exchange Rate (J$ = US$1.00)	69.06	72.92	88.49	87.38	86.08	88.99

Source: Bank of Jamaica, Planning Institute of Jamaica and Statistical Institute of Jamaica

Jamaica's rate of electrification, which measures access to electricity, is amongst the highest in the world at 96%.[3] In fact it surpasses the average rate for Latin America and Caribbean region which was estimated at 93.7% in 2009.[4] This has been made possible through the assistance of

[3] This figure changes as persons choose to live in more remote parts of the country and require access to the electric grid.
[4] IEA World Energy Outlook 2011.

government intervention programs aimed at providing electricity and demand side management solutions (which in some instances included renewable energy installations) to households and dwellings in areas away from grid. The Rural Electrification Program (REP) in collaboration with the JPS was integral to this milestone achievement.

The Jamaican economy registered a negative 0.3% average annual GDP growth in 2012 after moving from a favourable 1.3% the previous year. Evidently, the impact of Hurricane Sandy during 2012 had an adverse effect on economic activities in the country, measured by the extensive damage to the infrastructure and productive sectors. The outturn in 2013 is expected to be approximately 1.4%.

The sectors which registered the highest annual average growth in 2012 were hotels and restaurants, finance and insurance services, and agriculture, forestry and fishing.

3.0 ENERGY MARKET STRUCTURE AND INSTITUTIONAL FRAMEWORK

The major participants in Jamaica's energy sector are the Government of Jamaica (GOJ) and the private sector.[5] The GOJ is responsible for policy, legislative and regulatory matters, while the latter is directly concerned with investments, systems operations and managing the sector's commercial side and lobbying the GOJ to obtain more favourable terms.

The Energy Division of the Ministry of Science, Technology, Energy and Mining (MSTEM) has oversight responsibilities for the energy sector, particularly the petroleum industry and the power sector. The Ministry provides leadership for the achievement of an efficient, diversified and sustainable energy sector through the implementation of the energy policy that addresses the country's current and future energy needs; creating, amending and implementing a balanced legislative framework, which protects the interests of all stakeholders; pursuing energy security, and ensuring that the energy sector contributes to the country's development plans.

3.1 JAMAICA'S ENERGY MARKET

Jamaica's energy market may be subdivided as follows:

i. Fuel Import Market
ii. Electricity Market
iii. Domestic Fuel Supply Market – bunkering, LPG, etc.
iv. Finished Product Export Market

A list of the current and potential power plants and refining capacity is available in Appendix IV.

3.1.1 THE FUEL IMPORT MARKET

The fuel import market is the major segment of Jamaica's energy market. It is dominated by crude, which is imported mainly from Mexico and Venezuela, ethanol, very limited amounts of coal[6] and varying quantities of finished products.

The oil import business is dominated by the country's sole oil refinery, PETROJAM, which is jointly owned by the Government of Jamaica and the Government of Venezuela. PETROJAM Ethanol Limited (PEL), a subsidiary of PETROJAM, dominates the importation of hydrous ethanol, which is primarily used in blended gasoline (E-90 and E-87[7]). Other players in the fuel import market include the following:

- **International and regional oil marketing companies**. These include the following:

  i. Total, which bought the local assets of Esso Standard Oil S.A. Limited
  ii. Sol Petroleum
  iii. GB Energy
  iv. Rubis
  v. PEL

[5] A full list of the GOJ entities within the sector is available in Appendix V
[6] This material is imported by the country's sole cement manufacturing plant to assist in providing some of its energy needs.
[7] Ethanol 90 Octane and Ethanol 87 Octane.

GB Energy and Rubis acquired the local assets of Texaco Caribbean Inc.

Sol and Rubis indirectly acquired the assets of Shell in 2012, after the latter had sold its local assets to Cool Petroleum in 2006.

- **Local oil marketing companies**. These include:

  i. Petroleum Company of Jamaica Limited (PETCOM)
  ii. United Petroleum (Jamaica) Limited (UNIPET)
  iii. Jampet Service Station (JAMPET)
  iv. Cool Oasis Limited
  v. Epping Oil Company
  vi. Horace Service Station
  vii. Michael's Service Station

3.1.2 DOMESTIC FUEL SUPPLY MARKET

The domestic fuel supply market is deregulated. Consequently, it is fairly competitive. The marketing companies source products outside Jamaica and also from PETROJAM. Fuels and energy products that are available within the Caribbean Common Market (CARICOM), but sourced from other countries outside of Venezuela under the PetroCaribe Agreement and Mexico, attract a 5% Common External Tariff (CET). This has the effect of artificially increasing the cost of fuels and fuel products from non-CARICOM countries, Venezuela and Mexico, directly limiting importation from said countries, and possibly increasing cost to the Jamaican consumer.

At the end of 2013, the marketing companies collectively operated 282 service stations throughout Jamaica. These stations, plus a range of auto parts and accessories stores and other entities, dominate the domestic fuel supply market aimed at the general consumer – householders, vehicle operators, commercial establishments, hospitals, schools, etc. They retail fuel and lubricants.

Marketing companies, through their service stations, gas supply companies and a fleet of independent small trucks, retail Liquefied Petroleum Gas (LPG) for cooking and other industrial purposes. Acetylene and other gases for the industrial trade are supplied by several companies.

AVIATION FUEL AND BUNKERING

Aviation fuel is produced by PETROJAM and retailed by marketing companies.

Bunkering services are provided by PETROJAM in partnership with a private company. Less than three companies are directly involved in the bunkering business, which is expected to grow with the pending opening of the expanded Panama Canal and Jamaica's logistics hub.

TANKER DRIVERS

Bulk petroleum is transported by tanker wagons island-wide. The relationship between tanker drivers, their haulage companies and the marketing companies is of import to the petroleum trade. An antagonistic relationship has developed between the parties with tanker drivers

complaining of having no option but to pursue frequent industrial actions to force the marketing companies to provide them with contracts that afford 'reasonable earnings' that enable them to obtain adequate insurance, maintain and replace their fleet, and pay themselves and their workers decent wages.

Invariably, the tanker drivers' industrial actions negatively impact consumers, in the short term, when it leads to a shortage or absence of petrol at the service stations.

VERTICALLY INTEGRATED COMPANIES

There are five vertically integrated companies in the fuel market. They are as follows and are all involved at the wholesale and retail levels of the market:

i. The Petroleum Corporation of Jamaica (PCJ), which through its subsidiaries (PETROJAM and PETCOM) operates at the refinery/importation, wholesale and retail levels of the market;
ii. Sol
iii. Rubis
iv. Total, and
v. UNIPET.

Vertical integration can pose problems to regulators, limit competition and access to energy markets by other investors. Improperly used, it penalizes consumers by forcing them to accept inflated prices and sub-level services, and has therefore been discouraged in many jurisdictions, including the European Union. The practice has, in various instances, not benefited the Jamaican energy market and consumers. Interestingly, the GOJ has employed it, in the case of PCJ, PETROJAM and PETCOM, as a 'counter balance' to force the private sector to temper prices to the consumer. Specifically, PETCOM, which operates approximately 28 petrol stations was used by the GOJ to become the 'conscience' of the market as it offered, on average, some of the lowest fuel prices consumers could obtain in the areas in which they were located and sparked robust competition from privately owned petrol stations. In the last decade, the Jamaican authorities have tended not to aggressively oppose the practice.

3.1.3 FINISHED PRODUCT EXPORT MARKET

This market is largely dominated by PETROJAM, which sells products that it refines to others within the Caribbean and sections of the southern United States. Marketing companies involved in the sale of aviation fuel and the provision of bunkering services, are also deemed to be participating this segment of Jamaica's energy market.

Entities manufacturing and exporting charcoal are also part of this segment of the energy market. The Environment Ministry has indicated that it will grant licences allowing the exportation of charcoal manufactured only from a sustainable source such as bamboo, which is sufficiently fast growing to ensure sustainability. Only one licence has been granted to allow the exportation of charcoal (Ministry of Water, Land, Environment and Climate Change).

3.1.4 ELECTRICITY MARKET

The Electricity Market is dominated by the Jamaica Public Service Company Limited (JPSCo) through its Amended and Restated All-Island Electric Licence, 2011. The company has a monopoly over distribution and transmission and owns the national electric grid. However, while there is competition in electricity generation, there is no merit order dispatch owing to the JPSCo's monopoly over transmission and distribution and the absence of an independent entity that determines dispatch. The JPSCo's 2013 Rate Schedule is attached at Appendix V.

- **ELECTRICITY RATES**

High electricity prices are one of several factors that impede Jamaica's development. Primary reasons for high electricity prices in Jamaica include:

i. The use of high cost fuel. Approximately 95% of electricity generation uses expensive petroleum diesel and heavy fuel oil (HFO) for generation. Fuel cost and IPP charges, which are pass through items, constitute 65% - 67% of the electricity charge to the consumer. Service charges and taxes further increase the final price.

ii. Old and inefficient plants, transmission and distribution systems result in technical losses of approximately 10% - 17%.

iii. Theft of electricity or non-technical losses range between 10% - 14% of power generated. The JPSCo estimates that up to 70% of the electricity supplied to some communities is stolen. Approximately 50% of these losses are paid for by paying consumer, the company internalizes the remaining 50%, partly with support from a special fund created from charges to the consumer.

"At today's price of US$0.42 per Kwh, [retail] electricity prices are burdensome to the consumers and cause our businesses to be uncompetitive. This has to change" (Paulwell, 2014).

Retail electricity prices "… of US 12.88 cents per Kwh which would result in at least a 30% drop in electricity prices" (Paulwell, 2014) are being sought by the government to assist in improving the economy's competitiveness.

Through various Power Purchase Agreements (PPAs), the JPSCo sources power from Independent Power Producers (IPPs). The GOJ's net billing policy requires JPSCo to source smaller quantities of power generated by householders and small commercial businesses using renewable energy sources, namely solar photo-voltaics (PV). These producers are offered Standard Offer Contracts (SOC) by the JPSCo and the Office of Utilities Regulation (OUR).

As at March 2014, in consultation with the Office of Utilities Regulation (OUR), the Energy Ministry issued approximately 166 Net Billing Licences. The JPSCo signed 81 Standard Offer Contracts (SOC), and connected 43 properties (mainly in the agricultural/poultry sector) to its grid. The generation of small scale renewable energy under these 166 licences is projected to displace the importation of approximately 35,000 barrels of oil and save US$3.5 million per annum (Paulwell, 2014; Ministry of Science, Technology, Energy and Mining, 2014).

A new Electricity Policy has been drafted, the modernization of the Electric Lighting Act commenced, and a draft legal and regulatory framework for the gas sector has been developed.

While not a distinctive entity, it may be argued that a segment of the electricity market is focused on the generation of increasing quantities of electricity from Jamaica's renewable energy resources. Wind and hydro are currently the two most developed renewables. It also includes the island-wide production and sale of charcoal, which is entirely informal, and the use of firewood for cooking.

3.2 LOCAL FUEL PRICES

The petroleum market has been fully de-regularized. PETROJAM sets and announces its ex-refinery prices for finished products weekly. Marketing companies add their margins and generally indicate or dictate the prices that should appear in their franchised stations. Driven by competition, marketing strategy, and other factors, some of which may interest the Fair Trading Commission and other regulators, this has the impact of some petrol stations far from the Kingston-based refinery or tank farm in Jamaica's second city, Montego Bay, exhibiting prices that are lower than at many stations even next door to the refinery.

In recent years, especially since 2011, the marketing companies have been taking possession of their stations, thereby controlling a larger percentage of the market and the profits derived.

All marketing companies enter into exclusive franchise arrangements, with the result that a retailer deals only with the marketing company to which it is contracted (Fair Trading Commission (2004)). The franchise holders have regularly complained about the oppressive nature of some aspects of their contractual agreement with the marketing companies, which limit their profitability.

3.3 A COMPARISION OF ENERGY PRICES IN JAMAICA AND OTHER COUNTRIES

Jamaica is beset by some of the highest electricity prices (residential, commercial and industrial electricity) in the Americas. This is one of the main factors blamed for the country's un-competitiveness among its major trading partners. Gasoline prices are, however, competitive with many other countries. All subsidies on oil products were removed in the 1990s (except domestic kerosene). In 2012 the average prices of gasoline and diesel were similar, at around US$1.2/l; i.e. in line with average prices in the Caribbean.

The US has low gas prices, compared to Europe and Asia, largely due to its massive shale gas resources. Additionally, gas prices in Europe and Asia are linked to oil prices. Tensions in major oil producing regions, continued high demand, especially driven by China, a rebounding US economy, and rebounding economies in sections of the EU and Asia. Continuing growth in several economies of Africa and the South American continent has also helped to keep oil prices high.

TABLE 2: AVERAGE RETAIL ELECTRICITY TARIFF IN CARICOM COUNTRIES

NO.	COUNTRY	AVERAGE TARIFF, US$/KwH	YEAR
1	Antigua and Barbuda	0.43	2011
2	Bahamas	0.26	2010
3	Barbados	0.32	2010
4	Dominica	0.43	2011
5	Dominican Republic (East and North)	0.20	2011
5.i	Dominican Republic (South)	0.22	2011
6	Grenada	0.40	2011
7	Guyana	0.32	2011
8	Jamaica	0.42	2014
9	Haiti	0.38	2011
10	St. Lucia	0.38	2011
11	St. Vincent and the Grenadines	0.36	2011
12	Suriname	0.05	2013
13	Trinidad and Tobago	0.06	2013

Sources: Inter-American Development Bank; Ministry of Science, Technology, Energy and Mining

TABLE 3: AVERAGE DIESEL PRICES IN SELECTED COUNTRIES WITHIN LATIN AMERICA AND THE CARIBBEAN

NO.	COUNTRY	PRICE, (US$/L)
1	Belize	1.25
2	Costa Rica	1.36
3	Cuba	1.30
4	Dom Rep	1.35
5	El Salvador	1.17
6	Guatemala	1.04
7	Haiti	1.03
8	Honduras	1.15
9	Jamaica	1.19
10	Nicaragua	1.19
11	Panama	1.02
12	Trinidad and Tobago	0.24

Source: German Agency for International Cooperation - GIZ (2010)

3.4 DEVELOPMENT OF ENERGY POLICIES

The overarching structure was set by the Vision 2030 – National Development Plan Jamaica, which aims to have Jamaica achieve developed country status by 2030. The local energy sector is guided by the promulgated National Energy Policy 2009-2030 (NEP). The NEP aims to ensure “a modern, efficient, diversified and environmentally suitable energy sector providing affordable and accessible energy supplies with long-term energy security and supported by informed public behaviour on energy issues and an appropriate policy, regulatory and institutional framework.” The goals of the NEP are as follows:

1. Jamaicans use energy wisely and aggressively pursue opportunities for conservation and efficiency.

2. Jamaica has a modernized and expanded energy infrastructure that enhances energy generation capacity and ensures that energy supplies are safely, reliably, and affordably transported to homes, communities and the productive sectors on a sustainable basis.
3. Jamaica realizes its energy resource potential through the development of renewable energy sources and enhances its international competitiveness and energy security whilst reducing its carbon footprint.
4. Jamaica's energy supply is secure and sufficient to support long-term economic and social development and environmental sustainability.
5. Jamaica has a well-defined and established governance, institutional, legal and regulatory framework for the energy sector that facilitates stakeholder involvement and engagement.
6. Government ministries and agencies are a model/leader in energy conservation and environmental stewardship in Jamaica.
7. Jamaica's industry structures embrace eco-efficiency for advancing international competitiveness and move towards building a green economy.

To further support the implementation of the NEP, several draft sub-policies or addenda were created. They focus on key areas for developing the sector, and include:

1. National Renewable Energy Policy 2010-2030
2. National Energy From Waste Policy 2010-2030
3. National Energy Conservation and Efficiency Policy 2010-2030
4. National Biofuels Policy 2010-2030
5. National Policy for the Trading of Carbon Credits 2010-2030
6. Electricity Policy.

3.5 MSTEM'S BROADER ROLE IN THE ENERGY SECTOR

To effectively carry out its mandate, the Ministry collects, analyses and disseminates statistical data relating to energy demand, supply, prices and consumption. Reliable energy information and related economic indicators are collected from all relevant sources to inform policy and planning processes, legislative review and formulation of strategies to meet Government policy objectives. The statistics processed are submitted by institutions such as the petroleum marketing companies, the bauxite companies, electricity producers and the refinery. In order to manage the reporting functions of these entities and ensure that data gathering and dissemination are done in a cohesive manner, the Ministry continually seeks to improve the networking relationship among stakeholders.

In addition to its local obligations, the Ministry is the national focal point for several regional and international organizations such as the International Atomic Energy Agency (IAEA), Latin American Energy Organization (OLADE) and the Caribbean Energy Information System (CEIS), and is therefore required to fulfil international reporting obligations.

The MSTEM is also responsible for the overall administration of the licensing and registration process, ensuring the enforcement of the various laws and regulations that govern the petroleum and electricity industries. MSTEM is also responsible for ensuring that all industrial safety standards are met in the energy sector.

The Petroleum Corporation of Jamaica (PCJ) is an agency of MSTEM and serves as the implementing arm of the Ministry. PCJ does this by developing national energy efficiency projects; promoting the development of hydro, wind, solar and other renewable energy based generation projects. Its PETROJAM subsidiary imports, refines and exports petroleum products.

There are two main petroleum loading racks. One is owned by the state and is located at its refinery in Kingston on the island's south east coast. The other is owned by a consortium of private marketing companies and is located in Montego Bay on the country's north west coast.

The current infrastructure enables petroleum products to be reliably and safely supplied via road tanker-wagons and is easily accessible to consumers across the island via a network of petrol service stations, over 90% of which are privately owned.

3.6 POWER SECTOR

The major organizations involved in Jamaica's electric power sector include the MSTEM, the Office of Utilities Regulation (OUR), JPSCo, independent power producers (IPPs) and self-producers. The principal responsibilities of the main entities are as follows:

i. MINISTRY OF SCIENCE, TECHNOLOGY, ENERGY AND MINING (MSTEM)

The Ministry is responsible for setting policy, proposing legislations, regulation and their amendments, acting on the OUR's recommendations for approval of JPSCo Least Cost Expansion Plans (LCEP), moderating in disputes between stakeholders in the sector and ensuring the satisfactory operation of the sector in the nation's best interest.

ii. OFFICE OF UTILITIES REGULATION (OUR)

Tariff setting, approval of long-term power procurement procedures, approval of planning procedures, preparation of LCEPs consistent with internationally accepted best industry practice and submitting recommendations of the LCEP to MSTEM are major responsibilities of the OUR.

iii. JAMAICA PUBLIC SERVICE COMPANY LIMITED (JPSCo)

The company operates under the All–Island Amended and Restated Electric Licence, 2011, which extends to 2021. JPSCo is 80% privately owned and 20% by the Government of Jamaica (GOJ).

The company operates power plants, is able to compete for the supply of new power requirements and holds a monopoly over all transmission and distribution services in the country (See Appendix III – AIII.2 for map of the JPSCo plant locations island-wide). They oversee dispatch procedures and actual dispatch of all generating units on the grid, enter into power purchase agreements (PPAs) with IPPs and self-producers in exercising its single buyer function and retail electric power supply throughout the country.

