STRATEGIC REVIEW

OF

PETROJAM LIMITED

Prepared by the Petrojam Review Committee

for the

Government of Jamaica

31 May 2019

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Introduction & Methodology

Background

- Petrojam Limited is a wholly owned subsidiary of the Petroleum Corporation of Jamaica (PCJ) that was incorporated in 1982, when the Government of Jamaica (GoJ) purchased the ESSO Kingston Refinery for the purpose of processing crude oil into refined petroleum products to supply the local market. The company produces a range of domestic, transportation and industrial petroleum products.
- In 2008, the GoJ sold 49% of its shares to the Government of Venezuela under a joint venture agreement between PCJ, PDV Caribe SA and Petrojam. PDV Caribe SA is a wholly owned subsidiary of the Venezuelan state entity Petroleous De Venezuela SA (PDVSA), which is the state-owned oil and natural gas company. In February 2019 the GoJ acquired PDVSA's shares in Petrojam by an act of the Jamaican parliament.
- In the light of the recent public concerns raised regarding the governance and management of Petrojam a new board was appointed on 18 June 2018.
- Several investigations were launched into the affairs of Petrojam as a result of allegations in the public domain.
- The energy Ministry has increased its monitoring and oversight of Petrojam and the government has instituted new guidelines for implementation in a number of areas.

The Petrojam Review Committee (PRC) was appointed by Cabinet on 4 September 2018, with a remit to examine several other issues that remain concerning what the strategic direction the Company should take in the future.

Appointment of Petrojam Review Committee

The following members of the Committee were appointed:

1. Mr. Christopher Zacca – Chair an
2. Mr. Dennis Cohen
3. Mr. Norman Davis
4. Ms Carlene O'Connor
5. Mr. Ike Johnson
6. Mr. Joseph M. Matalon
7. Mr. Paul Hoo
8. Mr. Nicholas Scott
9. Mrs Helene Davis Whyte
10. Mr. Peter Moses

Committee's Terms of Reference

The PRC' purpose, objectives and functions included a review of the following: -

1. The current plans for upgrade of the refinery and assess them in relation to possible alternatives and against realistic options in respect of the future strategic path for the petroleum sector in the national interest, including considerations in relation to energy security;
2. The pricing policy, taking account of the regional petroleum products industry and market;
3. The structure, corporate positioning and ownership of the refinery;
4. The existing institutional and management arrangements with a view to recommending systemic improvements in the interest of good governance; and
5. Any other factors thought to be critical to the proper functioning and growth of Petrojam

Consultations

Consultations were held with a range of stakeholders including:

- the General Manager and other members of Petrojam's senior management team
- the executive of the Jamaica Gasolene retailers Association (JGRA)
- the CEO and Senior VP, Generation of the Jamaica Public Service Company (JPSCo)
- the CEOs of Total Jamaica, Rubis Energy Jamaica and GB Texaco Jamaica
- the CEO and management team of the PetroCaribe Fund
- Union representation from UCASE and union delegates from Petrojam
- Minister with responsibility for energy, Hon Fayval Williams

Engagement of Consultants and work process

In order to support the review by the Committee, and at its request, the GoJ represented by the Cabinet Office sought proposals from suitably qualified consultants to undertake a strategic review of Petrojam Limited, including the conduct of a business, financial and technical assessment of Petrojam's operations, and to assess the viability of the refinery inclusive of its present operations and options for the future.

The ToR for the Consultants entailed the following –

A. Examine and analyze the current plans for upgrade of the refinery and assess them in relation to possible alternatives and against realistic options in respect of the future strategic path for the petroleum sector in the national interest, including considerations in relation to energy security.
B. Assess the prudence and usefulness of the current governance structure and corporate positioning within the Petroleum Corporation of Jamaica (PCJ) group and the ownership of the refinery. The PRC guided the concentration of effort towards identifying opportunities and barriers for the participation of private entities in the refining and terminal operations currently operated by Petrojam.
C. Forecast the impact of oil prices, declining demand for traditional petroleum products and other significant market factors on the medium to long- term profitability of the national refinery.
D. Deconstruct the existing pricing approach and methodology used by Petrojam to sell its products and evaluate its usefulness and impact on the market that it serves.
E. Identify and discuss any and all factors encountered in the course of this exercise that are believed to be critical to the proper functioning and growth of Petrojam.

Gaffney Cline and Associates (GCA) were selected and a contract signed for their services. GCA conducted their review over a 3-month period from Jan 22 to April 22, 2019.

Petrojam Data

GCA's informed professional judgment was based on accepted standards of professional investigation and, as applicable, the data and information provided.

The following outlines the technical and financial information from Petrojam that was used in GCA's analysis:

1. *For the period from April 2014 through December 2018, Petrojam provided information on the refinery yields, the crudes and products purchased, the prices for such imports and the sales prices for products sold by the company.*

2. *Petrojam provided information on the pricing mechanism used to determine refinery-gate prices for products sold to marketers at the refinery rack. Information on costs for acquisition of imported products, taxes, and terminal and rack margins was utilized.*

3. *Internal Financial Statements for 2014 through 2018.*

4. *Process unit capacities for the refinery units.*

5. *Information related to the investment and crude and product yields expected from the RUP and VDU projects described later in this report.*

6. *Crude and product prices used by Petrojam for mid to long term planning.*

7. *Sales forecasts for Petrojam for the next 20 years.*

8. *Expected yield data for a typical sour crude (Vasconia) as well as expected yields from low sulphur (sweet) crude (Espoir) that is one of the sweet crudes that Petrojam is considering processing in the near future.*

9. *Historical operating cost data for Petrojam.*

The consultants (GCA) had several face-to-face meetings, and consultations via phone and teleconference with Petrojam. They also had meetings with many other stakeholders including the Ministry of Finance and the Public Service (MoFPS), Ministry of Education, Youth, Information (MoEYI), Ministry of Transport and Mining (MoT&M), Jamaica Bauxite Institute (JBI), Office of Utilities Regulation (OUR), petroleum marketing companies and the Jamaica Gasoline Retailers Association (JGRA).