The structure and span of the JPSCo's All–Island Amended and Restated Electric Licence, 2011 disallows competition in crucial segments of the electricity sector (transmission and distribution; and single seller of electricity to third parties) and protects inefficiency through the absence of merit-order dispatch. These structures serve to penalize consumers with high electricity prices and reduce the economy's competitiveness.

iv. **INDEPENDENT POWER PRODUCERS (IPPs)**

Deliver power to JPSCo in accordance with PPAs as stipulated by the All–Island Amended and Restated Electric Licence, 2011. One example is the Wigton Windfarm which has a 38.7 MW wind-farm in Manchester, Jamaica, and is in the process of adding a further 24 MW to be commissioned by the end of 2016 (See Appendix III – AIII.3 for map of the IPP power plants).

v. **SELF-PRODUCERS**

Supply their own power requirements and, if they wish, arrange to sell any surplus capacity to JPSCo via PPAs.

3.6.1 THE ELECTRICITY GRID

Owned and operated by the JPSCo, the transmission system includes a network of approximately 400 km of 138 kV and 800 km of 69 kV lines. The total length of these circuits is approximately 1,200 km.

The primary distribution system operates at voltages of 12 kV, 13.8 kV and 24 kV (See Appendix III – AIII.1 for map of the Transmission and Distribution Network). There are approximately 14,000 km of distribution lines operating at these voltage levels. The coverage of the overall electricity infrastructure of 14,000 km for transmission and distribution results in a national electrification rate of over 95%. Total system losses, inclusive of technical and non-technical losses, averaged 22.3% in 2011.

Large sections of the 'grid' are old, poorly maintained and in need of critical upgrade and investment. Consequently, technical transmission losses of between 12% - 15% of the power generated exceed international norms.

The company's transmission network is divided into 3 power islands based on major generation and demand centres as shown in Table 4 (See Appendix III – AIII.2 for map of the JPSCo plant locations island-wide).

TABLE 4: JPS TRANSMISSION NETWORK POWER ISLANDS

SUBSYSTEM	GENERATION (MW)	DEMAND + LOSSES (MW)	DIFFERENCE (MW)
Corporate Area Power Island (CAPI) SOUTH-EASTERN	160.7	137.9	+ 22.8
Old Harbour Power Island (OHPI) SOUTH-CENTRAL	180.1	128.1	+ 52
Bogue Power Island (BPI) NORTH-WESTERN	56.2	131.0	-74.8
TOTAL	397.0	397.0	0.0

Source: OUR (2012): JPS Power System Integrity Investigation System Shutdown of August 5, 2012.

3.7 THE LEGAL AND REGULATORY FRAMEWORKS: IMPACT ON ENERGY ACCESS

The energy sector is large, vibrant, fairly profitable and present numerous security, safety and health challenges. Therefore, effective and modern regulation and expert monitoring are essential for its efficient operation.

The MSTEM is tasked with ensuring that the sector operates at its optimum through, and among other things, the enforcement of the legal and regulatory regime that governs it.

The main pieces of legislation (Acts and Regulations), which are specifically designed to regulate the energy sector, are as follows (See Appendix II):

3.7.1 LEGISLATION

- The Electricity Development Act
- The Electric Lighting Act
- **The Amended and Restated All-Island Electric Licence, 2011**: Granted to the Jamaica Public Service Company Limited (JPSCo), this licence primarily transferred almost all the rights, responsibilities and privileges formerly held by the state light and power company, including a monopoly on the distribution and transmission of electricity and the sale of electricity.
- The Landing and Storage Act
- **The Weights and Measures Act**: Addresses the specification of all measuring devices employed in the petroleum trade. It is significant to the petroleum segment of the energy market as it seeks to ensure consistency in measurements used, guaranteeing consumers (refinery, marketing companies, service stations, and consumers in general) faith in the quantities of petroleum products received, dispatched and paid for. It has huge financial significance to all stakeholders in the petroleum trade.
- The Gunpowder and Explosives Act
- **Petroleum Act** – Addresses the ownership of petroleum in and over Jamaica's territory.
- **Petroleum (Quality Control) Act**: Addresses the quality of petroleum that is distributed and sold within Jamaica. It addresses the role of petroleum haulage contractors, licences required to operate as a retailer of petroleum products, controlling petroleum contamination, and prescribes the quality of vehicles (tank wagons) used in transporting petroleum.
- **Petroleum Oil Fuel (Landing and Storage) Act**: Addresses the standard of petroleum that is imported, stored or sold in Jamaica.
- **Petroleum Refining Industry (Encouragement) Act**: Is significant to the petroleum segment of the energy market as its gives legal standing to a petroleum refinery, refiner

of oil, grants approval of a company to operate as a recognised refinery of oil, and provides various concessions in respect of customs duty, General Consumption Tax (GCT) and income tax to companies designated as petroleum refineries and oil refiners under the Act.

- **Petroleum (Conveyance) Act**: Addresses the transportation of petroleum.

- **Petroleum (Marketing Franchise) Act, 1998**: Regulates the franchise arrangements between petroleum dealers and petroleum marketing companies. It is central to regulating the commercial aspects of the petroleum trade, but has often caused controversy between the two main parties, which have developed a Code of Conduct to regulate behaviour between the parties.

  The Act provides for marketing companies to be exempt from import duties, wharfage tax, General Consumption Tax (GCT) and income tax.

Jamaica Standards (JS21): Addresses the specifications for electrical devices that are to be used in areas where petroleum is located.

3.7.2 REGULATIONS

- The Petroleum (Prescribed Articles) Regulations
- Petroleum Oil Fuel (Landing and Storage) (Inflammable Vapour Temperature Testing) Order, 1970
- Petroleum (Landing and Storage) Regulations
- Petroleum (Landing and Storage) Rules
- Petroleum (Quality Control) Regulations
- LPG Code of Practice.

Other pieces of legislation impacting the energy sector, but not implemented through the Ministry of Science, Technology, Energy and Mining (MSTEM), include the following:

i. Office of Utilities Regulation (OUR) Act
ii. The Fire Brigade Regulations
iii. Natural Resource Conservation Authority's Permits and Licences Regulations which outline planning and environmental guidelines for the construction and operation of Petroleum Filling Stations
iv. The Factories Act: Addresses safety and health issues to be observed on premises where petroleum and other flammable liquids are stored, dispensed and otherwise handled.

3.8 FUNDING JAMAICA'S ENERGY MARKET

Jamaica's energy market is driven by a combination of private funds and state resources, including government guarantees for loans secured by GOJ entities involved in the energy market. A series of bilateral and multilateral agreements between the GOJ and the governments of Mexico, Nigeria and Venezuela have been central to funding energy needs, expansion of our

energy infrastructure, as in the case of the Nigerian Oil Deal and the PetroCaribe Agreement. They have therefore been particularly beneficial to the government and people of Jamaica, especially during various oil crises when oil prices threatened the country's political stability and economic complex.

The petroleum marketing companies, alumina companies and other private entities fund their imports either using their own resources or through the local and international banking sector.

THE PETROCARIBE AGREEMENT

The PetroCaribe Agreement with Venezuela, which began in 2005, is critical to Jamaica's ability to afford its energy requirements, is the single most important feature of Jamaica's bilateral energy market policy, and is enshrined in Jamaican law through The Petroleum (Amendment) Act, 2006. It allows the Jamaican Government to purchase oil at market value from Venezuela, but on preferential conditions that have benefited Jamaica's development.

Other countries that are signatories to the agreement are Antigua and Barbuda, the Bahamas, Belize, Cuba, Dominica, the Dominican Republic, Grenada, Guatemala, Guyana, Haiti, Honduras, Nicaragua, Suriname, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines.

The agreement's objective is to help alleviate the negative financial, balance of payment and other impacts of rising oil prices on the Jamaican people and is a major example of South-South cooperation aimed at facilitating development.

The PetroCaribe Agreement has two main regimes based on the level of oil prices:

i. **Crude prices at or below US$100 per barrel**
   The agreement requires that 40% of the cost of each shipment of oil is paid within 90 days. The remaining 60% of the cost can be converted into a loan payable over 25 years at a fixed interest rate of 1%.

ii. **Crude prices at or above US$150 per barrel**
   The agreement requires that 30% of the cost of each shipment of oil is paid within 90 days. The remaining 70% of the cost can be converted into a loan payable over 25 years at a fixed interest rate of 1%.

The resulting debt is used to fund the PetroCaribe Development Fund (PDF), which makes available loans and grants to fund numerous energy and non-energy related projects in Jamaica. These include the purchasing of wind turbines by the GOJ-owned Wigton Windfarm Limited (WWL) to generate electricity and reduce our dependence on imported energy; purchasing of buses for the government-operated public transportation system; refinancing of public sector debt; financing of PETROJAM; upgrading of the Norman Manly International Airport; funding of small and medium-size businesses, especially those with export potential, through loans to the National Export Import Bank of Jamaica (EXIM); and upgrading of the country's port infrastructure and road network.

THE PETROCARIBE AGREEMENT'S TRADE COMPENSATION MECHANISM

The Trade Compensation Mechanism (TCM) is a significant component of the PetroCaribe Agreement, and allows for increased two way trade between Venezuela and member countries. It allows Jamaica to settle the debt using goods and services in place of cash. Unfortunately, the process involved in accessing this facility is unbearably bureaucratic on the Venezuelan side. Many products in which Venezuela has been most interested are either not produced or produced in insufficient quantities in Jamaica. Consequently, very small quantities of goods and services have been 'bartered' with them.

MANAGING THE PETROCARIBE DEBT

A major criticism of the PetroCaribe Agreement is the staggering debt accumulated by member countries and the inability of some to repay, largely owing to the absence of the discipline required to manage loans. Fortunately, Jamaica is one of a few Caribbean countries that has remained current with its repayment.

Jamaica's energy market has also been funded by other bi-lateral and trilateral agreements, including the following:

i. The San Jose Accord
ii. Caracas Energy Agreement (Venezuelan Oil Agreement)
iii. The Nigerian Oil Deal

3.9 THE SAN JOSE ACCORD

Initiated in 1980, the San Jose Accord is a Venezuela/Mexico oil cooperation programme for Central American and Caribbean countries in response to the oil import burden on non-oil producing countries arising from the second major oil shock.

Under the agreement, Mexico and Venezuela would provide Jamaica with up to 29,000 barrels of crude oil per day under concessionary terms.

The original Agreement allowed a provision for 20% of the cost of the crude oil to be made available as a low interest loan for development projects when crude prices exceeded US$15 per barrel. The Agreement is reviewed annually and the terms have been modified, making it less concessional. It provides for:

i. Annual quota allocation to be based on the quantity supplied the previous year.
ii. Deferred payment on 20% of the cost of the crude, to be made available to the government as a low interest loan for development projects.
iii. Repayment of the deferred 20% within five (5) years if the development projects are not achieved.
iv. Crude to be processed by Petrojam refinery.

3.10 VENEZUELAN OIL AGREEMENT / CARACAS ENERGY AGREEMENT

Complementing the San Jose Accord, in October 2000, Venezuela proposed an energy deal to supply 80,000 barrels per day to Jamaica and nine other Central American and Caribbean states.

The Caracas Energy Agreement established preferential prices and terms for financing long term low interest loans to Jamaica based on the quantity of oil purchased. There was a one-year grace period with payments extending over 15 years at an interest rate of 2%. Jamaica accessed 7.4 million barrels of oil annually at a cost of $15 - $30 per barrel and paid 80% of the cost upfront. The other 20% was converted into a soft 15 year loan.

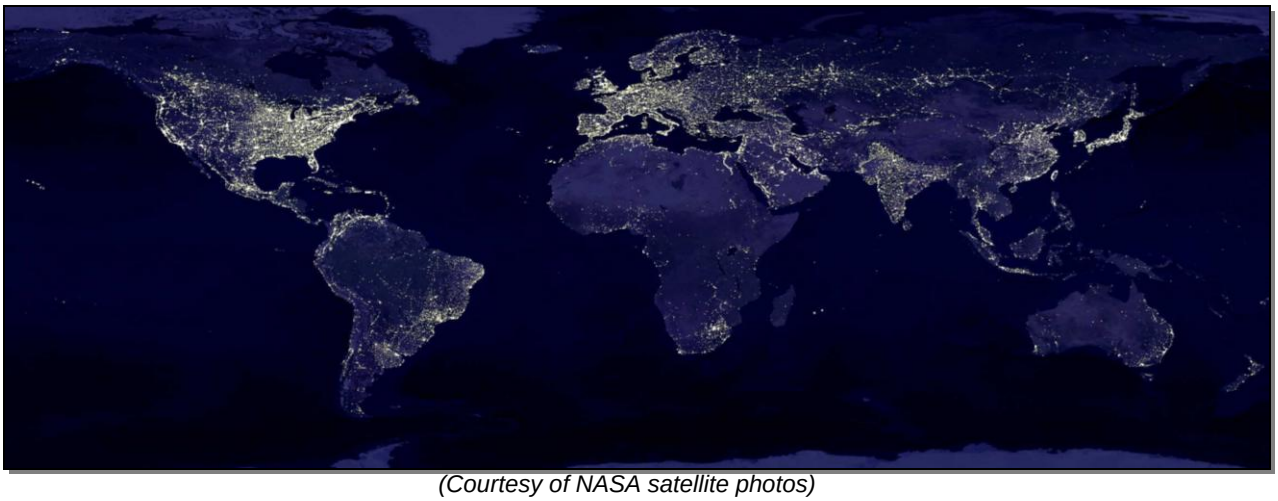
3.11 THE NIGERIAN OIL DEAL

In December 1978, Jamaica secured an annually renewable agreement to lift 5.475 million barrels per annum or 15,000 barrels per day of Nigerian light crude. A 90 day credit window was allowed, but was adjusted downward to 60 days and then to 30 days by February 1987. Supplies increased to 20,000 barrels per day in 1990, then to 10.95 million barrels per year or 30,000 barrels per day up to April 2006 before it was suspended owing to 'governance' issues on the part of the GOJ.

Only 40 per cent of earmarked volumes were lifted during the deal. After the first lift to Kingston, the GOJ realized that the Nigerian 33 API gravity[8] crude was too light for the PETROJAM refinery, whose configurations were more accommodative of the 23-28 grade.

The PCJ was created in 1979 to act as the GOJ's official oil contractor and to manage the trading activities. The proceeds built the PCJ Building, bought and renamed ESSO's refinery PETROJAM in 1982, funded the activities of the PCJ and early oil exploration campaigns, among other things. Between 1978 and April 2006, PCJ reported net income of US$4.64 from trading Nigerian oil: US$2.2 million on 93 million barrels during 1979-1993, and US$2.44 million on 32.35 million barrels between October 2000 and April 2006. In 2005 the Government redirected the profits from the PCJ to the Consolidated Fund to finance the national budget.

PICTURE 3 – THE EARTH'S LIGHTS AT NIGHT



(Courtesy of NASA satellite photos)

Picture 3 illustrates the level of disparity in energy access, in this case electricity. The main areas that benefit are typically those within developed countries or strong emerging markets. The illustration shows good concentrations of electricity in Europe, United Kingdom, Lesotho, Northern Algeria and Tunisia, North America, India, Japan, Indonesia, Malaysia, South Korea, Brazil's east coast along with the northern sections of Venezuela, Ecuador and Colombia.

[8] API is a measure of crude's density.

4.0 CURRENT ENERGY TRENDS IN JAMAICA

This section represents an overview of the Jamaican energy sector.

4.1 ENERGY SUPPLY

Jamaica is approximately 90% dependent on imported fossil resources to meet energy needs. The remaining 10% are garnered from domestic renewable sources. Imported resources include crude oil, refined products and coal (used in cement manufacturing). Licences permitting exploration for oil and gas in strategic blocks across Jamaica, particularly within its territorial waters, were cancelled in 2013 owing to the holders failure to drill. (See Appendix III – AIII.5 for map of fuelling ports and docking stations).

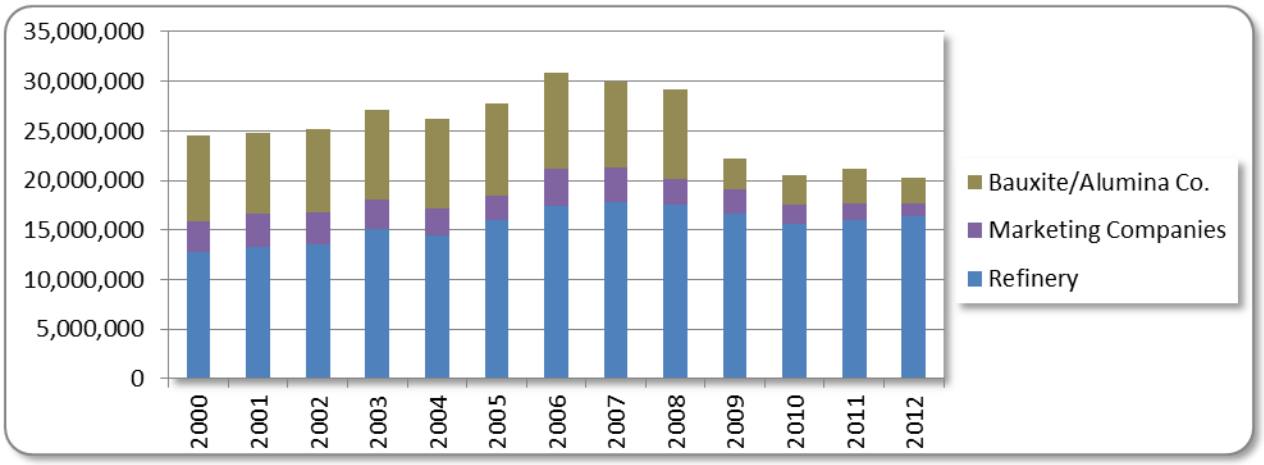
4.1.1 IMPORTS

Over the period 2000-2012 Jamaica imported approximately 25.4 million barrels (mbbl) of petroleum per annum. In 2012 petroleum imports were 20.3 mbbl, a decrease of 4% relative to 2011 (See Figure 2). Petroleum imports now represent about 21% of the country's GDP.

The levels of total imports seen in 2006/2007 could be surpassed by 2020 in barrel of oil equivalent by which time it is expected that over 250MW of power for the bauxite/alumina, cement manufacturing and logistic hub projects would have been commissioned (See Appendix III – AIII.6 for map of potential fuelling ports and docks).

The construction of a second oil refinery on lands owned by the PCJ at Font Hill, St. Elizabeth (a GOJ-driven project) and a tank farm to store and export fuel as part of the international energy trade (a private sector driven project) has been contemplated.

FIGURE 2 - PETROLEUM IMPORT TRENDS (BARRELS)



Imports are done by three categories of importers:

PETROJAM REFINERY

This 35,000 barrels per day (name plate capacity) hydro-skimming refinery supplies approximately 85% of the local market through the importation of refined products and crude later refined into fuel oil, lubricants, asphalt, diesel oil, kerosene, gasoline, butane and propane. Between 2000 and 2008, PETROJAM had 52% - 60% of total volumes imported. This increased to an estimated 81% in 2012.

PETROLEUM MARKETING COMPANIES

Comprised of a mix of foreign and locally-owned entities, these companies supply the domestic market through a combination of imports and purchases from the refinery. The larger companies, generally multi-nationals, import most of their supplies. The smaller companies, which are locally owned, source their supplies from PETROJAM.

BAUXITE / ALUMINA COMPANIES

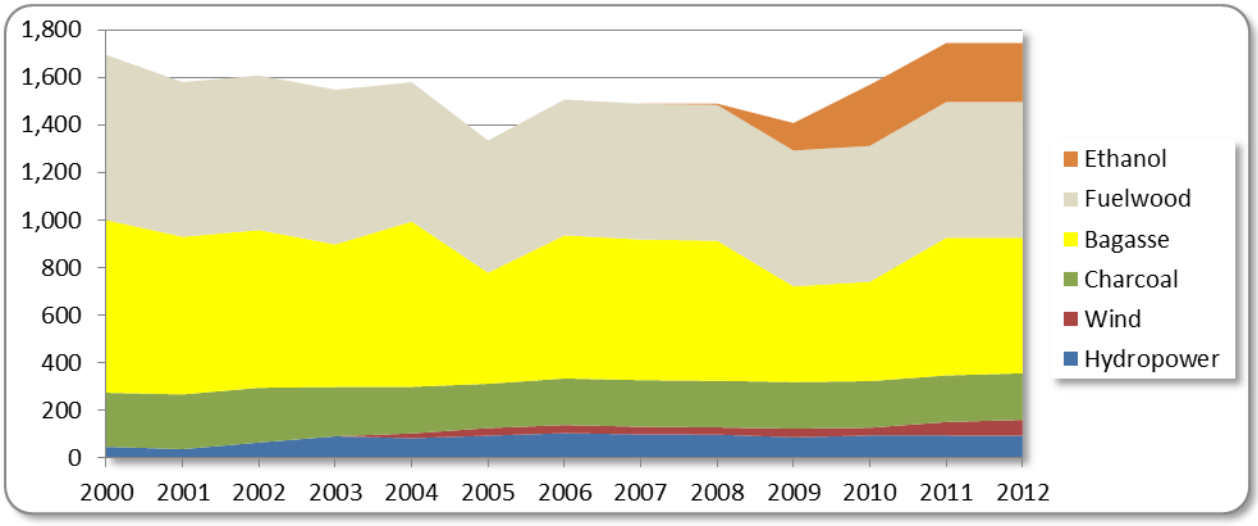
These entities import mainly diesel oil and fuel oil for their energy intensive processes, and are not allowed to sell fuel to third parties outside their operations. The closure of two of the existing four alumina refineries since May 2009 has contributed to a decrease in the volume of petroleum imports.

4.1.2 DOMESTIC RESOURCES

Local commercial quantity energy resources are renewables and peat. The primary types of renewables are hydro, solar and wind. Other forms often utilized are biomass (bagasse, charcoal and fuel-wood), biofuels (biodiesel and imported hydrated ethanol which is dehydrated locally) and biogas (See Appendix III – AIII.7 for map of the renewable plants in Jamaica).

The peat resources are undeveloped. They have not been utilized for commercial generation of electricity, cooking or any other large-scale energy-related purpose. Given the environmental sensitivity of the areas in which these resources are located, they are not projected to be exploited in the near future.

FIGURE 3 - RENEWABLE ENERGY CONTRIBUTION (KBOE)



Note: Data for fuel wood and charcoal after the year 2006 were estimated.

Figure 3 depicts the trend in the consumption of available renewable energy resources in Jamaica. It is clear that there has been some fluctuation in the use of local resources over the period. There was a decline in consumption levels between 2000 and 2005. The largest drop came in 2005 following the inclement weather conditions that prevailed 2004-2005 which adversely affected the deployment of resources because of damages to infrastructure. With normal conditions returning in 2006 consumption levels stabilized for two years at around 1,500 kboe. Consumption declined again in 2009 due mainly from reductions in bagasse quantities resulting from lower levels of sugar production. A slight uptick is seen from 2009 to 2012 as a result of the introduction of fuel ethanol into the transport sector energy consumption mix.

Wind and hydro utilization are now relatively small at 5% and 4%, respectively. While hydro has almost always played a contributing role, wind energy development returned to the forefront in 2004 with the commissioning of a 20.7 MW wind farm for Wigton I. The contribution from wind at this stage was approximately 1%. In 2010 Wigton II was commissioned and the contribution to total renewable consumption increased to around 2 – 3%.

Charcoal and fuel-wood data are difficult to ascertain (no reliable data available since 2005). The relevant Ministries, Departments and Agencies (MDAs) continue to strategize in order to find the best way to accurately collect these data.

4.2 ENERGY EXPORTS

The island's state owned refinery, PETROJAM Limited, is currently the only entity which exports petroleum fuels. Based on maritime regulations, exports are reportedly received in Caribbean and United States markets and by local bauxite / alumina companies.

PICTURE 4 – THE TRANSPORT SECTOR IS THE HIGHEST PETROLEUM FUEL CONSUMER

4.3 TOTAL ENERGY DEMAND

Jamaica's total energy consumption was an estimated 21 mboe for the year 2012. This signified a downward shift compared to 2000 when demand was 18% higher at 25.7 mboe. Over the period 2000-2007, outside of the slight decline in 2004 due to the impact on demand from Hurricane Ivan, energy demand grew steadily before stabilizing in 2007. Demand has not recovered substantially since the dramatic decline during the 2008/2009 global economic downturn, which started several years of the global recession. In fact, after registering an estimated 30 mbbl in 2007, demand has to date fallen by 30% (see trend in Figure 4).

The primary reasons for the decline in demand are:

i. A marked reduction in industrial output associated with the alumina sector. Two of the four alumina plants, including the largest, have been closed since May 2009.

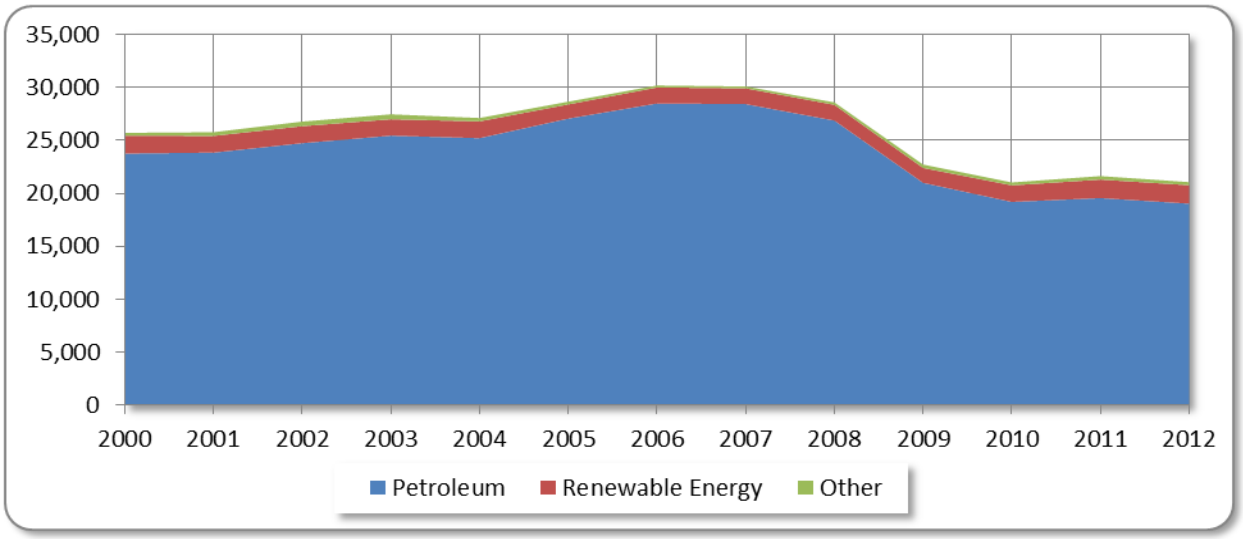
ii. Slowed annual growth in energy consumption within the ground transportation sector.

iii. The implementation of demand side management initiatives undertaken voluntarily by consumers, to reduce the impact of high prices, and through government led programmes which promote energy efficiency and energy conservation.

iv. Comparatively low levels of economic growth, which would have possibly stabilized or increased energy demand.

Energy economic indicators have also shown that per capita energy demand moved from its highest level of 11.0 boe in 2006 to 7.3 boe in 2012. Again, this is attributable to reduced demand for petroleum products stemming mainly from a decline in economic activities, along with continued energy conservation and efficiency measures employed during the global economic recession.

FIGURE 4 - JAMAICA TOTAL ENERGY DEMAND (THOUSANDS OF BARREL OF OIL EQUIVALENT (KBOE))



4.3.1 SECTORAL TRENDS

Since the year 2000, the petroleum consumption pattern has not shifted in any major way (See Figure 5). Three sectors continue to dominate consumption levels. These sectors, namely transport[9], electricity generation and bauxite / alumina processing, together made-up 94.1% of consumption in 2012 (see Figure 5): their share was 93.8% in 2000, peaking at 95.5% in the years 2007and 2008.

FIGURE 5 - CONSUMPTION TREND OF MAJOR ACTIVITIES (MBBL)

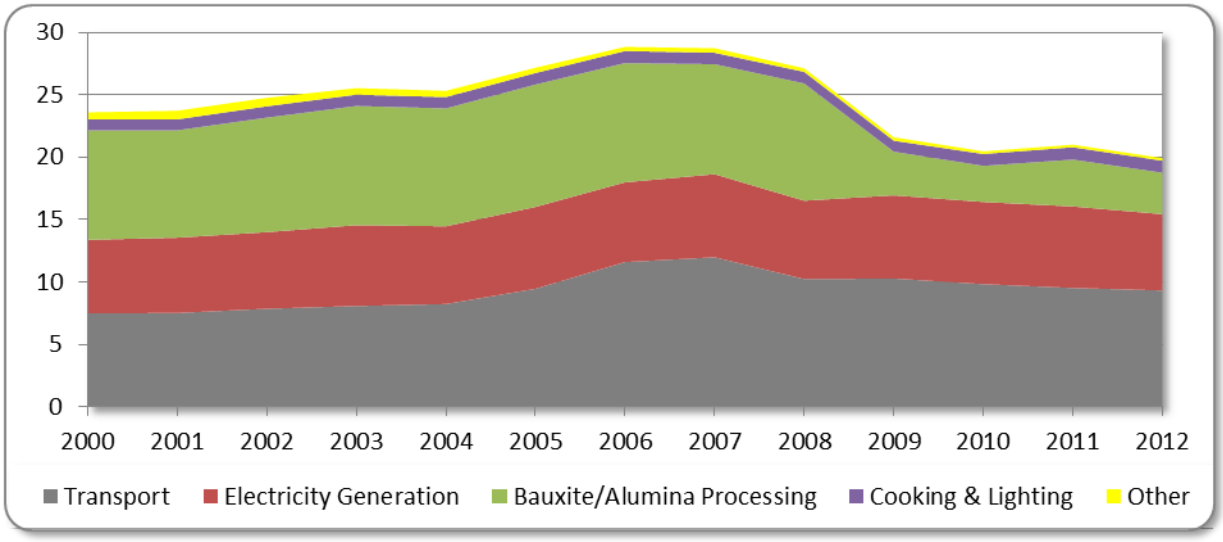
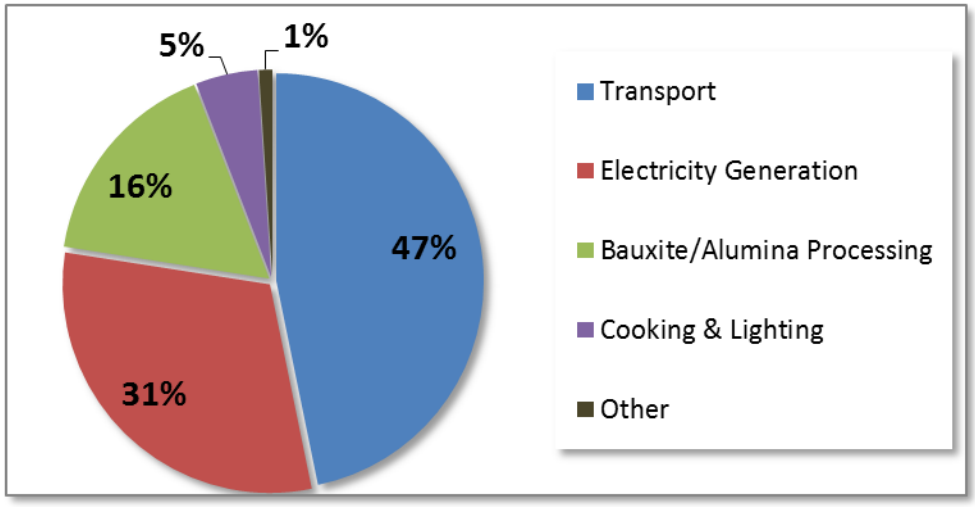


FIGURE 6 - CONSUMPTION SHARES BY ACTIVITY (2012)



[9] The transport sector is aggregated to include road transport, shipping activities, aviation and rail transport.

Table 5 highlights the volumes demanded by the major consuming activities in the economy. The transport sector has led consumption trends with 9.3 mbbl consumed on an annual basis. Petroleum consumption for electricity generation has been fairly stable hovering between 5.9 and 6.7 mbbl per annum while bauxite / alumina processing consumption levels have declined significantly over the period moving from 8.8 mbbl in 2000 to 3.3 mbbl in 2012 (see Table 5).

TABLE 5: CONSUMPTION TRENDS BASED ON MAJOR ACTIVITIES (MBBL)

Activities	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Transport	7.5	7.5	7.9	8.1	8.2	9.5	11.6	12.0	10.2	10.3	9.8	9.5	9.3
Electricity Generation	5.9	6.0	6.1	6.5	6.2	6.6	6.4	6.7	6.3	6.7	6.6	6.5	6.1
Bauxite / Alumina Processing	8.8	8.6	9.2	9.5	9.4	9.8	9.6	8.8	9.4	3.5	2.9	3.8	3.3
Cooking & Lighting	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	1.0	1.0	1.0
Other	0.6	0.7	0.7	0.5	0.5	0.4	0.3	0.4	0.3	0.3	0.2	0.2	0.2

Source: MSTEM

TRANSPORT

Table 6 shows the fluctuation in this activity over the period. Road and rail transport (predominantly road travels) peaked in 2006 with 6.4 mbbl. Since then it has ranged from a low of 5.8 mbbl to a high of 6.4 mbbl up to 2012. For the last three years demand has averaged 6.0 mbbl/yr.

TABLE 6: TRENDS IN TRANSPORT DEMAND (MBBL)

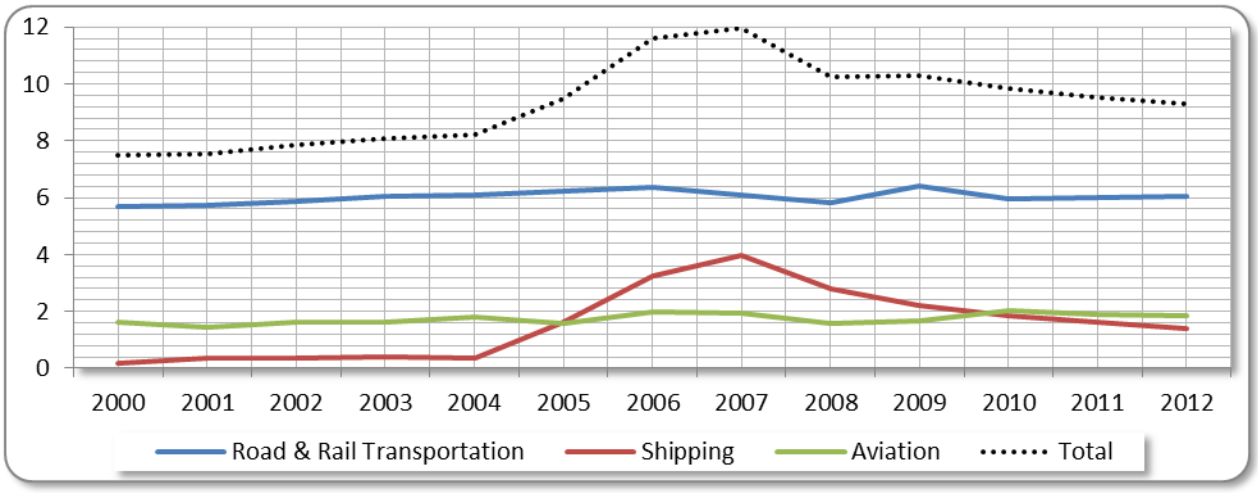
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Road & Rail	5.7	5.7	5.9	6.1	6.1	6.2	6.4	6.1	5.8	6.4	5.9	6.0	6.1
Shipping	0.2	0.4	0.4	0.4	0.4	1.6	3.2	4.0	2.8	2.2	1.9	1.6	1.4
Aviation	1.6	1.5	1.6	1.6	1.8	1.6	2.0	1.9	1.6	1.7	2.0	1.9	1.9
Total	**7.5**	**7.5**	**7.9**	**8.1**	**8.2**	**9.5**	**11.6**	**12.0**	**10.2**	**10.3**	**9.8**	**9.5**	**9.3**

Source: MSTEM

Shipping activities were slightly stable between 2000 and 2004 but increased by 300% in 2005 relative to 2004. This increase resulted from a shipping agreement reached between the refinery and Aegean which saw increased amounts of bunkering activities taking place. Demand reached its highest in 2007 but due to curtailed activities during the recessionary period it has declined every year since to currently amount to 1.4 mbbl for 2012.

Petroleum consumption by the aviation category fluctuated between 1.5 mbbl and 2.0 mbbl. However, there was no significant movement in this activity which has averaged 1.9 mbbl/yr for the last four years.

FIGURE 7 - TRENDS IN TRANSPORT SECTOR CONSUMPTION (MBBL)



MANUFACTURING AND INDUSTRY

The total petroleum demand by manufacturing and industry related activities has been declining since it peaked at 16.6 mbbl in 2005 (see Figure 8). It is currently at its lowest level of consumption at 9.5 mbbl in 2012. This would indicate that there has been some reduction in manufacturing and industrial activities in the country. Based on Table 5, the only notable categories which significantly influence consumption were electricity generation and bauxite / alumina processing.

Petroleum consumption for electricity generation has steadily declined since 2009 (see Figure 10) consistent with the current trend in the demand for end-use electricity. Demand for this category has now retreated to former 2002 levels.

Similarly, the bauxite/alumina category has experienced drastic declines in consumption levels particularly since post 2008 (see Figure 9). This was due largely to the global economic downturn which resulted in the closure of three of the four alumina processing plants, one of which has reopened since July 2010. Plants were forced to close as a result of extremely low commodity prices for alumina on the international market after the financial bubble of 2008/2009, which then made local operations uncompetitive.