Development of Yield Data

GCA obtained existing Petrojam crude yield data to calibrate its models to be able to predict refinery performance using a variety of alternate crude oil feedstocks available internationally. From this yield data, future operational and estimates of financial performance under various scenarios were calculated.

Analysis of Historical Data

To understand the historical financial performance of Petrojam and to be able to model future

scenarios it was necessary to surmount the critical challenge of Petrojam's financial statements not having separated the financials of the refinery from those of the terminal.

To overcome this, GCA performed revenue and cost allocation analyses which enabled them to estimate the contribution of the refinery separate from the terminal and produce pro forma historical financial statements for these separate operations.

Analysis of Future Options

The consultants built models of the refinery operations with input data as detailed above. They established the contributions to gross-margins from various sources including terminal fees, Customs Administration Fee (CAF) margins (the difference between the rates of CAF applicable to crude imports (J$0.35/ ltr) and finished product imports (J$3.50/ltr)) for the refinery and the effect of other adjustments. These other adjustments were excluded for future scenario planning. The consultants calculated the NPV for various investment scenarios with this provisio:

> *"It should be clearly understood that the NPV contained herein do not represent a GCA opinion as to the market value of the subject properties, nor any interest in them. All NPVs were calculated using a discount rate of 10%, taking into consideration cash flows for the period 2019-20 to 2038-39 as Petrojam's calendar year is from April through March.*
>
> *In assessing a likely market value, it would be necessary to take into account a number of additional factors including comparable transactions, multiple of earnings and risks associated with the market or operation of the assets; perceptions of economic and sovereign risk, including potential change in regulations; potential upside; other benefits, encumbrances or charges that may pertain to a particular interest; and, the competitive state of the market at the time. GCA has explicitly not taken such factors into account in deriving the NPVs presented herein." (GCA Report pp.12)*

The PRC noted that for ease of analysis a single discount rate of 10% was applied by GCA in arriving at the NPV of future cash flows in each scenario examined. The Committee took the view however, given the significantly higher operating and execution risks involved in refinery operations, that the differential risk profiles of refinery operations versus terminal-only operations should be taken into consideration during its deliberation and formulation of recommendations. The higher risk profile of the Refinery arises from its greater operational complexity, the significant challenge involved in increasing plant utilization from the historic levels of ~63% to the projected utilization rate of 78%, and the project execution risks involved in any capital improvement expenditures.

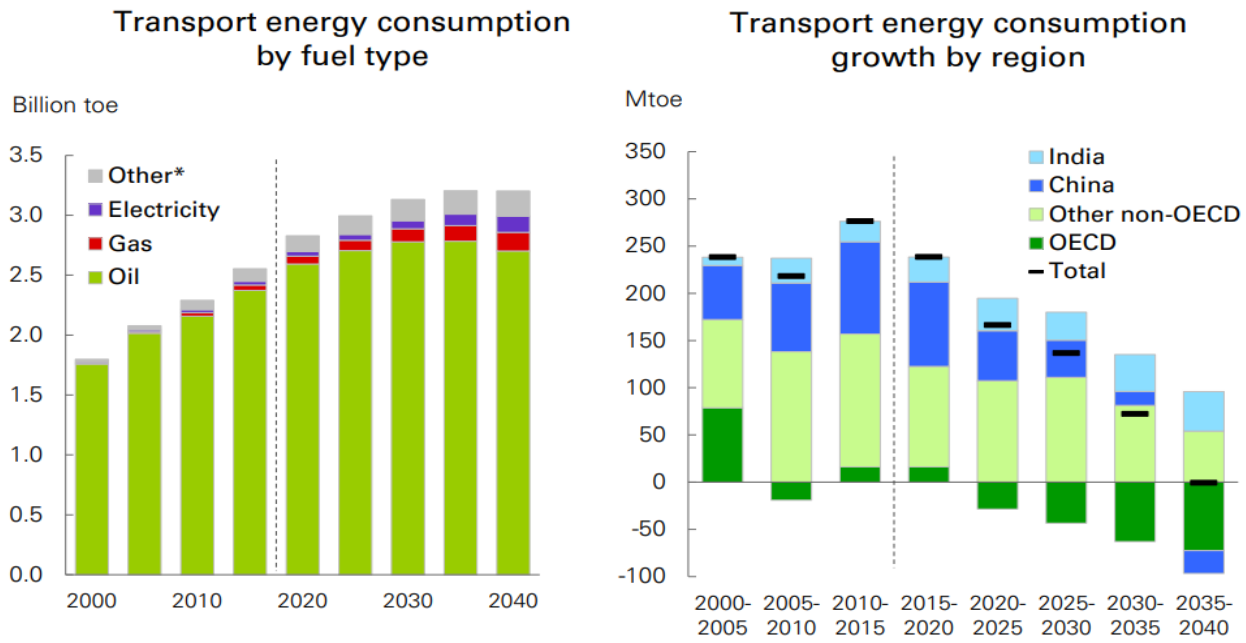
Market Outlook

International Petroleum Environment

The Committee examined the international industry context and environment of Petrojam's operations. On the world-wide demand side, OPEC estimates that world oil demand will increase by ~0.6% per annum until sometime in the 2030's, while LNG demand will increase by 1.7% per annum. Oil will primarily be used for transportation fuels and petrochemical feedstocks with a lesser emphasis on heavy fuels.