TABLE 7: TRENDS IN MANUFACTURING AND INDUSTRY DEMAND (MBBL)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Cement Manufacture	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity Generation	5.9	6.0	6.1	6.5	6.2	6.6	6.4	6.7	6.3	6.7	6.6	6.5	6.1
Bauxite/Alumina Processing	8.8	8.6	9.2	9.5	9.4	9.8	9.6	8.8	9.4	3.5	2.9	3.8	3.3
Sugar Manufacturing	0.2	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0
Other Manufacturing	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0
TOTAL	**15.1**	**15.0**	**15.6**	**16.3**	**16.0**	**16.6**	**16.2**	**15.8**	**15.9**	**10.3**	**9.6**	**10.4**	**9.5**

Source: MSTEM

FIGURE 8 - CONSUMPTION TRENDS FOR ACTIVITIES RELATED TO MANUFACTURING AND INDUSTRY (MBBL)

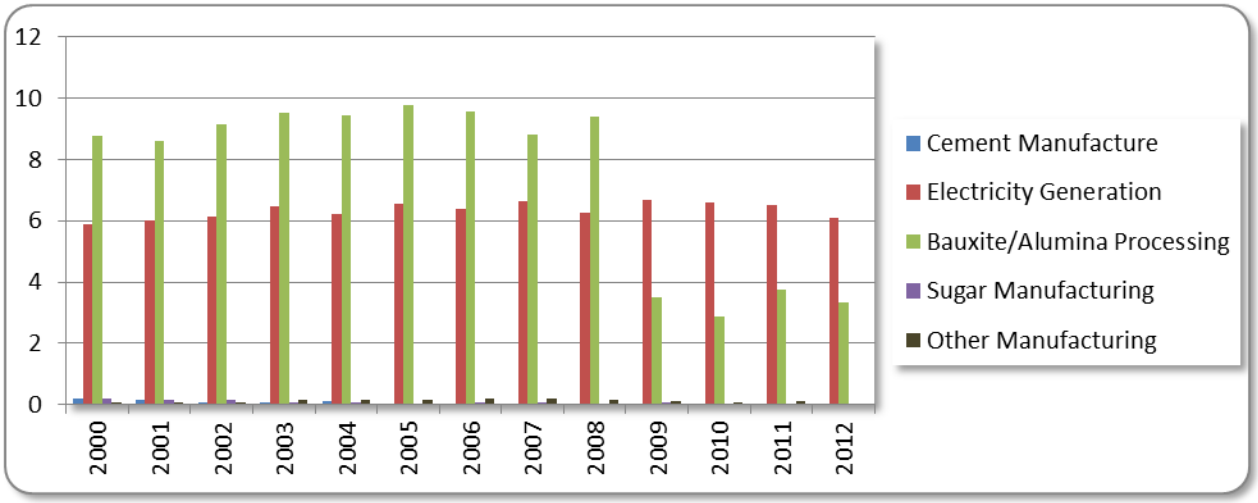


FIGURE 9 - ACTIVITY TREND FOR ELECTRICITY GENERATION (MBBL)

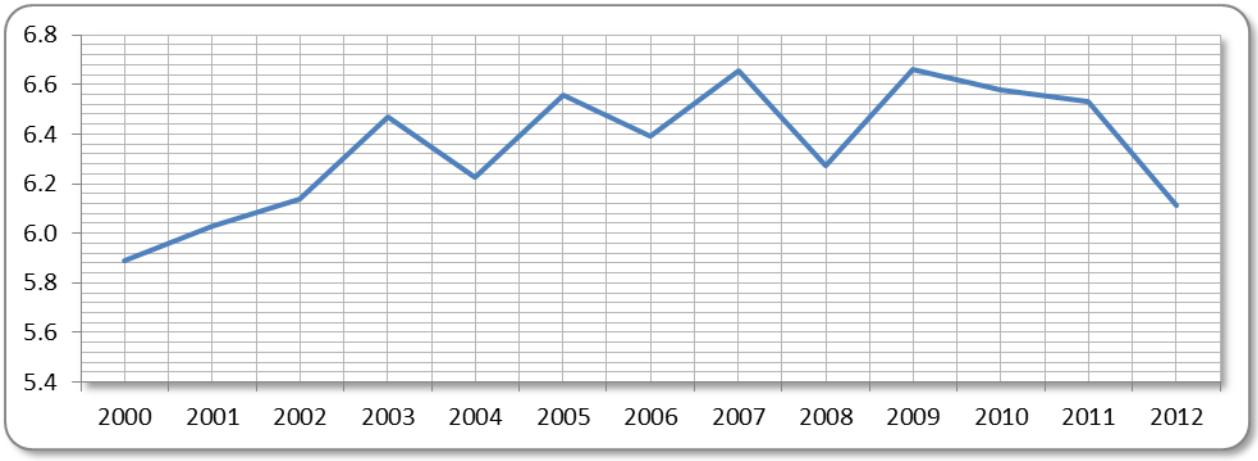
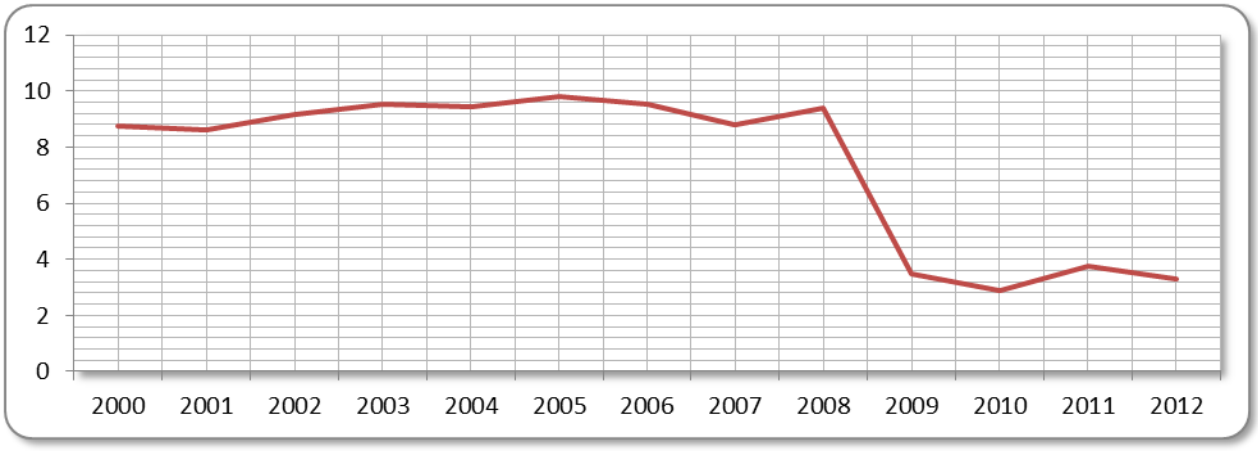


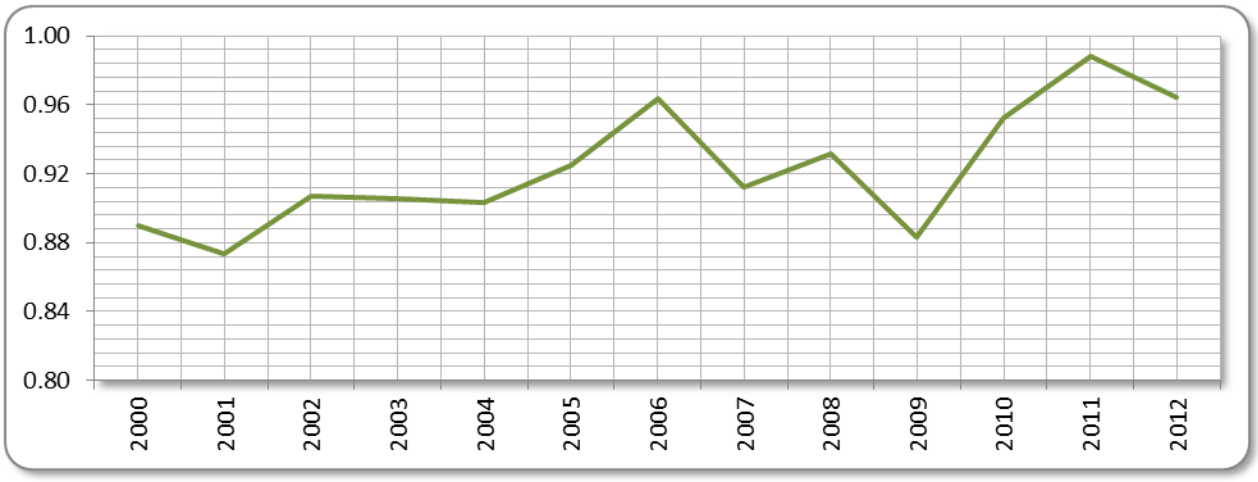
FIGURE 10 - ACTIVITY TREND FOR BAUXITE / ALUMINA PROCESSING (MBBL)



COOKING AND LIGHTING

After initially peaking in 2006, the category cooking and lighting then declined to 0.88 mbbl in 2009 following the global recessionary period. Consumption levels, however, have since recovered and stood at approximately 0.96 mbbl in 2012. Despite fluctuations cooking and lighting grew by 0.7% per annum between 2000 and 2012.

FIGURE 11 - ACTIVITY TREND FOR COOKING AND LIGHTING (MBBL)



4.3.2 PRODUCT-BASED TRENDS

Total petroleum product demand fell from 23.98 mbbl in 2000 to 20.10 mbbl in 2012. The fall in demand over the period has been owing to several reasons: economic downturn which led to reduced energy demand (closure of several small and medium sized enterprises and bauxite plants are examples); higher prices due to the application of special consumption taxes (SCT) has meant that in many instances consumers implemented voluntary energy conservation and efficiency measures.

TABLE 8: TOTAL PETROLEUM PRODUCT DEMAND (MBBL)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Turbo+avgas+kero*	1.70	1.50	1.66	1.66	1.83	1.62	2.02	1.94	1.62	1.68	2.03	1.89	1.87
Gasoline	4.16	4.17	4.29	4.39	4.40	4.58	4.50	4.30	4.29	4.76	4.29	4.14	4.14
Diesel Oil	2.44	3.33	3.23	3.92	4.13	4.79	4.35	4.06	3.91	3.89	3.72	3.89	3.74
Fuel Oil	14.69	13.94	14.75	14.66	14.09	15.29	17.03	17.52	16.37	10.50	9.48	10.11	9.23
LPG	0.83	0.82	0.86	0.86	0.86	0.89	0.93	0.90	0.93	0.87	0.94	0.97	0.95
Other	0.15	0.30	0.38	0.31	0.35	0.22	0.30	0.24	0.19	0.09	0.13	0.18	0.17
TOTAL	**23.98**	**24.06**	**25.16**	**25.81**	**25.66**	**27.38**	**29.13**	**28.97**	**27.31**	**21.80**	**20.60**	**21.18**	**20.10**

*Note: * The total for* **Turbo+avgas+kero** *comprises turbo fuel (turbo), aviation gasoline (avgas) and kerosene (kero)*
Source: MSTEM

Over the period the products which consumed the most were gasoline, diesel oil and fuel oil (see Table 5). Gasoline consumption averaged 4.3 mbbl between 2000 and 2012 and was fairly predictable during the period except for the peak of 4.8 mbbl in 2009.

FIGURE 12 - CONSUMPTION TREND OF MAIN PRODUCTS (MBBL)

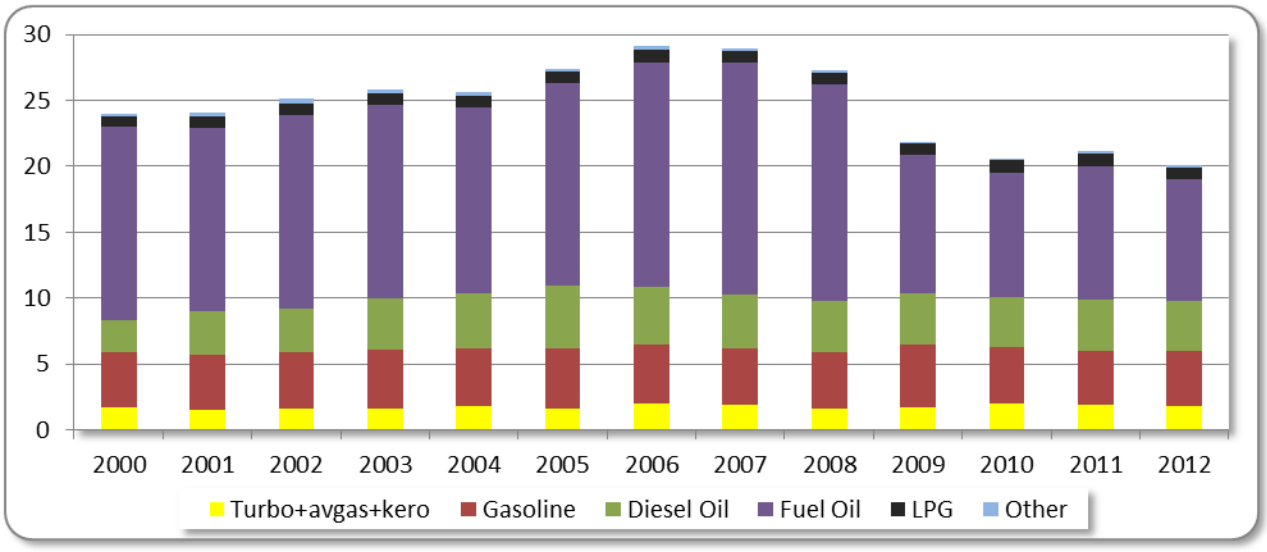
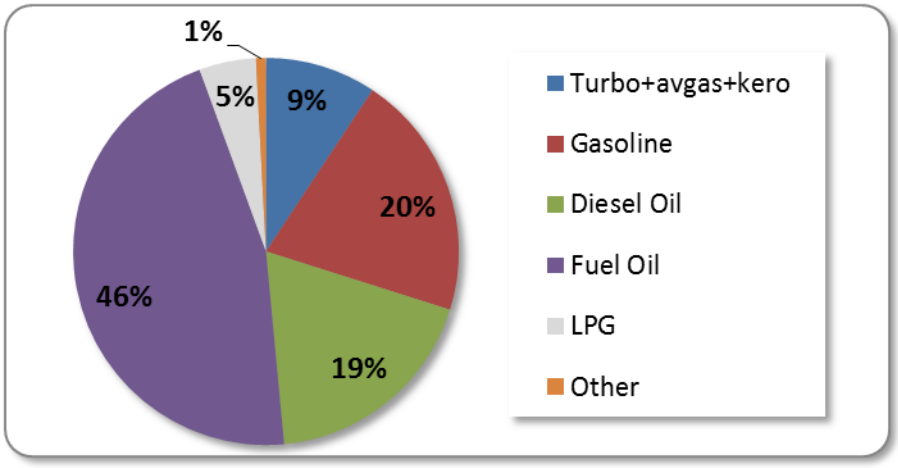


FIGURE 13 - PRODUCT CONSUMPTION SHARES (2012)



Diesel oil is used mainly for transport and electricity generation. Diesel oil consumption grew from 2.4 mbbl at the start of the study period to 3.74 mbbl in 2012.

Fuel oil usage however has decline significantly since recording 14.69 mbbl in 2000 and now stands at 37% less. The drastic decline has being due to several factors: a decline in electricity consumption for the last couple years; decline in bauxite activity which is a major consumer of the fuel.

Despite slight fluctuations between 2005 and 2009, the consumption of liquefied petroleum gas (LPG) has steadily increased by 15% from the year 2000 to currently total 0.95 mbbl. With a growing population and subsequent growing households, the end-use demand for cooking has increased. According to a survey conducted in 2007 approximately 83% of households used LPG.[10]

[10] See PIOJ, et. al. (2007). Residential Consumer End Use Survey.

PICTURE 5 – SERVICE SECTOR TO CONTRIBUTE SIGNIFICANTLY TO GROWTH BY 2030

Picture source: Screenshot of Riu Hotel (http://www.riu.com/en/home.jsp)

PICTURE 6 – MANUFACTURING WILL BOOST GROWTH POTENTIAL

World energy demand could grow by 30% in the year 2030. Locally, the main drivers of demand up to that period will be the services and manufacturing sectors (IEA World Energy Outlook 2013 & PIOJ Vision 2030 Jamaica – National Development Plan).

5.0 ENERGY DEMAND PROJECTIONS TO 2030

Jamaica's National Energy Policy 2009-2030 projects a significant restructuring of the role played by different energy sources in the country's energy mix up to 2030. Table 9 captures the projections.

TABLE 9: PROJECTED ROLE OF FUELS IN JAMAICA'S ENERGY MIX UP TO 2030

ENERGY TYPE	YEAR / PERCENTAGE			
	2008	2015	2020	2030
Petroleum	95	67	52	30
Renewables	5	12.5	15	20
Natural Gas	0	15	26	42
Petcoke / Coal	0	5	5	5
Other	0	0.5	2	3

Source: National Energy Policy 2009-2030.

The structure of the country's energy mix in 2015, 2020 and 2030 is likely to be different from that projected by the National Energy Policy 2009-2030. The reasons are as follows:

1. In 2012, the political administration committed to pursue a policy that will result in 30% of the country's electricity supplies being provided by renewables by 2030. This projection may be surpassed, especially if oil-driven electricity prices continue to increase, forcing the country to consider increased use of renewable energy resources. The search for energy independence, climate change, the need to reduce the annual spend on imported energy, plus the necessity to create employment using local RE sources will push the drive for increased RE use.

2. In a bid to reduce electricity costs by around US$0.10 – US$0.15 per kWh for all utility customers, the GOJ has committed to a transition from expensive oil-fired plants to coal and natural gas for central generation.

3. The series of aborted campaigns between 2009 and early 2014 to bring natural gas into the energy mix has ensured that the fuel will not provide 15% of the country's energy mix by 2015. It is unlikely for the project proponents to select a development partner (preferred bidder or otherwise), source gas, build and commission the plants by 2015. This target is more likely to be met by 2016 – 2030.

4. The global economic recession which started in 2008 continues to negatively impact Jamaica's bauxite/alumina sector as two of the four alumina plants, including the largest, remain closed. Without access to adequate supplies of affordable energy, the plants will remain closed. In all previous discussions, the alumina companies have rejected natural gas in whatever form based primarily on the 'take of pay' contract that continues to be an integral part of gas supply to its users. Again, this development is likely to limit the role of natural gas in the country's energy mix.

Currently, two of the alumina companies have each proposed constructing a 50MW electricity plant to supply their energy needs. The fuel being discussed is coal. It is abundant and cheap. The latter parameter is critical to the revival of the local alumina sector. Without cheap energy, the plants are globally uncompetitive unless there is a dramatic increase in demand for alumina. The expected significant increase in aluminium prices would offset current plant un-competitiveness. A return to normalcy would, however, revert the plants to a state of un-competitiveness.

A proposed new alumina plant which may be built by 2018 is also slated to use coal. Another large scale project aimed at developing new port facilities and a logistic hub is also slated to employ coal. Consequently, although the projected 5% of the energy mix to be occupied by coal by 2015 will be missed, by 2020 it may be responsible for more than 10%-15% of the energy mix.

5. Global demand for Liquefied Natural Gas (LNG) and other forms of natural gas will influence increased prices for the fuel as seen in the Asian LNG markets. The 9.0 magnitude earthquake centred 130 km offshore Sendai in Miyagi prefecture, Japan in March 2012 resulted in the closure of the Fukushima nuclear plant, the loss of 2719 MWe net of electricity and a decision by the government to increase reliance on LNG while reducing dependence on nuclear energy for power generation. Germany has made a similar decision to reduce the significance of nuclear energy in its energy mix. These decisions, plus a global drive for cleaner fuels, abundant natural gas reserves and resources, gas being a fuel that offers superior power generation economics and lower greenhouse gas emissions than coal and oil, plus growing energy consumption have increased demand for natural gas.

6. Approximately 800 MW of capacity needs to be constructed between 2010 and 2020. The OUR's Generation Expansion Plan 2010 recommends the commissioning of 360 MW (3 x 120 MW) of natural gas-fired combined cycle capacity in 2014; 292 MW will be for displacement of aged, inefficient capacity and the remainder for demand growth requirements. The 2014 timeline will be missed.

5.1 METHODOLOGY FOR ESTIMATING DEMAND

Jamaica has considered employing a scenario planning methodology for estimating "future energy demand based on medium to long-term scenarios on demographic, socio-economic, and technological developments." This methodology relates to the energy demand for producing goods and services, and to the corresponding social, economic and technological factors that affect demand. Energy demand is disaggregated into a large number of end-use categories; each corresponding to a given service or to the production of a certain good.

The nature and level of the demand for goods and services are a function of factors which include:

- Population growth;
- The number of inhabitants per dwelling;
- The number of electrical appliances used in households;
- Peoples' mobility and preferences for transportation modes;

- National priorities for the development of certain industries or economic sectors;
- Equipment and process efficiency;
- Market penetration of new technologies or energy forms;
- Energy intensity of productive processes;
- GDP growth – wealth indicators;
- Government policy.

5.2 KEY ASSUMPTIONS

Critical assumptions driving the methodology and projects are as follows:

i. Global and regional economic growth will increase. At minimum, growth in the economies of Jamaica's major trading partners will increase by 1.5 to 4 percentage points year on year up to 2030. Demand created in those economies will generate demand in the Jamaican economy.

ii. The major development projects slated for implementation in Jamaica, including the logistics hub, 381 MW LNG-fired power plant, major highway, hotel and housing construction, will occur on schedule, and will serve as a catalyst for other investments.

iii. Per capita energy consumption will increase in line with increased production and growing wealth. It is accepted that there is now an established decoupling of output and energy consumption: improved efficiencies may generate increased output and productivity while utilizing less or slightly more energy.

iv. Global fossil fuel prices will become more volatile. It is projected that global oil prices could exceed US$180/bbl by 2030. This would seriously impair Jamaica's development, especially within the context of its status as a Small Island Developing State (SIDS).

v. Jamaica will strengthen and expand demand-side management, including its public energy efficiency and energy conservation campaign, and incentivize efficiency.

vi. Electricity prices are expected to decrease 20% – 30 % by 2017 following the addition to the energy mix of 115 MW of renewables (wind (59 MW), solar (20 MW) and energy from waste (projected 39 MW – 60 MW) by 2016, 381 MW of new LNG-fired generation, over 210 MW of coal-fired capacity in the alumina sector, with the possible sale of over 70 MW to the national grid is added to the mix. Generation cost is expected to be US12.88 ¢/kWh – US 15 ¢/kWh (See Appendix III – AIII.4 and AIII.8 for maps of the proposed power plant potentials).

vii. Increased investment in household and other small-scale renewable energy projects**.**

viii. Government policies directed at the energy sector will be consistent and predictable. Government will support and actively pursue electric power wheeling, net metering, grid liberalization, distributed generation, mass public transportation, consistently lower the age of vehicles imported, continue to incentivize the acquisition of small engine passenger vehicles, etc.

ix. Continued climate change will negatively impact energy markets and the energy infrastructure.

x. 'Climate proofing' the energy infrastructure, particularly the national grid, will be expensive, but necessary.

5.3 PROJECTION ANALYSIS

Employing the National Energy Policy 2009-2030, developments since its publication, expected changes in technology and the market, plus the role of countries such as China, Russia, India, Brazil, Mexico, Spain, Germany and the USA, the following projections are plausible:

1. Renewable energy, particularly wind and solar, will play an increasingly important role in Jamaica's energy mix.

2. Driven by public health, environmental and cost control reasons, commercial scale energy from waste (municipal waste, farm waste and industrial waste) will become a noted part of the energy mix by the end of 2020. The major municipal dumps, especially those in Kingston and St. James, are routinely set ablaze by arsonists. The environmental and health impacts, especially on persons within the immediate vicinity have been decidedly negative. The practice is unsustainable and appears most likely to be resolved by employing the waste in a productive manner, one of which is energy production.

3. Small-scale energy from waste projects, at the level of households, farms and institutions, will become increasingly common, especially in rural areas if fossil fuel prices continue to increase. This approach will also increase as the country seeks to provide more of the energy it needs using its own resources.

4. The oil and gas exploration campaign will be resumed, driven by private capital, by the end of 2017. It is assumed that drilling operations will occur by 2018.

5. Coal fired plants will play a major role in rebooting segments of the industrial economic, especially alumina and cement production. Despite its environmental challenges, coal remains the cheapest major fuel source and is necessary to assist in improving the competitiveness of significant segments of the economy.

6. The continuation of concessionary bilateral fuel supply programmes such as the PetroCaribe Agreement will be central to Jamaica's ability to afford energy into the foreseeable future.

7. The large scale theft of electricity in some communities and the high technical losses within the JPSCo operated grid is unsustainable and must become a primary focus of both the company and the state.

Wide-scale electricity theft is symptomatic of serious underlying economic problems, notably consumers' ability to afford the product owing to high levels of unemployment and low salaries for those employed. The utility operator needs to make the required investments to make the grid tamper proof as a central strategy in tempering the problem.

8. Natural gas must become a major fuel in the country's energy mix. However, significant disquiet remains about access to the fuel and the possible upward movement in its cost as its use becomes mainstream. There are large reserves of gas within the Americas, especially within the USA, but it is still being developed for delivery to market. Additionally, energy politics appears set to limit its availability to some countries that may not be in particular trade relationships with the USA.

9. The possibility of electricity being supplied to Jamaica and other Caribbean states via the electric grid out of Florida will attract increasing attention from the Americans. It may be stalled by concerns about security of supplies, especially in the event of political differences between the USA and recipient states (See Appendix III – AIII.9 for map regional energy trade interconnectivity potential).

10. The general cost of electricity must be reduced to allow the Jamaican economy to become competitive, especially in the area of manufacturing. Unfortunately, it remains unclear whether or not natural gas, in one or another form, can make this possible. Simultaneously, there is widespread opposition by the environmental lobby to coal, which is a proven, available and much cheaper fuel. The cost-benefit analysis has to be done, trade-offs made and a firm decision taken about coal's role in electricity provision to the general economy.

11. The ownership and management of the national electric grid require recasting to ensure improved efficiency, merit order dispatch and expected lower electricity prices.

12. The implementation of policies requiring electric energy wheeling and net metering is overdue.

13. While fuel prices in Jamaica remain competitive with many areas of the Americas, the increasing cost of operating a motor vehicle requires that prices remain as low as is possible.

14. The introduction of a smart grid to assist in reducing electricity theft, reduce technical losses and help consumers better manage their electricity budget will become a feature of the public electricity superstructure by 2020.

15. The necessary policies will be implemented and investments made to 'climate proof' the energy infrastructure, particularly the national electric grid.

PICTURE 7 – WIGTON WINDFARM HELPS TO MEET ELECTRICITY DEMAND

Picture source: www.wwfja.com

PICTURE 8 – SOLAR INSTALLATION ON THE ROOF OF A TERTIARY INSTITUTION

Picture source: http://www.solarhydrogen.utechsapna.com/

PICTURE 9 – BIO-DIGESTER IN A RURAL FARM COMMUNITY

6.0 MEETING ENERGY MARKET DEMAND POTENTIALS

6.1 LOCAL MARKET NEEDS

Meeting the needs of the local energy markets will require that attention be given to the following:

1. Reduce energy cost, particularly electricity cost.

2. Upgrade and increase the capacity of the PETROJAM refinery, including increased storage capacity. This will allow the facility to:
   i. Lower operations cost
   ii. Reduce the volume of imported finished products
   iii. Increase the amount of lighter fractions produced thereby increasing efficiency and profitability from each barrel refined, possibly satisfy national needs begin exporting said products
   iv. Possibly develop a petrochemical complex that would further increase business opportunities, reduce the importation of certain fertilizers and other products, and earn increased export income.

   The benefits derived from this operation could be passed on to consumers in the form of lower cost products.

3. Provide low cost funding on concessionary terms to support wide-scale build out of energy efficiency and renewable energy technologies and equipment. The National Housing Trust (NHT) should increase the amount of resources made available to clients for said purpose. Funding through the Development Bank of Jamaica (DBJ) for SMEs[11] must be consistent and sufficiently large to achieve the required results.

4. Encourage private banks to become more aggressive in financing renewable energy and energy efficiency projects, be willing to lower interest rates and to modify loan requirements and repayment terms to facilitate the required take-up.

5. Protect the interests of all stakeholders in the energy market. The poor and vulnerable who need energy services to help improve their quality of life must be points of focus. The state must employ measures and policies that incentivize and compel the petroleum marketing companies and tanker drivers and petroleum marketing companies and their franchise holders to improve their relationship and pursue policies that are less confrontational than formerly and which ensures that both parties are justly and adequately compensated for their investments. It must be appreciated that the consumer must not suffer from disagreements between these parties.

6. Require that ‘watchdog’ entities such as the Consumer Affairs Commission (CAC), the Bureau of Standards Jamaica (BSJ) and the Office of Utilities Regulation (OUR) are

[11] Small and Medium Size Enterprises

sufficiently resourced to implement their mandates, particularly consumer protection. Matters such as fuel quality, obtaining the correct volume of products purchased, and the quality of electricity supply should occupy the regulator's attention. The Parliament and other bodies must ensure that they are frequently and consistently required to publicly provide comprehensive reports on their stewardship. Recommendations on changes necessary to improve their efficiency and effectiveness must be central components of such reports.

7. Build out rural electrification. This must continue as a priority; however, whereas the state has been the entity funding this programme, the private sector, particularly the JPSCo, must markedly increase its investment in this area. Rural communities need the utility to assist in improving their quality of life.

   The use of standalone renewable energy systems to serve households and districts as opposed to the conventional expensive hard wire solution must be considered.

8. Active and possible disruptive political activities within Venezuela may threaten the PetroCaribe Agreement. The GOJ should intensify its 'horizon scan' with the aim of obtaining fuel supplies from other sources, on possibly similar concessionary terms. Simultaneously, it may be prudent to begin preparing the population for the possibility of markedly high fuel and electricity costs.

9. Continue using PETCOM to act as the 'conscience of the market' by promoting competition among service stations. It is necessary to guard against predatory pricing and sustained unfair competition by particularly the international marketing companies that may use prices to drive competitors out of the market, only to increase prices and monopolize the market after such unfair practices have achieved their objective.

10. The possibility for regional interconnection of electricity grids should be considered.

6.1.1 RESIDENTIAL

At the residential level, private and public sector policies and actions should aim to:

1. Promote and encourage consistent demand-side management.

2. Promote hydrogen for cooking.

3. Promote the production of bamboo-derived charcoal for jerking and other selective cooking, especially during holidays. This should help to improve the sustainability of charcoal production. Simultaneously, the price of LPG and other blends of cooking gas must be kept affordable and be available in sufficient and consistent supply to prevent any large-scale increase in charcoal use.

6.1.2 INDUSTRIAL

To provide for projected demand within the industrial sector, the following will be necessary:

1. Introduction of policies allowing electric power wheeling and the rates to dispatch various quantities of electricity per kilometre.

2. Natural gas and coal for alumina and cement production and electricity generation. Other manufacturing activities, particularly value-added manufacturing, are expected to benefit from cheaper electricity generated from coal and natural gas.

3. Increased demand will be driven by a range of factors, including increased economic growth arising from the major projects to be introduced, the resuscitation of various segments of the economy, including the alumina sector and manufacturing. Specific activities include:

    - New port (electricity, bunkering)[12]
    - Increased traffic (road, air and marine - fuels)
    - New hotels (electricity)
    - Manufacturing activities:
        i. Caymanas Industrial Zone
        ii. Refinery Upgrade Project (RUP), including a proposed 120MW petcoke plant
        iii. Goat Island Project

4. Consider the possibility of self-generators being permitted to sell limited quantities of electricity to a limited number of third party clients other than the JPSCo. This has the potential to spur demand, especially in instances in which power can be supplied at significantly lower rates than those provided by the JPSCo.

[12] See Appendix III – AIII.10 for the potential logistic hub connections to other major markets

7.0 CONCLUDING REMARKS

Jamaica's energy market will remain dependent on external facilities such as the PetroCaribe Agreement for the foreseeable future until the economy begins to perform robustly and the country secures a semblance of energy security through a combination of methodologies. These will include:

1. Investment in an active oil and gas exploration campaign. Providing some of the energy resources that we need is in our best interest.

2. Development of commercial-scale and household renewable energy systems to displace over 35% of current oil imports. A programme of households, especially in the middle and upper classes, providing their own electricity needs ought to be contemplated. The national grid may then be focused on providing electricity for industries, businesses and other segments of the population.

3. An aggressive, expansive and continuous energy efficiency, energy conservation and related public education campaign.

4. Investment in smart technologies.

5. Renegotiation of the JPSCo's All-Island Electric Licence to allow for increased competition and radical changes in the management of the electric grid. Grid liberalization and unbundling are necessary.

6. Low cost and concessionary funding to support the build-out of renewable energy and energy efficiency technologies and systems throughout the economy.

7. Increased number of trained professionals to support the renewable energy and energy efficiency programme

8. The prevailing scenario of up to 70% of the electricity supplied to some communities being stolen must end. On the consuming side, this is a function of affordability, lifestyle choices and morality, all of which must be treated to realize the required outcomes. This is necessary as it forms one of the methodologies to reduce electricity prices to paying consumers and to improve the JPSCo's profitability.

9. Implementation and conclusion of the PETROJAM Upgrade Project to expand the refinery, improve its efficiency, produce lighter fractions, increase exports and reduce the quantum of refined energy products imported.

Access to the local energy market is well established, but can be improved by making noteworthy changes to the prevailing system. Importantly, some of the proposed changes will require little or no capital injection.

8.0 RECOMMENDATIONS FOR INSTITUTIONAL FRAMEWORK FOR JAMAICA'S ENERGY SECTOR

In attempting to improve access to energy markets, Jamaica may wish to consider the following policy prescriptions:

8.1 Local Market Reach

- Implement more demand side management programmes to assist in reducing energy consumption.
- Expand the GCT and CET exemption listing for energy efficiency, energy conservation and renewable energy items.
- Increase the rate of rural electrification.
    - This may be facilitated by enhancing the affordability of renewable energy (RE) systems, increasing recognised training opportunities and providing certification to increase the number of qualified technicians and engineers to install and maintain the systems. This would likely improve and increase local accessibility to RE throughout the country.

- Promulgate the modernized Electric Act and repeal the antiquated Electric Lighting Act of 1892.

- Stabilize fuel prices though the implementation of possibly a Stabilization Fund Facility or based on the mandating of a Pricing Board or Commission. This option allows for the following:
    - Better forecasting for energy expenditures
    - Improved planning strategies for FOREX costs to businesses
    - Helps to stabilize the Jamaican dollar (JMD)
    - Attracts private investment and foreign direct investment (FDI)
    - Reduces consumer (individual and commercial) vulnerability to fuel and electricity costs, particularly for persons not employing RE systems.

- **Jamaica Public Service Company Limited (JPSCo)**

Similar to government action in 2009 which stripped the PCJ of its monopoly to develop Jamaica's renewable energy potential, release the JPSCo of its monopoly over electricity distribution and transmission. The JPSCo should also be allowed to improve its infrastructure, including power plants, transmission and distribution network and systems, and sub-stations, when deemed necessary and without the dictates of the Office of Utilities Regulation (OUR).

The heat rate of the company's turbines and general power plants must be reduced from the current 22% – 26% to acceptable international standards of 7% - 10%. Transmission losses, both technical and social, must be reduced to acceptably international standards. The OUR and the energy ministry must become aggressive so as to achieve this objective.

Electricity generating companies should be allowed to use the fuel of their choice, provided that they meet the prescribed environmental, safety and price delivery standards.

These actions should allow for increased competitiveness, lower electricity prices to consumers, increased company profits, reduced spend on energy imports owing primarily to improved efficiency by the power generation, transmission and distribution companies.

- **Office of Utilities Regulation (OUR)**

Electricity systems planning functions should be removed from the OUR. These include:

- Planning electricity demand
- Determination of the fuel type(s) to be used in electricity generation
- Determination of the annual rate of growth of generation, transmission and distribution capacity
- Determination of the quantity of renewables to be included in the power generation mix
- Determination of the dates by which companies can improve and modernize their systems.

The following is proposed for housing these functions:

i. House the functions in a specifically mandated, adequately staffed and resourced unit within the energy ministry.
ii. Establish an independent entity tasked with electricity systems planning. This entity could be a statutory body, an executive agency or some other legal entity with the requisite legal protection and structure to facilitate the effective execution of its remit.

- **Energy Ministry**

Restrict the ministry to policy development and planning, amending and introducing legislation and regulations.

Good governance dictates that it is best to separate project development and implementation from the policy development, planning, legislative and regulatory functions. The former activities should be implemented by its agencies, including the PCJ and the Rural Electrification Programme Limited (REP).

- **GOJ's Energy Agencies**

The respective GOJ energy agencies should be monitored to ensure that they implement their mandates.

It is proposed that the PCJ should focus more on oil and gas exploration. This should be fast tracked.

- **The Rural Electrification Programme Limited (REP)**

The Rural Electrification Programme Limited (REP) has proposed a name change to the National Energy Services Company Limited (NESol) and an expansion in its remit. These recommendations should be accepted and quickly implemented.

- **Grid Operation**

The operation of the electricity grid should become the remit of an independent body established by the GOJ or owned and operated by a private entity not involved in the electricity sector.

Dispatch to the grid must be directed by GOJ policy focused on:

- Merit order dispatch
- Diversification of the energy mix, including the percentage of electricity provided by renewables.

8.2 International and Regional Trade Policy

Jamaica should collaborate with other Caribbean territories to develop cross border terminals and infrastructure to reduce capital outlay costs, hence possibly creating a Caribbean Energy Hub to share limited resources. Some factors for consideration include:

- LNG terminal / ports / storage facilities[13]
- Petroleum terminals
- Coal terminals
- Electricity interconnectivity[14]

- PETROJAM Refinery Upgrade Project should be fast tracked
  - The refinery should be expanded to produce an increased proportion of cleaner fuels and lighter fractions per barrel of crude compared with cheap heavy fractions.
  - Facilitate increased exportation to markets throughout the Americas (Caribbean, North and South America) and other markets.
  - Reduce the quantity of lighter fuels and cleaner fuels, such as ultra-low sulphur diesel (ULSD), imported.
  - Facilitate the development of a petrochemical industry.
  - Increase the facility's efficiency and profitability.

[13] See Appendix AIII.9 - Proposed Caribbean Energy Trade and Interconnections for some examples.
[14] See Appendix AIII.9 - Proposed Caribbean Energy Trade and Interconnections for some examples.

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APPENDIX I – LIST OF ACRONYMS AND ABBREVIATIONS

The following abbreviations and technical expressions are used throughout the report.