> *"... Energy agencies, large integrated oil companies and OPEC[1] oil producers coincide in a view for oil demand, which indicates that growth in demand will continue until sometime in the 2030s. As the energy-mix is changing with the increase of natural gas and renewables, the overall demand for oil will continue to increase but at a slower pace than in the past. OPEC estimates 2] indicate that oil demand will increase from 86.3 MMBpd in 2015 to 101.3 MMBpd (0.6% p.a. growth) while natural gas is expected to grow faster, from 59.4 MMBoepd to 91.3 MMBoepd (1.7% p.a. growth) and renewables even faster from 3.9 MMBoepd to 23.1 MMBoepd (7.4% p.a. growth). Oil will be primarily used for the production of transportation fuels and petrochemical feedstocks.*
>
> *Transport fuel demand is expected to grow up to year 2033 according to BP[3] and others (Figure 2), growth will be concentrated in developing nations with Asian countries representing the major growth markets for fuels*." (Source GCA Report pp. 22)

The following chart shows the historical growth and projected demand for various energy sources -



Source: 2018 BP Energy Outlook

The world petroleum production supply environment has in recent years undergone a paradigm shift due to changes in technology that enabled sharply increased US production of petroleum crude supplies which was supported by changes in US legislation (2015) that enabled the USA to begin exporting and become a major player in the world market. Other nations, primarily those in the Middle East, Asia and the Pacific are also well advanced with plans to increase refining capacity.

Jamaica Petroleum Environment

Petrojam Refinery

The Petrojam refinery is of low complexity (simple refining), worldwide petroleum refineries are increasingly becoming more complex and of larger scale to support higher levels of conversion of crude feedstocks to '*light-clean'* products. In many cases the refining capacity will be integrated to produce high value petrochemicals rather than simple fuels. Refineries are increasingly being built in the Middle East, Asia & Pacific and to a lesser extent Africa and Russia. In contrast, a large number of refineries in the Caribbean and Central American region have shut down and refinery production for the region is increasingly dominated by US Gulf Coast refineries exporting fuels to these regions.

Additional refining capacity under construction worldwide is expected to result in the emergence of major exporters of petroleum products, particularly from the Middle East/Saudi Arabia, Europe and the USA. "*The International Energy Agency estimates that these new additions far exceed*

the increase in demand for refined products, plant closures might be necessary to rebalance the market; refineries with low capacity and complexity with high fuel costs will be the first affected…". (GCA Report pp.19) The Report comments further that:

> *"Most of the refineries in the Caribbean have shut down, as they were unable to compete with product imports. The cost of operating small refineries is large because of small capacities, lack of low-cost fuel (natural gas) as available in the USA. Larger refineries, oriented to export products, primarily to the USA have ceased operation: Aruba's 235 Mbd refinery shut down in 2012; Curacao's 335 Mbd refinery has shut down as PDVSA was unable to continue sending crude to the refinery or provide the funds for operating the refinery expenses; and, Trinidad's Petrotrin 175 Mbd refinery was shut down in September 2018 on the back of years of poor financial results..."* (GCA Report pp.20)

Condition of Refineries in the Caribbean and Central America

Country	Refinery	Crude Supply	Present Condition
Aruba	Aruba	235,000	Shutdown
Costa Rica	Recope Puerto	24,000	Shutdown
Cuba	Cienfuegos	65,000	Turndown
Cuba	Hermanos Diaz	30,000	Turndown
Cuba	Nico Lopez	36,400	Turndown
Cuba	Sergio Solo	2,800	Shutdown
Dominican Republic	Falconbridge	16,000	Operating-Special Fuel Oil
Dominican Republic	Refidomsa Haina	34,000	Operating
El Salvador	Acajutla	22,000	Shutdown
Guatemala	Puerto Barrios	12,500	Shutdown
Guatemala	La Libertad	5,000	Upstream
Honduras	Puerto Cortes	16,000	Shutdown
Jamaica	Kingston	36,000	Operating
Martinique	Fort-de-France	17,329	Operating
Nicaragua	Managua	19,950	Operating
Puerto Rico	Yabucoa	73,000	Shutdown
Trinidad and Tobago	Pointe-a-Pierre	168,000	Shutdown
Netherland Antilles, Curacao	Isla	320,000	Turndown (Considering a lease to Motiva Enterprises)
USVI	St Croix	450,000	In partial restart (to 200 Mbd)

Source: Gaffney, Cline & Associates

"…Based on the refinery yields for the recent period of April 2014 to December 2018, the refinery processed an average 20.24 Mbd of crude oils and imported 0.78 Mbd of ethanol to produce 6.88 Mbd of "light products16" and 12.93 Mbd of "heavy products" for a total of 19.81 Mbd of products supplied to the market. For the same period, Petrojam imported 22.58 Mbd of products, 16.06 Mbd of light products and 6.53 Mbd of heavy product. Thus, the light product

contribution of the refinery to local sales is 30% while the heavy product contribution is 67%."

Petrojam Terminal

The committee examined the separate roles of the terminal and that of the refinery. *The terminal has an approximate storage capacity o f 2,717 MBbl of gross capacity of which 1,009 MBbl correspond to crude oil and the remaining are intermediate and final products. The loading rack storage is 347 MBbl of gross capacity and the LPG storage is 34 MBbl gross capacity. …. The terminal can receive crude cargoes of 350- 370 MBbl and clean product cargoes of 150 MBbl and 190 MBbl for fuel oil. Petroleum imports (crude oil and finished products) are received via one of two main docking facilities. Products are sold through a loading rack in Kingston or in Montego Bay where Petrojam operates a second terminal that sells light products only. A dry dock is used to import and export asphalt. Petrojam is currently expanding its asphalt-exporting capabilities. Petrojam also operates a petroleum-testing laboratory for its own purposes, although it also offers limited service to the public.*

Refinery operations are intertwined with the product terminal operations; products from the refinery except for ULSD (Ultra Low Sulfur Diesel) are co-mingled with imported finished products. The terminal charges a Terminal Fee of US$2.75/Bbl on each barrel of product that it handles (imported or locally produced) and a Rack Fee of US$0.40/Bbl for products sold across the rack.