Bbl	Barrels
Boe	Barrels of oil equivalent
BSJ	Bureau of Standards Jamaica
FDI	Foreign direct investment
FSRU	Floating Storage Regasification Plant
GDP	Gross Domestic Product
GOJ	Government of Jamaica
GWh	Gigawatt hours
IAEA	International Atomic Energy Agency
IPP	Independent Power Producer
JPSCo	Jamaica Public Service Company Limited
Kboe	Thousand barrels of oil equivalent
km^2	Square kilometres
KWh	Kilowatt hour
LNG	Liquefied Natural Gas
Mbbl	Million barrels
Mboe	Million barrels of oil equivalent
MDAs	Ministries, Departments and Agencies
MSTEM	Ministry of Science, Technology, Energy and Mining
MW	Megawatt
MWe	Megawatt equivalent
MWh	Megawatt hour
OUR	Office of Utilities Regulation
PCJ	Petroleum Corporation of Jamaica
PIOJ	Planning Institute of Jamaica
RE	Renewable Energy
SMEs	Small and Medium Sized Enterprises
STATIN	Statistical Institute of Jamaica
UNDP	United Nations Development Programme

APPENDIX II – LIST OF RELATED LEGISLATIONS AND REGULATIONS

Below is a list of the related legislations and regulations governing the energy sector:

LEGISLATION

- Electricity Development Act
- Electric Lighting Act
- JPSCo Limited All-Island Electricity Licence, 2001
- Landing and Storage Act
- Weights and Measures Act
- Petroleum Act
- Petroleum (Quality Control) Act
- Petroleum Oil Fuel (Landing and Storage) Act
- Petroleum Refining Industry (Encouragement) Act

REGULATIONS

- The Petroleum (Prescribed Articles) Regulations
- Petroleum Oil Fuel (Landing and Storage) (Inflammable Vapor Temperature testing) Order 1970
- Petroleum (Landing and Storage) Regulations
- Petroleum (Landing and Storage) Rules
- Petroleum (Quality Control) Regulations
- LPG Code of Practice

The following represent those not directly administered by MSTEM but integral in the monitoring process:

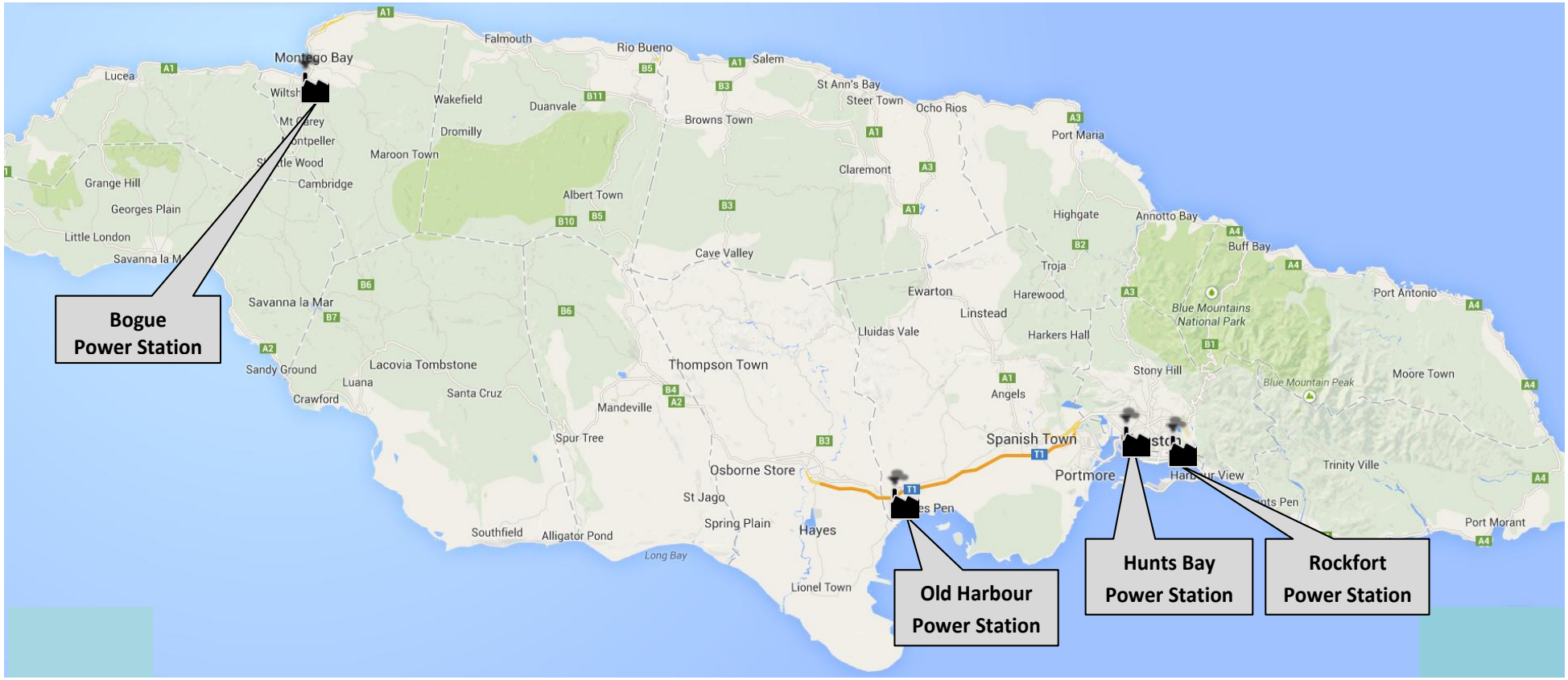
- The Fire Brigade Regulations
- National Resource Conservation Authority's Permits and Licenses Regulations
- The Factories Act
- The Office of Utilities Regulation Act

APPENDIX III – ENERGY MAPS

AIII.1 – NATIONAL GRID: TRANSMISSION AND DISRIBUTION NETWORKS

Source: JPS website - http://www.myjpsco.com/about-us/jamaicas-electricity-grid/

AIII.2 – MAIN THERMAL PLANTS, JPS

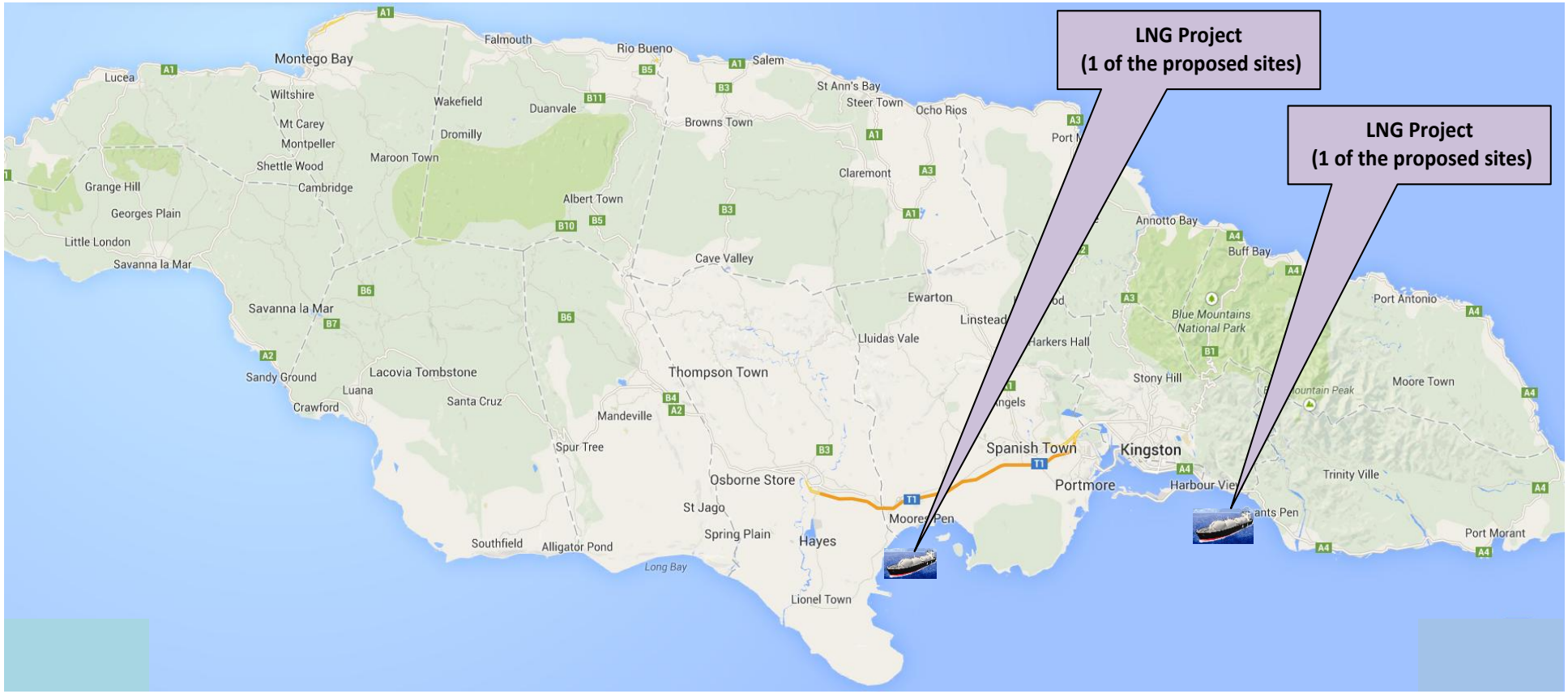


AIII.3 – EXISITING THERMAL PLANTS FOR IPPS AND MAIN SELF-PRODUCERS

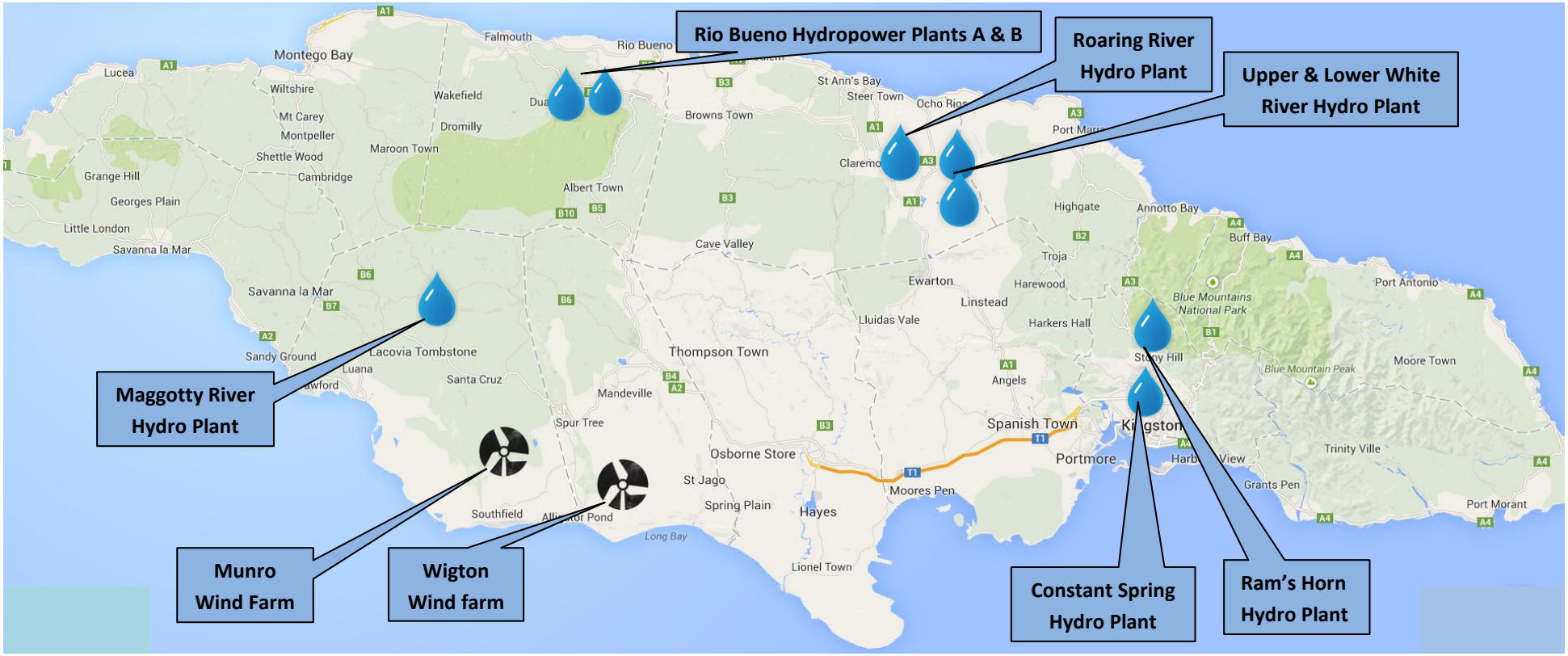
AIII.4 – NEW THERMAL PLANT POTENTIAL

AIII.5 – MAJOR FUEL PORTS / DOCKS AND REFINERY

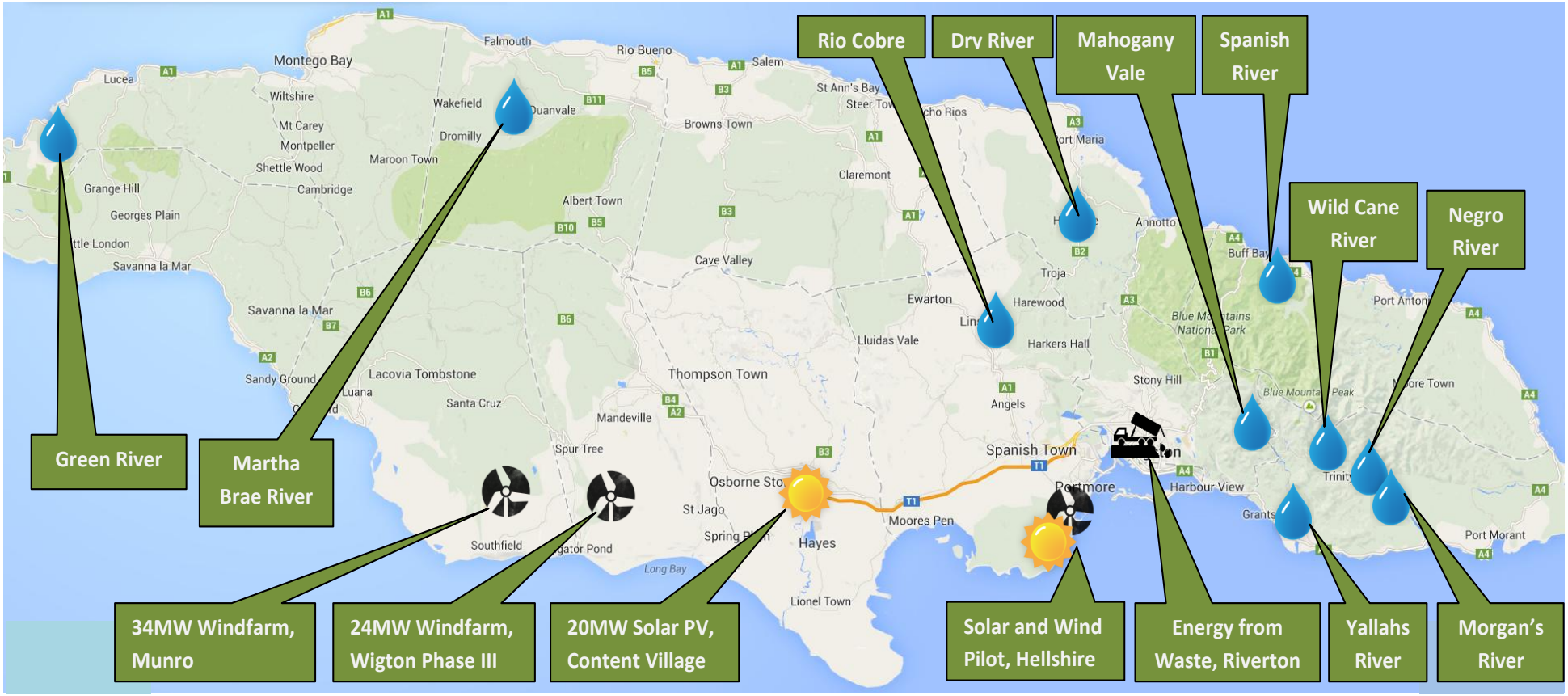
AIII.6 – POTENTIAL FUELLING PORTS / DOCKS



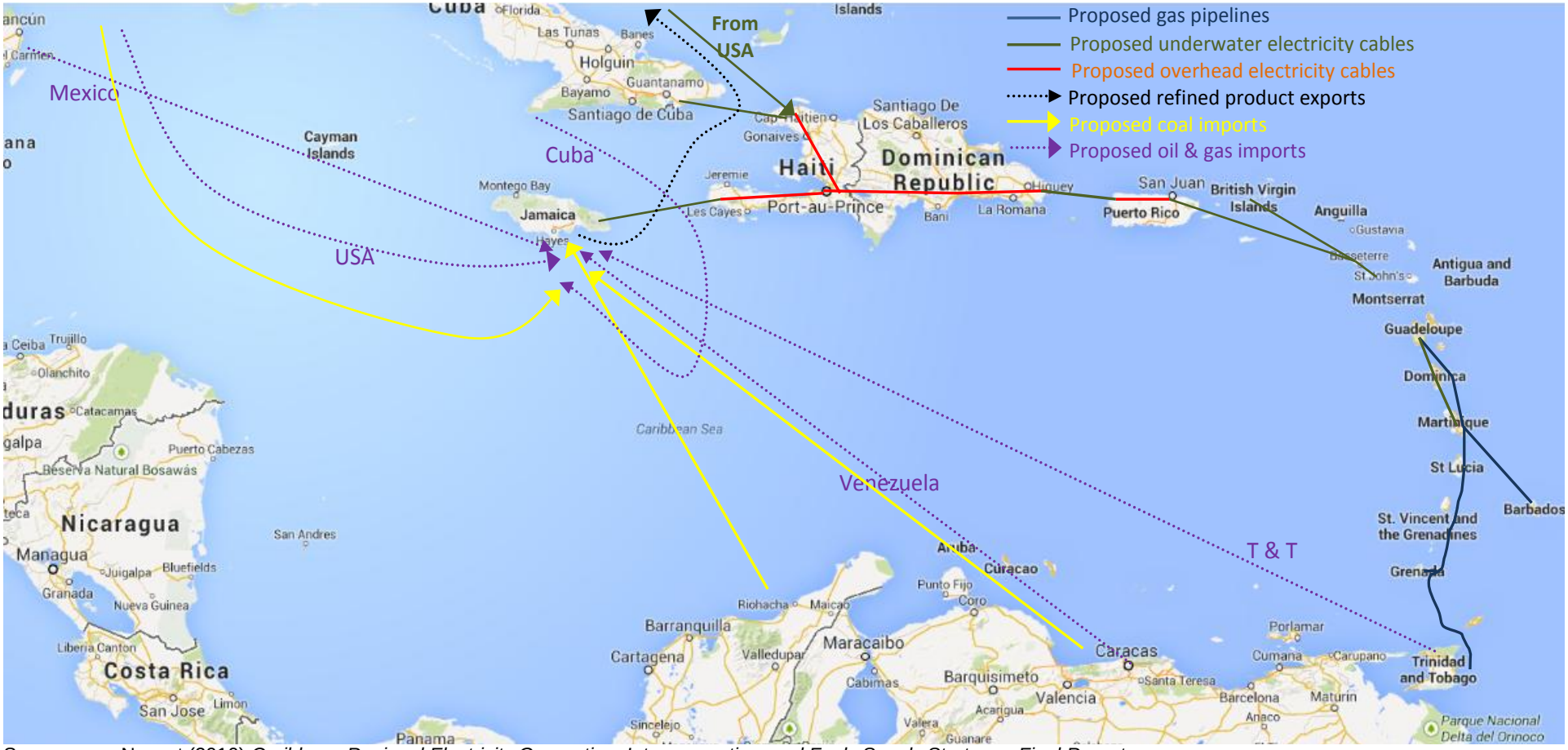
AIII.7 – EXISTING RENEWABLE PLANTS



AIII.8 – NEW RENEWABLE PLANT POTENTIAL



AIII.9 – PROPOSED CARIBBEAN ENERGY TRADE AND INTERCONNECTIONS



Sources: Nexant (2010) *Caribbean Regional Electricity Generation, Interconnection, and Fuels Supply Strategy - Final Report*
World Energy Council (2008) *Regional Energy Integration in Latin America and the Caribbean*