The consultant determined that "*… the level of profit for this terminal is higher than US averages when compared in terms of barrels of product through the terminal or in terms of tank (shell) capacity. Other terminals in the Caribbean are typically used for crude storage: Bonaire, USVI, St Lucia and others with much larger tanks dedicated to crude oil storage at a cost of ~US$0.60/month/Bbl which are not really comparable to the cost of storing products in Jamaica at US$1.38/month/Bbl. …. Other terminals are available in Jamaica, but these have a much smaller capacity and account for less than 10% of the imported products: Rubis, West Indies Petroleum and GB Energy.*

…Based on the refinery yields for the recent period of April 2014 to December 2018, the refinery processed an average 20.24 Mbd of crude oils and imported 0.78 Mbd of ethanol to produce 6.88 Mbd of "light products16" and 12.93 Mbd of "heavy products" for a total of 19.81 Mbd of products supplied to the market. For the same period, Petrojam imported 22.58 Mbd of products, 16.06 Mbd of light products and 6.53 Mbd of heavy products. Thus, the light product contribution of the refinery to local sales is 30% while the heavy product contribution is 67%."

Current Issues in the Jamaican Petroleum environment

In the short run, local demand for heavy petroleum products from Petrojam will decline substantially due to the reduction in fuel oil demand primarily by its industrial customers. These changes have already begun and will accelerate sharply in mid-2019 into the 2020 period and will primarily negatively affect the operation of the refinery, with little projected change or implication for the Petrojam terminal.

The Petrojam refinery supplies approximately 65% of heavy petroleum products (HFO and asphalt) demanded by the local economy and only 30% of the light products demanded (LPG, gasoline, diesel, kerosene and jet/turbo fuels).

There exist a number of threatening strategic market issues, the first being that Petrojam

internal projections of heavy fuel oil (HFO) demand show a steep decline, decreasing from ~9.9 Mbd in 2019/20 to ~8.5 Mbd in 2020/21 and ~6.0 Mbd in 2021/22 and further declining to ~3.9 Mbd by 2030. (ref. GCA Table 3).

Independent projections of demand for HFO to supply the electricity generating sector (JPSCo and its independent power producers) undertaken by the Office of Utility Regulations, point to a reduction from ~6MbD in 2019/20 to ~3.6 Mbd by 2022, as a consequence of the conversion to LNG by the electricity generating sector and the increase in the use of renewable energy sources.

The second threatening strategic concern arises due to the expected reduction in demand for fuel oil (HFO) to supply marine customers (bunker fuel) as a consequence of changes in the International Maritime Organization's (IMO) 'marine fuel specifications' regulations beginning Jan. 1, 2020. This stipulates that all international shipping must use fuels with sulphur concentration below (<0.5%) (i.e. low-sulphur), this is less than the existing 3.5% limit (high-sulphur) which the present Petrojam refinery operation is capable of producing.

These two situations will create a severe marketing constraint for the current high-sulphur fuel oil products (HFO) of the refinery and poses an existential threat to the refinery's continued operation.

National Energy Policy & Energy Security

The PRC examined the wider background to this situation and in particularly from the context of *Jamaica's National Energy Policy 2009-2030* which is aligned with the Vision 2030 Jamaica – National Development Plan. The national energy policy presents seven goals, the accomplishment of which, will enable Jamaica to achieve the country's energy vision of:

> *"A modern, efficient, diversified and environmentally sustainable 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 outlined in the national energy policy are:

> Goal 1: *Jamaicans use energy wisely and aggressively pursue opportunities for conservation and efficiency*
>
> Goal 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

Goal 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*

Goal 4: *Jamaica's energy supply is secure and sufficient to support long-term economic and social development and environmental sustainability*

Goal 5: *Jamaica has a well-defined and established governance, institutional, legal and regulatory framework for the energy sector that facilitates stakeholder involvement and engagement*

Goal 6: *Government ministries and agencies are a model/leader in energy conservation and environmental stewardship in Jamaica*

Goal 7: *Jamaica's industry structures embrace eco-efficiency for advancing international competitiveness and move towards building a green economy*

The committee noted that the occurrence of the previously outlined "urgent and strategic issues that threaten Petrojam are due to the successful pursuit by the c ountry of the goals of this National Energy Policy, and specifically the pursuit of Goals 1,2 and 3, which has resulted in the decline of HFO use by JPSCo and the electricity generating sector, while the pursuit of Goals 6 and 7 are part of Jamaica's international cooperation and leadership in climate change and climate adaptation treaties, specifically those that restrict the use of high-sulphur HFO being sold to the maritime/shipping sector commencing Jan. 1, 2020.

The importance of the respective roles of the Petrojam refinery and terminal respectively, were considered in the context of the security of Jamaica's energy supply. The terminal can exist and operate independently of the refinery solely on imports of finished petroleum projects, in supplying Jamaica's energy needs. In their international petroleum market overview GCA also opined that adequate supplies of finished product would be available should a decision be taken to cease refining in Jamaica.

Based on the foregoing, the PRC concluded that the existence of local refinery operations is not essential to ensuring Jamaica's energy security. However, the terminal because of its storage capacity and ability to receive petroleum product cargos and to supply distributors via its terminal racks, is deemed to be critical to ensuring energy security for the nation.