AIII.10 – JAMAICA GLOBAL LOGISTICS HUB INITIATIVE

Picture source: Screenshot from http://jamaicalogisticshub.com/

APPENDIX IV – ENERGY INSTALLATIONS

TABLE 10: ENERGY INFRASTRUCTURE (EXISTING AND POTENTIAL)

LOCATION – DISTRICT	LOCATION - PARISH	OWNER	PRODUCTION TECHNOLOGY	FUEL TYPE	FUEL SOURCE	CAPACITY INSTALLED / PROPOSED (MW)	PLANT TYPE	DATE OF COMMISSION	EXISTING / POTENTIAL	AGE (YRS)
Maggotty	St. Elizabeth	JPS	Run of River Hydro	Water	River	13.5	Base Load	1959	Existing	55
Hermitage	St. Andrew	JPS	Dam	Water	River	0.6	Base Load	1989	Existing	25
White River	St. Ann	JPS	Run of River Hydro	Water	River	4.9	Base Load	1952	Existing	62
White River	St. Ann	JPS	Run of River Hydro	Water	River	3.8	Base Load	1945	Existing	69
Roaring River	St. Ann	JPS	Run of River Hydro	Water	River	3.8	Base Load	1949	Existing	65
Rio Bueno	Trelawny	JPS	Run of River Hydro	Water	River	2.5	Base Load	1966	Existing	48
Rio Bueno	Trelawny	JPS	Run of River Hydro	Water	River	1.1	Base Load	1988	Existing	26
Constant Spring	St. Andrew	JPS	Run of River Hydro	Water	River	0.8	Base Load	2011	Existing	3
Yallahs	St. Thomas	--	Run of River Hydro	Water	River	45.0	Base Load	2030	Potential	--
--	St. Thomas	--	Run of River Hydro	Water	River	2.5	Base Load	2018	Potential	--
Bog Walk	St. Catherine	--	Run of River Hydro	Water	River	2.0	Base Load	2018	Potential	--
Martha Brae	Trelawny	--	Run of River Hydro	Water	River	7.0	Base Load	2018	Potential	--
--	St. Thomas	--	Run of River Hydro	Water	River	2.7	Base Load	2030	Potential	--
--	St. Thomas	--	Run of River Hydro	Water	River	2.6	Base Load	2040	Potential	--
Spring Garden	Portland	--	Run of River Hydro	Water	River	7.7	Base Load	2018	Potential	--
--	St. Thomas	--	Run of River Hydro	Water	River	2.5	Base Load	2021	Potential	--
--	Hanover	--	Run of River Hydro	Water	River	1.4	Base Load	2021	Potential	--
--	St. Mary	--	Run of River Hydro	Water	River	1.0	Base Load	2030	Potential	--
--	Hanover	--	Run of River Hydro	Water	River	8.0	Base Load	2021	Potential	--
--	St. Ann	--	Run of River Hydro	Water	River	2.0	Base Load	2018	Potential	--
Hope Bay	Portland	--	Run of River Hydro	Water	River	2.1	Base Load	2021	Potential	--
Ginger House	Portland	--	Run of River Hydro	Water	River	0.9	Base Load	2021	Potential	--
Comfort Castle	Portland	--	Run of River Hydro	Water	River	0.9	Base Load	2021	Potential	--
--	Portland	--	Run of River Hydro	Water	River	6.0	Base Load	2021	Potential	--
Wigton	Manchester	Wigton	Wind Power	Wind	Air	20.7	Base Load	2004	Existing	10

LOCATION – DISTRICT	LOCATION - PARISH	OWNER	PRODUCTION TECHNOLOGY	FUEL TYPE	FUEL SOURCE	CAPACITY INSTALLED / PROPOSED (MW)	PLANT TYPE	DATE OF COMMISSION	EXISTING / POTENTIAL	AGE (YRS)
Wigton	Manchester	Wigton	Wind Power	Wind	Air	18.0	Base Load	2010	Existing	4
Wigton	Manchester	Wigton	Wind Power	Wind	Air	24.0	Base Load	2016	Potential	--
Munro	St. Elizabeth	JPS	Wind Power	Wind	Air	3.0	Base Load	2010	Existing	4
Munro	St. Elizabeth	Blue Mountain	Wind Power	Wind	Air	34.0	Base Load	2016	Potential	--
Content Village	Clarendon		Solar PV	Solar	Sun	20.0	Base Load	2016	Potential	--
Riverton City	St. Andrew	PCJ	Plasma / incineration	Solid Waste	NSWMA	46.0	Base Load	2020	Potential	--
Bogue	St. James	JPS	Combined Cycle	ADO	PETROJAM		--	1973-2003	Existing	41-11
Rockfort	St. Andrew	JPS	Steam Turbine	HFO	PETROJAM		--	1993	Existing	21
Rockfort	St. Andrew	JPPC	Steam Turbine	HFO	PETROJAM	60.0	--	1993	Existing	21
Hunts Bay	Kingston	JPS	Gas Turbine	HFO	PETROJAM		--	1976	Existing	38
Old Harbour	St. Catherine	JPS	Steam Turbine	HFO	PETROJAM	193	--	1968	Existing	46
Industrial Terrace	Kingston	EWP / JEP	Medium Speed Diesel	ADO	PETROJAM	66	--	2011	Existing	3
Hayes	Clarendon	JAMALCO	Steam Turbine	HFO	PETROJAM	11	--	1974	Existing	40
Old Harbour Bay	St. Catherine	JEP1	Steam Turbine	HFO	PETROJAM	74.2	--	1995	Existing	
Old Harbour Bay	St. Catherine	JEP2	Steam Turbine	HFO	PETROJAM	50.2	--	2006	Existing	
Cane River	St. Andrew	EWI	Gas Turbine	LNG	--	200	Base Load	2017	Potential	--
Old Harbour	St. Catherine	EWI	Gas Turbine	LNG	--	181	Base Load	2017	Potential	--
Ewarton	St. Catherine	RUSAL	Steam Turbine	Coal	Columbia	50	Self-Producer	2017	Potential	--
Halse Hall	Clarendon	JAMALCO	Steam Turbine	Coal	Columbia	50	Self-Producer	2017	Potential	--
Goat Island	Clarendon	--	Steam Turbine	Coal	--	50	Self-Producer	2018	Potential	--
Marcus Garvey Drive	Kingston	PETROJAM	Steam Turbine	Petcoke	PETROJAM	120	Self-Producer / Base Load	2019	Potential	--

Notes:

(1) -- information unknown, unavailable or not applicable

Sources: Ministry of Science, Technology, Energy and Mining, Petroleum Corporation of Jamaica, PETROJAM Refinery, Bauxite / Alumina Companies

APPENDIX V – JAMAICA ELECTRICITY RATE SCHEDULE 2013

(Source: Jamaica Public Service Company – www.myjpsco.com)

THE AMENDED AND RESTATED ALL-ISLAND ELECTRIC LICENCE, 2011

This is the approval of the prices to be charged by the Jamaica Public Service Company Limited (JPS or the Company) in respect of the supply of electricity. In exercise of the powers conferred on the Office of Utilities Regulation by the AMENDED AND RESTATED ALL-ISLAND ELECTRIC LICENCE, 2011 the prices to be charged by Jamaica Public Service Company Limited (JPS) in respect of the supply of electricity as set out in the following Schedules are HEREBY APPROVED effective July 01, 2013

Maurice Charvis
Director General, Office of Utilities Regulation

SCHEDULE I: RATE 10 – RESIDENTIAL SERVICE

AVAILABILITY
This rate class is available throughout the Island of Jamaica.

APPLICABILITY
This rate is applicable to residential households for single phase domestic uses, including single phase motor(s) of individual capacity of 3.730 kW (5 H.P.) or less when service is taken through one meter at a single point of delivery.

CHARACTER OF SERVICE
Service is alternating current, 50 Hertz (cycles per second), single phase 110 volts, or 110/220 volts. At the Company's discretion, three phase 220 volts service may be provided under this rate in accordance with the terms and conditions currently in effect.

CUSTOMER CHARGE
The Customer Charge is applicable whether or not there is any consumption and irrespective of the level of consumption and shall be a monthly contribution of $387.00 towards the cost of providing the service.

MINIMUM CHARGE
The minimum monthly charge shall be the Customer Charge.

ENERGY CHARGE
The Energy Charge shall be $6.98 per kilowatt-hour (kWh) for each of the first 100 kilowatt-hours per month and $15.96 per kWh for each kilowatt-hour in excess of 100 kilowatt-hours per month. The Energy Charge covers non-fuel costs that vary with consumption such as the cost of wear and tear of the electricity plant in service and also such additional fixed non-fuel costs not recovered through the Customer Charge. The Energy Charge does not include any portion of fuel cost.

FUEL AND INDEPENDENT POWER PRODUCER (IPP) CHARGE
The Fuel and IPP Charge shall be a monthly amount per kilowatt-hour and shall be calculated in the manner set out in the Additional Terms and Conditions hereto. **The Fuel Charge** represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required for producing and delivering each kilowatt-hour of electricity. **The IPP Charge** represents the difference between the IPP costs included in the base Customer and Energy Charges and the actual IPP non-fuel costs payable and/or paid by JPS. The Fuel and IPP Charge shall apply to all kWh billed under this schedule.

FOREIGN EXCHANGE ADJUSTMENT
The Foreign Exchange Adjustment in force at the time shall apply to all charges except Fuel and IPP Charges under this schedule. The requisite terms and conditions of the Foreign Exchange Adjustment provision are set out in the Additional Terms and Conditions hereto.

METER READING AND BILLING
JPS reserves the right to read its meters no less frequently than every other month but nevertheless to render bills monthly. In the event that JPS renders an estimated bill such estimate shall be based on the average of the previous three (3) actual meter readings except for the first six (6) months of a new account. According to the guaranteed standards (EGS 7), JPS shall not render more than two consecutive estimated bills (where it has access to the meter). A ninety-nine percent (99%) compliance rate is in effect since October 1, 2009 in this area of service delivery.

SCHEDULE II: RATE 20 - GENERAL SERVICE

AVAILABILITY
This rate class is available throughout the Island of Jamaica.

APPLICABILITY
This rate is applicable to customers other than residential households, with demand less than 25 kilovolt-amperes (kVA) for all purposes not specifically provided for in other schedules, provided that customers' equipment do not cause undue voltage fluctuations as defined in the Company's terms and conditions currently in effect and all service is taken through one meter at a single point of delivery. Not applicable for standby, breakdown or auxiliary service.

CHARACTER OF SERVICE
Service is alternating current, 50 Hertz (cycles per second), single phase 110 or 110/220 volts or three-phase 220 volts delta.

CUSTOMER CHARGE
The Customer Charge is applicable whether or not there is any consumption and irrespective of the level of consumption and shall be a monthly contribution of $851.40 towards the cost of providing the service.

MINIMUM CHARGE
The minimum monthly charge shall be the Customer Charge.

ENERGY CHARGE
The Energy Charge shall be $13.63 per kilowatt-hour (kWh) for all kilowatt-hours. The Energy Charge covers non - fuel costs that vary with consumption such as the cost of wear and tear of the electricity plant in service and also such additional fixed non-fuel costs not recovered through the Customer Charge. The Energy Charge does not include any portion of fuel cost.

FUEL AND INDEPENDENT POWER PRODUCER (IPP) CHARGE
The Fuel and IPP Charge shall be a monthly amount per kilowatt-hour and shall be calculated in the manner set out in the Additional Terms and Conditions hereto. **The Fuel Charge** represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required for producing and delivering each kilowatt-hour of electricity. **The IPP Charge** represents the difference between the IPP costs included in the base Customer and Energy Charges and the actual IPP non-fuel costs payable and/or paid by JPS. The Fuel and IPP Charge shall apply to all kWh billed under this schedule.

FOREIGN EXCHANGE ADJUSTMENT
The Foreign Exchange Adjustment in force at the time shall apply to all charges except Fuel and IPP Charges under this schedule. The requisite terms and conditions of the Foreign Exchange Adjustment provision are set out in the Additional Terms and Conditions hereto.

METER READING AND BILLING
JPS reserves the right to read its meters no less frequently than every other month but nevertheless to render bills monthly. In the event that JPS renders an estimated bill such estimate shall be based on the average of the previous three actual meter readings except for the first six months of a new account. According to the guaranteed standards (EGS 7), JPS shall not render more than two consecutive estimated bills (where it has access to the meter). A ninety-nine percent (99%) compliance rate is in effect since October 1, 2009 in this area of service delivery.

SCHEDULE III: RATE 40A (LV) - POWER SERVICE

STANDARD Demand Charge ($/kVA per Month)	TIME-OF-USE OPTION ($/kVA per Month)		
	On-peak	Part-Peak	Off-Peak
1,466.12	825.45	645.10	62.23

AVAILABILITY
This rate is no longer available.

SCHEDULE IV: RATE 40 - POWER SERVICE LOW VOLTAGE

AVAILABILITY
This rate class is available throughout the Island of Jamaica.

APPLICABILITY
This rate is applicable to customers other than residential household customers, with demand 25 kilovolt–amperes (kVA) or more for all power and lighting purposes. Service is to be taken through one meter at a single point of delivery. Not applicable for standby, breakdown or auxiliary service.

CHARACTER OF SERVICE
Service is alternating current, 50 Hertz (cycles per second) and three-phase.

This service is provided and metered at three-phase 220 volts delta system or three phase 415/240 volts star system.

TIME-OF-USE OPTION
JPS may upon the application of a customer, bill such customer in accordance with the Time-of-Use Option for Demand Charges based on the time of day electricity is consumed.

On-peak hours: Monday-Friday 6:00 p.m. to 10:00 p.m.

Off-peak hours: Monday-Friday 10:00 p.m. to 6:00 a.m., and Weekends and Public Holidays, all hours other than 6:00 p.m. to 10:00 p.m.

Partial-peak hours: Monday-Friday 6:00 a.m. to 6:00 p.m., and Weekends and Public Holidays 6:00 p.m. to 10:00p.m.

CUSTOMER CHARGE
The Customer Charge is applicable whether or not there is any consumption and irrespective of the level of consumption and shall be a monthly contribution of $6,192 towards the cost of providing the service.

DEMAND CHARGE
The Demand Charge for each kilovolt-ampere (kVA) billing demand shall be determined in accordance with the Time-of-Use Option or the Standard Demand Charge as applicable (see table below).

MINIMUM CHARGE
The minimum monthly charge shall be the sum of the Demand and Customer Charges

ENERGY CHARGE
The Energy Charge shall be $3.89 per kilowatt-hour. The Energy Charge covers non-fuel costs that vary with consumption such as the cost of wear and tear of the electricity plant in service and all such additional fixed non- fuel costs not recovered through Customer and Demand Charges. The Energy Charge does not include any portion of fuel cost.

BILLING DEMAND

STANDARD
The kilovolt-ampere (kVA) Billing Demand for each month shall be the maximum demand for that month, or 80% of the maximum demand during the five-month period immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes (kVA).

TIME- OF- USE OPTION

On-Peak Period: Billing Demand in this period shall be the maximum demand for the On-Peak hours of that month. The minimum 25 kilovolt-amperes (kVA) do not apply.

Partial-Peak Period: The Billing Demand in this period shall be the

Pg 1 of 4

maximum demand for the on-peak and partial-peak hours of that month, or 80% of the maximum demand for the on-peak and partial-peak hours during the five-month period immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes (kVA).

Off-Peak Period: The Billing Demand in this period shall be the maximum demand for that month (regardless of the time of use period it was registered in), or 80% of the maximum demand during the five-month period immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes kVA).

DETERMINATION OF MAXIMUM DEMAND
The maximum Demand shall be the registered integrated average load in kVA measured in the 15-minute interval in which such average load in kVA is highest during the applicable period.

FUEL AND INDEPENDENT POWER PRODUCER (IPP) CHARGE
The Fuel and IPP Charge shall be a monthly amount per kilowatt-hour and shall be calculated in the manner set out in the Additional Terms and Conditions hereto. **The Fuel Charge** represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required for producing and delivering each kilowatt-hour of electricity. **The IPP Charg**e represents the difference between the IPP costs included in the base Customer, Demand and Energy charges and the actual IPP non-fuel costs payable and/or paid by JPS. The Fuel and IPP Charge shall apply to all kWh billed under this schedule.

FOREIGN EXCHANGE ADJUSTMENT
The Foreign Exchange Adjustment in force at the time shall apply to all charges except Fuel and IPP Charges under this schedule. The requisite terms and conditions of the Foreign Exchange Adjustment provision are set out in the Additional Terms and Conditions hereto.

TERMS OF CONTRACT
A contract for a period of three (3) years may be required as a condition of service, or of selection of the Time-of-Use Option. Customers are required to consume at least 50% of their energy requirements within the off-peak period in order to qualify for the Time-of-Use option.

SCHEDULE IV: RATE 50 – POWER SERVICE MEDIUM VOLTAGE

AVAILABILITY
This rate class is available throughout the Island of Jamaica.

APPLICABILITY
This rate is applicable to customers other than residential households, with demand of 25 kilovolt-amperes (kVA) or more for all power and lighting purposes. Service is to be taken through one meter at a single point of delivery. Not applicable for standby, breakdown or auxiliary service. This is only applicable to customers with transformers that are non Company (JPS) owned.

CHARACTER OF SERVICE
Service is alternating current, 50 Hertz (cycles per second) and three-phase.

This service is provided and metered at primary voltage (6.9 kilovolts, 12 kilovolts, 13.8 kilovolts or 24 kilovolts as applicable and available).

TIME-OF-USE OPTION
JPS may upon the application of a customer bill such customer in accordance with the Time-of-Use Option or Demand Charge, based on the time of day electricity is consumed.

On-peak hours:
Monday-Friday 6:00 p.m. to 10:00 p.m.

Off-peak hours:
Monday-Friday 10:00 p.m. to 6:00 a.m., and weekends and Public Holidays all hours except 6:00 p.m. to 10:00 p.m.

Partial-peak hours:
Monday-Friday 6:00 a.m. to 6:00 p.m., and weekends and Public Holidays 6:00 p.m. to 10:00 p.m.

CUSTOMER CHARGE
The Customer Charge is applicable whether or not there is any consumption and irrespective of the level of consumption and shall be a monthly contribution of $6,192 towards the cost of providing the service.

DEMAND CHARGE
The Demand Charge for each kilovolt-ampere (kVA) billing demand shall be determined in accordance with the Time-of-Use Option, or the Standard Demand Charge as applicable (see table below).

STANDARD	TIME-OF-USE OPTION ($/kVA per Month)		
($/kVA per Month)	On-peak	Part-Peak	Off-Peak
1,319.52	733.06	571.79	58.64

MINIMUM CHARGE
The minimum monthly charge shall be the sum of the Demand and Customer Charges.

ENERGY CHARGE
The Energy Charge shall be $3.69 per kilowatt-hour. The Energy Charge covers non-fuel costs that vary with consumption such as the cost of wear and tear of the electricity plant in service and all such additional fixed non-fuel costs not recovered through Customer and Demand Charges. The Energy Charge does not include any portion of fuel cost.

BILLING DEMAND

STANDARD
The kilovolt-ampere (kVA) Billing Demand for each month shall be the maximum demand for that month, or 80% of the maximum demand during the five-month period immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes (kVA).

TIME- OF- USE OPTION
On-Peak Period:
Billing Demand in this period shall be the maximum demand for the On-Peak hours of that month. The minimum 25 kilovolt-amperes (kVA) do not apply.

Partial-Peak Period:
The Billing Demand in this period shall be the maximum demand for the on-peak and partial-peak hours of that month, or 80% of the maximum demand for the on-peak and partial-peak hours during the five-month period immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes (kVA).

Off-Peak Period:
The Billing Demand in this period shall be the maximum demand for that month (regardless of the time-of-use period it was registered in), or 80% of the maximum demand during the five-month period immediately preceding the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes kVA).

DETERMINATION OF MAXIMUM DEMAND
The maximum Demand shall be the registered integrated average load in kVA measured in the 15-minute interval in which such average load in kVA is highest during the applicable period.

FUEL AND INDEPENDENT POWER PRODUCER (IPP) CHARGE
The Fuel and IPP Charge shall be a monthly amount per kilowatt-hour and shall be calculated in the manner set out in the Additional Terms and Conditions hereto. **The Fuel Charge** represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required to produce and deliver each kilowatt-hour of electricity. **The IPP Charge** represents the difference between the IPP costs included in the base Customer, Demand and Energy charges and the actual IPP non-fuel costs payable and/or paid by JPS. The Fuel and IPP Charge shall apply to all kWh billed under this schedule.

FOREIGN EXCHANGE ADJUSTMENT
The Foreign Exchange Adjustment in force at the time shall apply to all charges except Fuel and IPP Charges under this schedule. The requisite terms and conditions of the Foreign Exchange Adjustment provision are set out in the Additional Terms and Conditions hereto.

TERMS OF CONTRACT
A contract for a period of three (3) years may be required as a condition of service, or of selection of the Time-of-Use Option. Customers are required to consume at least 50% of their energy requirements within the off-peak period in order to qualify for the Time-of-Use option.

SCHEDULE V: RATE 60 - STREET LIGHTING

AVAILABILITY
This rate class is available throughout the Island of Jamaica by way of fixtures within the Company's secondary distribution system. Dusk to dawn service controlled by photocell or other device to provide for approximately 4,450 hours of service per lamp per year.

APPLICABILITY
This rate is applicable to Public Authorities, Local Municipalities, Statutory Organizations and private customers to provide lighting on public roadways, streets, parks, gardens, and other public areas as well as for private property at the customer's request.

CHARACTER OF SERVICE
Service is alternating current, 50 Hertz (cycles per second), single-phase 110 volts or 110/220 volts. Installation is in accordance with the Company's specifications as to equipment, installation, operation and maintenance standards.

CUSTOMER CHARGE
The Customer Charge is applicable whether or not there is any consumption and irrespective of the level of consumption and shall be a monthly contribution of $2,322 towards the cost of providing the service.

ENERGY CHARGE PER LAMP PER MONTH
The Energy Charge covers non-fuel costs that vary with consumption such as the non-fuel cost of wear and tear of the electricity plant in service and all such additional non-fuel fixed costs not recovered through the Customer Charge. The Energy Charge does not include any portion of the fuel cost.

Streetlights
(i) Company owned facilities - the installation, operation and maintenance of the fixtures installed within the company's secondary distribution system are covered by the following rates:

STREET LIGHTS $ PER LAMP PER MONTH FOR ENERGY RATES									
TYPE	50 W	70 W	100 W	125 W	150 W	160 W	175W	250 W	400 W
Incandescent (1)*			549		823				
Mercury Tungsten						879	961		
Mercury Vapour (2) **				686				1,372	2,197
High Pressure Sodium		545	748		1,059			1,713	2,608

* These prices apply only to existing installations. JPS will not provide new installations of these types of lamps, except in areas where it is necessary to provide compatibility with existing lamps.

** No new installations or replacements of these types of lamps will be made.

These rates are based on an energy charge of $14.73 per kilowatt-hour.

(ii) Customer-owned Facilities - Street lighting installations, installed, owned and maintained by the customer shall be metered and charged $14.73 per kilowatt-hour.

Traffic Signals - traffic signals, traffic control systems installations, installed owned and maintained by the customer shall be metered and charged $14.73 per kilowatt-hour (kWh).

FUEL AND INDEPENDENT POWER PRODUCER (IPP) CHARGE
The Fuel and IPP Charge shall be a monthly amount per kilowatt-hour and shall be calculated in the manner set out in the Additional Terms and Conditions hereto. The Fuel Charge represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required for producing and delivering each kilowatt-hour of electricity. The IPP Charge represents the difference between the IPP costs included in the base Customer and Energy charges and the actual IPP non-fuel costs payable and/or paid by JPS. The Fuel and IPP Charge shall apply to all kWh billed under this schedule.

FOREIGN EXCHANGE ADJUSTMENT
The Foreign Exchange Adjustment in force at the time shall apply to all charges except Fuel and IPP Charges under this schedule. The requisite terms and conditions of the Foreign Exchange Adjustment provision are set out in the Additional Terms and Conditions hereto.

SCHEDULE VI: STANDBY CLASS – Non- Firm

AVAILABILITY
This rate class is available throughout the Island of Jamaica.

APPLICABILITY
This rate is applicable for standby service to customers with a minimum demand of 25 Kilovolt-amperes (kVA), who own and operate power production equipment or other source of power to meet their own power requirement and in addition contract to take supply from JPS at one location through one meter at a single point of delivery, on a non-firm basis. Service will be provided at the discretion of JPS, based on the availability of the supply demanded by the customer and upon execution of the appropriate Contract for Standby Services.

CHARACTER OF SERVICE
Service is alternating current, 50 Hertz (cycles per second) and three-phase.

Low Voltage (LV) Classification
This service is provided and metered at three-phase 220 volts delta system or three phase 415/240 volts star system.

Medium Voltage (MV) Classification
This service is provided and metered at primary voltage (6.9 kilovolts, 12 kilovolts, 13.8 kilovolts or 24 kilovolts, as applicable and available).

RESERVE CAPACITY
The service shall be based on a contracted demand (reserve capacity) of which the minimum shall be 25 kilovolt-amperes (kVA). If in providing the supply the registered demand is higher than the contracted level, JPS shall apply the registered demand as the new Reserve Capacity.

CUSTOMER CHARGE
The Customer Charge is applicable whether or not there is any consumption and irrespective of the level of consumption and shall be a monthly contribution of $6,192 towards the cost of providing the service.

DEMAND CHARGE
The Demand Charge for each kilovolt-amperes (kVA) billing demand shall be $82 per kVA during months where no service is taken and shall be determined by the customer's voltage classification during the months when service is taken.

VOLTAGE CLASSIFICATION	DEMAND CHARGE ($/kVA)
Low Voltage (LV)	1,466.12
Medium Voltage (MV)	1,319.52

MINIMUM CHARGE
The minimum charge shall be the sum of the Demand and the Customer Charges.

ENERGY CHARGE
The Energy Charge shall be $3.89 per kilowatt-hour for the Low Voltage (LV) classification and $3.69 per kilowatt-hour for the Medium Voltage (MV) classification. The Energy Charge covers non-fuel costs that vary with consumption such as the cost of wear and tear of the electricity plant in service and all such additional fixed non-fuel costs not recovered through the Customer and Demand Charges. The Energy Charge does not include any portion of fuel cost.

FUEL AND INDEPENDENT POWER PRODUCER (IPP) CHARGE
The Fuel and IPP Charge shall be a monthly amount per kilowatt-hour and shall be calculated in the manner set out in the Additional Terms and Conditions hereto. **The Fuel Charge** represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required for producing and delivering each kilowatt-hour of electricity. **The IPP Charge** represents the difference between the IPP costs included in the base Customer, Demand and Energy Charges and the actual IPP non-fuel costs payable and/or paid by JPS. The Fuel and IPP Charge shall apply to all kWh billed under this schedule.

BILLING DEMAND
The kilovolt-ampere (kVA) Billing Demand for each month shall be the Reserve Capacity.

DETERMINATION OF DEMAND
The Demand shall be the registered integrated average load in kVA measured in the 15-minute interval in which such average load in kVA is highest during the applicable period.

FOREIGN EXCHANGE ADJUSTMENT
The Foreign Exchange Adjustment in force at the time shall apply to all charges except Fuel and IPP Charge under this schedule. The requisite terms and conditions of the Foreign Exchange Adjustment provision are set out in the Additional Terms and Conditions hereto.

TERMS OF CONTRACT
A contract for a period of three (3) years may be required as a condition of service.

SCHEDULE VII: STANDBY CLASS - Firm

AVAILABILITY
This rate class is available throughout the Island of Jamaica.

APPLICABILITY
This rate is applicable for standby service to customers with a minimum demand of 25 kilovolt-Amperes (kVA), who own and operate power production equipment or other source of power to meet their own power requirement and in addition contract to take supply from JPS at one location through one meter at a single point of delivery, on a firm basis. Service will be provided upon execution of the appropriate Contract for Standby Services. Service in excess of the firm contracted reserve capacity may be provided at the sole discretion of JPS, based on the availability of the supply.

CHARACTER OF SERVICE
Service is alternating current, 50 Hertz (cycles per second) and three-phase.

Low Voltage (LV) Classification
This service is provided and metered at three-phase 220 volts delta system or three phase 415/240 volts star system.

Medium Voltage (MV) Classification
This service is provided and metered at primary voltage (6.9 kilovolts, 12 kilovolts, 13.8 kilovolts or 24 kilovolts, as applicable and available).

RESERVE CAPACITY
The service shall be based on a contracted demand for reserve capacity of which the minimum shall be 25 kilovolt-amperes (kVA). If in providing supply the registered demand is higher than the contracted level, JPS shall apply the billing demand as the new Reserve Capacity.

CUSTOMER CHARGE
The Customer Charge is applicable whether or not there is any consumption and irrespective of the level of consumption and shall be a monthly contribution of $6,192 towards the cost of providing the service.

DEMAND CHARGE
The Demand Charge for each kilovolt-amperes (kVA) billing demand shall be determined by the customer's voltage classification.

VOLTAGE CLASSIFICATION	DEMAND CHARGE ($/kVA)
Low Voltage (LV)	1,466.12
Medium Voltage (MV)	1,319.52

MINIMUM CHARGE
The minimum charge shall be the sum of the Demand Charge and Customer Charges.

ENERGY CHARGE
The Energy Charge shall be $3.89 per kilowatt-hour for the Low Voltage (LV) classification and $3.69 per kilowatt-hour for the Medium Voltage (MV) classification. The Energy Charge covers non-fuel costs that vary with consumption such as the cost of wear and tear of the electricity plant in service and all such additional fixed non-fuel costs not recovered through the Customer and Demand Charges. The Energy Charge does not include any portion of fuel cost.

FUEL AND INDEPENDENT POWER PRODUCER (IPP) CHARGE
The Fuel and IPP Charge shall be a monthly amount per kilowatt-hour and shall be calculated in the manner set out in the Additional Terms and Conditions hereto. The Fuel Charge represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required for producing and delivering each kilowatt-hour of electricity. The IPP Charge represents the difference between the IPP costs included in the base Customer, Demand and Energy Charges and the actual IPP non-fuel costs payable and/or paid by JPS. The Fuel and IPP Charge shall apply to all kWh billed under this schedule.

BILLING DEMAND
The kilovolt-ampere (kVA) Billing Demand for each month shall be the reserve capacity.

DETERMINATION OF DEMAND
The Demand shall be the registered integrated average load in kVA measured in the 15-minute interval in which such average load in kVA is highest during the applicable period.

FOREIGN EXCHANGE ADJUSTMENT
The Foreign Exchange Adjustment in force at the time shall apply to all charges except Fuel and IPP Charge under this schedule. The requisite terms and conditions of the Foreign Exchange Adjustment provision are set out in the Additional Terms and Conditions hereto.

TERMS OF CONTRACT
A contract for a period of three (3) years may be required as a condition of service.

FUEL AND IPP CHARGE
The Fuel Charge represents the total cost of fuel (including the cost of fuel for energy purchased from Independent Power Producers) required for producing and delivering each kilowatt-hour of electricity.

The cost of fuel per kilowatt-hour shall be calculated each month on the basis of the total fuel computed to have been consumed by JPS and Independent Power Producers (IPPs) in the production of electricity, adjusted for the applicable system heat rate and system losses.

The applicable system heat rate is **10,200kJ/kWh**, and is a combination of the Company's generating heat rate and the IPP's generating heat rate as per contract with the IPPs. The applicable value of system losses is **17.50%** of total net generation of the Company and Independent Power Producers delivered to the grid. The term, Independent Power Producers (IPPs), includes private suppliers from whom JPS purchases electricity in bulk for transmission and distribution.

The IPP Charge represents the difference between the IPP costs included in the base Customer, Demand and Energy Charges and the actual IPP non-fuel costs payable and/or paid by JPS.

The Fuel and IPP Charge shall be:

- combined as a single line item on the customer's bill,
- a monthly amount per kilowatt-hour,
- calculated in US dollars and be converted to Jamaican dollars at the Billing Exchange Rate,
- divided by billed kWh sales and be applied to all sales.

The Fuel and IPP charge per kilowatt-hour shall be calculated to the nearest one thousandth of a dollar.

Where a bill straddles two months the latest Fuel and IPP Charge shall be used for billing purposes.

CHARACTER OF SERVICE
Notwithstanding the Terms of Contract provision, JPS may at its option after three (3) months notice and advice to the customer, shift customers to an appropriate rate class, if it is determined that the customer's character of service over the previous twelve (12) month period fits that of another class.

FOREIGN EXCHANGE ADJUSTMENT
All charges excluding the Fuel and IPP Charge are subject to a Foreign Exchange Adjustment. The charges excluding the Fuel and IPP Charge will be increased or decreased by a percentage computed as follows:

$$\%FE\ Adjust = \frac{\text{Billing exchange rate - Base exchange rate}}{\text{Base exchange rate}} \times 76$$

Note

1. The Base Exchange Rate is J$98.50: US$1.00.

2. The Billing Exchange Rate which is shown on the face of the bill shall be the arithmetic mean of the daily weighted average of rates at which financial institutions in Jamaica sell United States dollars for Jamaican dollars on the Spot Market (the "Spot Market Weighted Average Selling Rate") issued by the Bank of Jamaica for the last trading day of the month preceding the month of billing. If no such rate is issued the last trading day by the Bank of Jamaica or, if the current system for determining the rate at which United States dollars are exchanged for Jamaican dollars shall have changed then, for the purpose of this provision, the rate for that day shall be the weighted average of the rates at which Commercial Banks in Jamaica sell United States dollars for Jamaican dollars on that same day as determined by the JPS. Where the billing period exceeds one month, that rate shall be the arithmetic mean of the monthly Billing Exchange Rates determined in accordance with the foregoing.

ANNUAL ADJUSTMENT CLAUSE
All charges excluding the Fuel and IPP Charge shall be adjusted on or about June 1st of each year to reflect Jamaican inflation, US inflation, change in the weighted average US selling Exchange Rate rounded to the nearest Jamaican dollar and issued by the Bank of Jamaica on or about March 31, of each year and efficiency and quality of service factors.

The annual Jamaican inflation rate shall be based on the most recent published values of the Statistical Institute of Jamaica (STATIN) All Group 12-month point to point Consumer Price Index (CPI) at February 28 each year. The annual US inflation rate shall be based on the most recent published 12-month point to point Consumer Price Index, all urban consumers, US city average, US Department of Labor, Bureau of Labor Statistics, published monthly at February 28 each year. The Annual Adjustment shall be computed as follows:

$BRn = BR(1 + dI \pm X \pm Q \pm Z)$

Where: dI = annual growth rate in inflation and devaluation.

X = the offset to inflation (annual real price increase or decrease) resulting from productivity changes in the electricity industry;

Q = adjustment allowed by the OUR to reflect changes in the quality of service provided to customers.

Z = any adjustment approved by the OUR to reflect events that affect JPS' costs, which are not due to JPS' managerial decisions and which are not captured by other elements in the price cap mechanism.

$dI = 0.76\ ((EXn - Exb)/ Exb)(1 + 0.92INFus) + (0.76)(0.92)\ Ius + 0.24\ INFj$

EXb = Base Exchange Rate

EXn = New Base Exchange Rate

INFus = US inflation rate

INFj = Jamaican inflation rate.

RECONNECTION FEE
The Reconnection Fee is applicable to all Rate Categories. Effective July 1, 2013 Reconnection Fee shall be $1,650.00. Thereafter JPS shall be entitled to charge its customers a Reconnection Fee which shall be determined by June 30 each year and which shall be based on the actual cost of undertaking reconnections in the preceding fiscal year plus a ten percent (10%) service charge PROVIDED THAT the said actual cost was incurred in the most cost efficient and cost effective manner. In the absence of a determination the existing rate shall continue in force.

Other charges for services or changes in these schedules approved by the Office of Utilities Regulation will be published from time to time.

RATE SUMMARY EFFECTIVE JULY 01, 2013
BASE EXCHANGE RATE J$98.50 = US$1.00

Class		Block/Rate Option	Customer Charge	Energy J$/kWh	Demand-J$/KVA			
					Std.	Off-Peak	Part Peak	On-Peak
Rate 10	LV	--100	387.00	6.98				
Rate 10	LV	> 100	387.00	15.96				
Rate 20	LV		851.40	13.63				
Rate 40A	LV							
Rate 40	LV - Std		6,192.0	3.89	1,466.12			
Rate 40	LV - TOU		6,192.0	3.89		62.23	645.10	825.45
Rate 50	MV - Std		6,192.0	3.69	1,319.52			
Rate 50	MV - TOU		6,192.0	3.69		58.64	571.79	733.06
Rate 60	LV		2,322.0	14.73				

(1) Minimum Standard Billing Demand per month: 25kVA for Rate 40 and Rate 50.

(2) Billing Demand in the on-peak period is the maximum registered demand for the On-Peak hours of that month.

(3) The Billing Demand for the partial peak period each month shall be the maximum registered demand for the on-peak and partial-peak hours of that month, or 80% of the highest maximum registered demand for the on-peak and partial-peak hours during the six-month period ending with the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes (kVA).

(4) The billing demand for the off-peak period each month shall be the maximum demand for that month (regardless of the time of use period it was registered in), or 80% of the highest maximum demand during the six-month period ending with the month for which the bill is rendered, whichever is higher but not less than 25 kilovolt-amperes (kVA).

(5) Standby Rates: see details in the Schedules.

APPENDIX VI – KEY ENERGY AND RELATED ENTITIES

The major GOJ entities within the energy sector are as follows:

i. The Ministry with responsibility for energy. Currently, this is the Ministry of Science, Technology, Energy and Mining (MSTEM)

ii. The Office of Utilities Regulation (OUR)

iii. Energy agencies of MSTEM:
   a. Board of Examiners (BOE)
   b. Government Energy Inspectorate (GEI)
   c. Petroleum Corporation of Jamaica (PCJ)
   d. PETROJAM Oil Refinery (PETROJAM)
   e. PETROJAM Ethanol Limited (PEL)
   f. Petroleum Company of Jamaica Limited (PETCOM)
   g. Jamaica Aircraft Refuelling Services Limited (JARS)
   h. Rural Electrification Programme Limited (REP)
   i. Wigton Windfarm Limited (WWL)

Other important GOJ entities that significantly impact the energy sector's development, but are not directly involved in its management are:

i. The Ministry of Finance and Planning
ii. Jamaica Customs