Historically, the GoJ's tax policies have maintained a differential rate in the Customs Administration Fee (CAF) that is charged for crude supplies as against that charged for finished petroleum products. This CAF differential provides a significant tax incentive to refining over the importation of finished products and this CAF differential represents a major

contributor to the economic viability of the refinery.

Product Pricing Methodology

The Committee considered the two components of the value chain and the pricing system for petroleum products in Jamaica. The first being the setting of prices at the refinery gate or terminal, referred to as 'ex-refinery' billing pricing; and the second being the distribution and retail value chain post the refinery, both of which independently affect the pricing of petroleum products to consumers.

Ex-refinery/Terminal Pricing

Petrojam has been the subject of long-standing inquiry and criticism in respect of its business practices, which appear to place undue economic burden on the end users of its products.

The petroleum price computation formulae utilized by the refinery has long been a point of discussion amongst stakeholders who express concerns as to its fairness and transparency. The impact of pricing of finished products on the wider economy has been a concern to consumers and planners. Competition in the petroleum products distributive sector (post refinery) is dominated by large marketers who do not really compete but allow Petrojam to set prices and they follow.

Petrojam sets a Refinery Billing Price (RBP), posted on a weekly basis, for all products based on a Cost Insurance and Freight (CIF) of sourcing products to which is added an Acquisition Differential, various taxes payable to GoJ, terminal and rack fees and 'other market adjustments' added by Petrojam.

The Acquisition Differential reflects the difference between the actual cost of acquisition by Petrojam and the reference price as determined by S&P Platt pricing services.

> "*Petrojam is the only company that posts prices at the rack on a weekly basis, the Refinery Billing Price, other importers are not required to post prices and sell imported products to dealers on a private contract basis… The RBP is determined internally by Petrojam and there appears to be no oversight by the Ministry of Energy or other governmental authority."* (GCA pp.40)

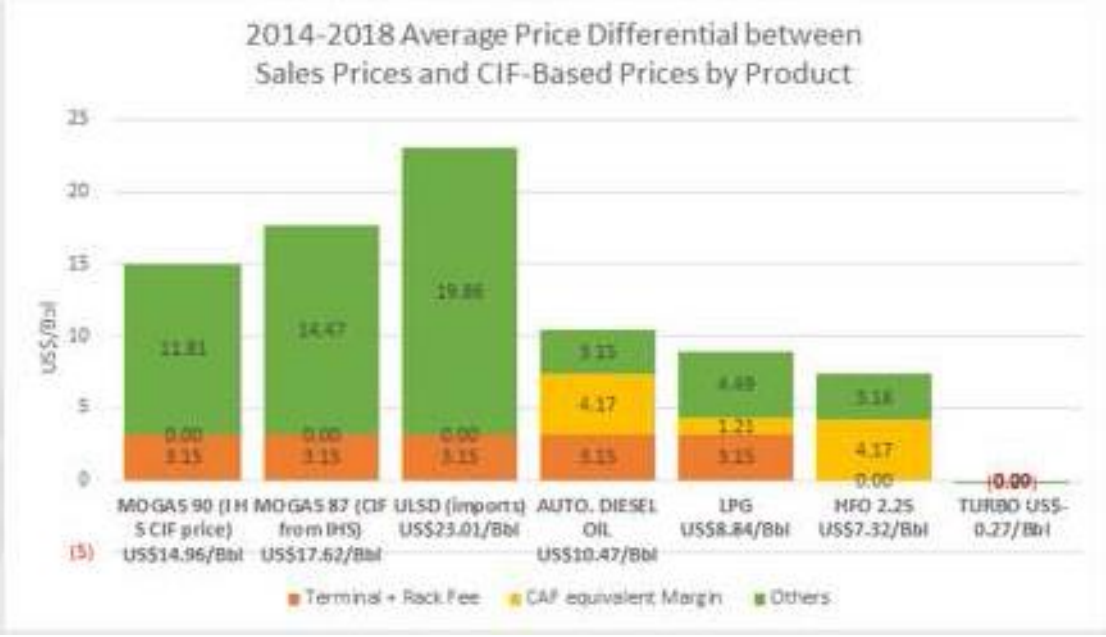
GCA Review of ex-refinery petroleum product pricing

GCA conducted an analysis in order to understand and deconstruct the pricing approach in order to better understand the economics of the Petrojam refinery and terminal. Using Petrojam's internal financial statements GCA compared the average sales prices against the

CIF based purchase prices on each product for the financial years 2014-2018 and noted important positive differentials.

Components of Price Differential between Sales Prices and CIF Prices for Selected Products SALES - CIF PRICES (US$/Bbl)	Total Delta	Terminal + Rack Fee	CAF Equivalent Margin	Other Adjustments
MOGAS E10 90 less MOGAS 90 (IHS CIF Price)	**14.96**	3.15	0.00	11.81
MOGAS E10 87 less MOGAS 87 (IHS CIF Price)	**17.62**	3.15	0.00	14.47
ULSD (imports)	**23.01**	3.15	0.00	19.86
AUTO. DIESEL OIL	**10.47**	3.15	4.17	3.15
LPG	**8.84**	3.15	1.21	4.49
HFO 2.25	**7.32**	0.00	4.17	3.16
TURBO	**(0.27)**	0.00	0.00	(0.27)

"…the price differentials from the historical financials exceeded the terminal and rack fee and the CAF differential on all products except Turbo. The additional difference could only be from additional adjustments made to the product sales prices. Some of these adjustments reflected the capital recovery fees that were being recovered in the case of ULSD (expected to be US$2.62/Bbl) and/or price adjustments made to Mogas 90 to capture a portion of the high differential that the marketers charged at the pump for the two products (expected to be US$1.90/Bbl). However, the *"others"* differentials exceeded these *adjustments."* (GCA Report pp.50).



Source: GCA analysis of Petrojam's internal financials (pp 52)

For those products that are imported there is no CAF margin. The CAF that is paid for the imported product is collected as part of the sales price and paid over to GOJ . The operation

of the refinery generates a margin on the locally refined products as Petrojam includes the CAF for these products on the sales price as if they had been imported, but has only paid over to GOJ the lower CAF for the crude imported. Petrojam imports MOGAS 90 and ULSD as these products cannot be produced by Petrojam, but it also imports products that are made in the refinery to meet product demand, thus for example MOGAS 87 is shown with no CAF differential, but some of the MOGAS 87 sold is subject to a price differential as it is internally produced by Petrojam.

The 'other adjustments' are comprised of market adjustment factors that are subjectively set by the Petrojam pricing committee and these vary from time to time. The adjustment mechanism includes 'smoothing adjustments' that would be expected to accumulate to zero over the long run, however GCA's analysis has determined that the revenue impact of such adjustments is appreciably net-positive over the four year period under review for reasons that could not be ascertained.

Due to the subjectivity of applying these 'other adjustments' and the expectation that they will not contribute to long-term revenue gain or loss, Petrojam appropriately adopts the practice of setting the effect of these 'other adjustments' to zero when conducting any forward financial planning and budgeting. However, the calculated historical impact of these 'other adjustments' are significant in all years examined and are responsible for the contribution of over half of the gross margin of the company. Without them the historical (2014-18) financial performance of Petrojam would have been significantly worse and the Company would have operated at a substantial loss. (see later section on Petrojam Historical Performance)

Post Refinery Distribution Chain Pricing (marketing companies and retailers)

The GCA consultants have found that:

> *"The Jamaican fuel supply chain structure is quite common and follows the traditional structure of fuel supplier-marketer-retailer…There are currently five suppliers, which are Petrojam, Total, GB Energy, Rubis and West Indies. The fuel suppliers are responsible for selling fuel to the marketers; marketers are approved by the Ministry of Energy based on financial capacity and volume commitment. The marketers are responsible for off-taking product and distributing them to the retail stations or industrial customers. There are currently 17 marketers in Jamaica and 320 service stations." (GCA pp.40)…. The prices at the pump include a transportation cost which is suggested by the Ministry of Energy and is between J$1.1 to 2.0 J$/lt.; the total gross margin between the pump and the RBP varies over time. A snapshot for the 4th quarter 2018 indicates the following: range in prices:*

Marketing and Retail Margins	Service Station/Refinery Billing Price
E10 87	~12-30
E10-90	~14-36
ADO	~15-32
ULSD	~12-42

Source: Petrojam Limited

> *…The breakdown of the margin is typically 15-25 J$/Lt. for the marketing company and between 8- 10 J$/Lt for the retailer; 73% of retail market is with international brands and 27% with local brands. There appears to be high customer loyalty with a strong perception of higher quality for international brands, thus the consumer is willing to pay more for "perceived quality" in the fuel.*
>
> *Compared to the US where the equivalent marketing margin is J$7/lt., Jamaica's marketing margins are 2-6 times higher: possible explanations for this are lower throughput for the average gas station in Jamaica, the employment of attendants to dispense fuel to vehicles and lower convenience store traffic. …To obtain the price at the pump or the price paid by consumers in Jamaica, the marketing and retail margin needs to be added to the Refinery Billing Prices."(GCA Report pp. 42)*

The Committee is of the opinion that increasing the number of players in the fuel distribution and retail chain will lead to greater competition resulting in lower costs at the service station to customers and greater scope for dealer network stations.

Fuel Tax levels

The Consultants examined Jamaica's level of fuel taxes comparing them to other jurisdictions and reported that:

> "*The level of taxes on fuel products in Jamaica is comparable to some Eastern European nations and is approximately 36% for gasolines and diesels, and lower for other products such as LPG and fuel oil. The absolute price at the pump is higher than most of the other Caribbean nations, but they are all within 6% of Jamaica's. Excluding Barbados and Belize, the three largest Caribbean nations: Cuba, Dominican Republic and Jamaica all have operating refineries and have the highest prices at the pump, suggesting that prices are determined, at least in part, to make refining viable against imported products.* "
>
> *The CAF is paid to the Government of Jamaica on each barrel of product imported and collected as part of the billing price on each barrel of product sold.*

Petrojam's Historical Financial Performance

Petrojam Consolidated 4-year Financial Summary

The following are summary Internal Profit & Loss Statements for Petrojam for the years2014/15-2017/18.

(US$MM)	2014/15	2015/16	2016/17	2017/18	Average	4-Yr Total
SALES REVENUE	1,559	954	930	1,046	1,122	4,489
COST OF SALES	(1,492)	(843)	(827)	(955)	(1,029)	(4,117)
GROSS MARGIN	**67**	**111**	**103**	**92**	**93**	**373**
OTHER OP.INCOME	(2)	6	(5)	10	2	9
OTHER OP.EXPENSE	(23)	(6)	(6)	(8)	(11)	(43)
EXPENSES	(64)	(57)	(59)	(69)	(62)	(250)
OPERATING INCOME /(EXPENSE)	**(22)**	**54**	**33**	**24**	**22**	**88**
NON-OP. (DR)/CR.	4	(8)	(7)	(1)	(3)	(12)
P/(L) BEFORE TAX	**(18)**	**45**	**26**	**23**	**19**	**76**
INCOME TAX	4	(10)	(5)	(3)	(3)	(13)
Net Profit before	(14)	36	21	20	16	64
DIVIDENDS	0	(20)	0	0	(5)	(20)
NET PROFIT/(LOSS)	**(14)**	**15**	**21**	**20**	**11**	**43**

Source: Petrojam Financial Statements

These internal profit and loss statements (2014-2018) suggested that, on average, Petrojam was able to generate a positive profit at the company level, and in only 1 of 4 years was there a loss, while the 3 other years were profitable.

There are long existing challenges in separating the financial contributions from two very distinct operating business units within Petrojam, namely the refinery separates from those of the terminal. Despite the clear recommendation in the Centennial report of 2009 to improve this critical aspect of financial reporting, this challenge continues to exist. It is essential in any business to separate the contribution of business units and to allow management to clearly

ascertain each unit's costs and revenues separately. It is important to understand that both the terminal and the refinery can operate in an open and competitive environment and could be managed as two separate and individual companies. This financial management capability is important to understanding the margin contributions of all aspects of the business and is essential to modelling operating scenarios for the Company and projecting their future economic impact.

Refinery 4-year Financial Performance

To overcome the above weakness in financial reporting, the Consultants were able to separate the financials of the overall company into separate pro-forma statements for both the refinery and for the terminal.

> *"The ... scenario simply divided the sales revenue and the expenses at the company level into two parts, assuming that the volume sold from refinery production belonged to the refinery, and the volume sold due to imports generated a revenue for the terminal. In other words, to allocate sales revenue between the refinery and the terminal from the total company, GCA calculated refinery sales revenue as refinery production volume (Table 21) multiplied by sales prices, and terminal revenue as imported volume (delta between total sales and refinery production) multiplied by sales prices. The refinery production accounted for on average 47% of Petrojam's total sales volume, and 43% of the sales revenue. As confirmed with Petrojam, the sales prices included the terminal and rack fee collected by the refinery on behalf of the terminal. Company expenses, including operating costs as well as depreciation, were also allocated between the refinery and the terminal. GCA used historical data from previous studies and concluded that 70% of Petrojam's overall expenses could be allocated to the refinery, and the balance to the terminal." (GCA pp.51)*

The following are the Consultants calculations of the margins from the refinery using the above approach. These are based on the actual historical sales prices used and includes the application of the CAF differential and the costs of crude supply inputs at CIF prices.

Refinery Margins based on Sales Prices (US$MM)	2014/15	2015/16	2016/17	2017/18	Average	4-Yr Total
Revenue	605	431	378	515	482	1,928
Cost of Sales	(555)	(380)	(361)	(512)	(452)	(1,809)
REFINERY GROSS MARGIN	**50**	**50**	**17**	**3**	**30**	**120**
GROSS MARGIN PER BBL	**7.64**	**6.33**	**2.39**	**0.34**	**4.08**	**4.08**
Refinery Expenses	(45)	(40)	(41)	(48)	(44)	(175)
REFINERY NET PROFIT	**5**	**10**	**(25)**	**(46)**	**(14)**	**(55)**
NET MARGIN PER BBL	**0.80**	**1.26**	**(3.52)**	**(5.83)**	**(1.82)**	**(1.82)**

Source: GCA analysis of Petrojam's financials

The PRC noted from the above analysis that the Refinery, as a separate business unit to the terminal, incurred losses of US$55MM over the four-year period.

Economic Impact of CAF differential on Refinery operations

The consultants also produced a hypothetical calculation in order to demonstrate the effect of removing the CAF differential and its contribution to the refinery margins. This calculation assumes that the terminal receives all terminal and rack fees for the refinery's products and that these revenues do not accrue to the refinery.

Refinery Margins based on CIF Prices (US$MM)	2014/15	2015/16	2016/17	2017/18	Average	4-Yr Total
Revenue	583	377	330	443	433	1,734
Cost of Sales	(555)	(380)	(361)	(512)	(452)	(1,809)
REFINERY GROSS MARGIN	**28**	**(3)**	**(31)**	**(69)**	**(19)**	**(75)**
GROSS MARGIN PER BBL	**4.25**	**(0.38)**	**(4.42)**	**(8.78)**	**(2.55)**	**(2.55)**
Refinery Expenses	(45)	(40)	(41)	(48)	(44)	(175)
REFINERY NET PROFIT	**(17)**	**(43)**	**(72)**	**(117)**	**(62)**	**(250)**
NET MARGIN PER BBL	**(2.60)**	**(5.45)**	**(10.33)**	**(14.95)**	**(8.33)**	**(8.33)**

Terminal 4-year Financial Performance

The performance of the terminal over the corresponding period is described below in terms of the contributions to the terminal margins on the sales of imported products.

Terminal Margins from Sales of Imports (US$MM)	2014/15	2015/16	2016/17	2017/18	Average	4-Yr Total
Sales Revenue of Imports	953	524	552	538	642	2,567
Cost of Sales	(871)	(441)	(498)	(485)	(574)	(2,295)
TERMINAL GROSS MARGIN	**83**	**82**	**54**	**52**	**68**	**272**
GROSS MARGIN PER Bbl	**9.25**	**10.72**	**6.19**	**7.28**	**8.36**	**8.36**
Terminal Expenses	(19)	(17)	(18)	(21)	(19)	(75)
TERMINAL NET MARGIN	**64**	**65**	**37**	**32**	**49**	**197**
NET MARGIN US$/Bbl	**7.10**	**8.48**	**4.19**	**4.40**	**6.04**	**6.04**

Source: GCA analysis of Petrojam's financials

As reflected in the table above, the terminal operations produced accumulated profits of US$197 million over the historical reference period compared to refinery losses of US$55MM (including the CAF Margin) and US$250MM (excluding the CAF Margin).

Summary of Petrojam Past Financial Performance

The Committee accepted the consultant's assessment of Petrojam's historical performance.

> *"Operationally the refinery performance has been subpar with a low level of utilization averaging 63.3%. The low operating level contributed to a relatively high unit operating cost. The operating cost has averaged US$5.44/Bbl against US$4.59/Bbl average for Latin-American refineries.*
> *Power supply issues and the need to frequently shut down the refinery because of problems with the naphtha reformer are identified by Petrojam as the primary causes for this performance.*
> *Theoretically, a market-oriented operation would likely have shut down the refinery during periods where gross margins net of variable costs were negative.*
>
> *For the period analysed the refinery has lost money on a CIF basis. Due to the price adjustments, the refinery was able to generate a positive net margin in two out of the four years. The terminal has made money because of the terminal and rack fees plus price adjustments on the products sold." (GCA Report pp.59)*

From internal financials Petrojam averaged US$98MM per year of gross margins and US$36MM per year of Net margin after subtracting US$62MM of expenses. GCA's analysis of the gross

margin contributions indicated that the refinery operation on a CIF basis contributed negative US$(19)MM per year to the gross margin, the terminal contributed US$45MM per year, the CAF adjustment contributed US$26MM per year and the price adjustments on products contributed

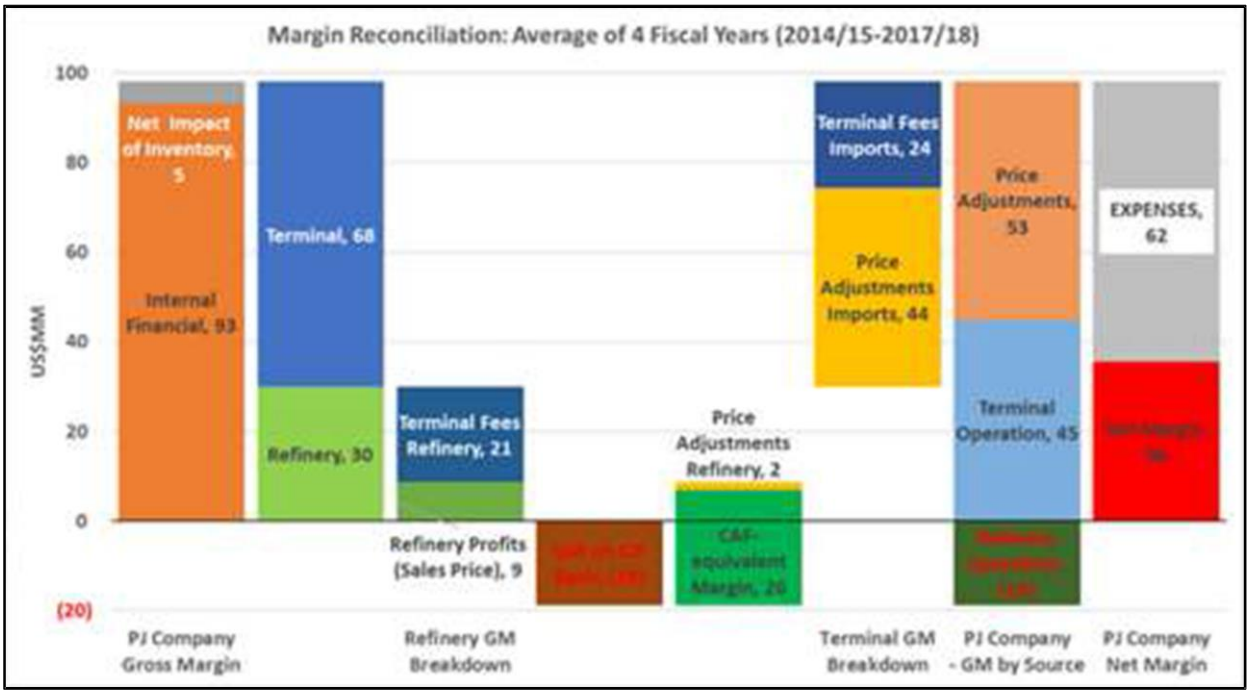
US$46MM per year. Without the impact of this CAF differential and 'other adjustments' for sales price, the refinery gross margin was negative for all but one of the 4 years. With the CAF differential the refinery still had a combined net loss of US$55m over the 4 year period combined, or an average loss of US$14m/year.

The CAF differential is the result of a policy set by GoJ to encourage the operation of the refinery and significantly contributes to the refinery's continued viability. GCA's experience is that this sort of incentive is created by governments to encourage local industries. In some countries these incentives have a time limit in order to allow for investors to invest in the assets or improve operations so they become profitable without the need of incentives, in others they seem to become structural to the business viability.

The 'other market adjustments', which would be expected to net to zero over time, are nonetheless significantly positive in each of the 4 years under review and had an important impact on the company's profitability. These historical price adjustments were not used in projecting future planning scenarios.

Analysis and conclusions

The table below presents a reconciliation of the various sources of margin earned by Petrojam over the reference period and clearly demonstrate that the 'terminal operations' and 'price adjustments' are the main positive contributors to the margin of the company, while refinery operations have a negative contribution to Petrojam's margins.



Source: (Table 20 pp58)

The issue of improving refinery utilization levels from the current 63.3% to a targeted 78% is critical to the viability of all future refinery operations and the success of all potential investment for the refinery. Without achievement of these higher utilization levels the refinery would best be closed.

The Committee notes that the Centennial Report on Petrojam (2009) highlighted the same issue of plant availability as being a critical factor. The Centennial report noted a then (2009) plant name plate capacity of 38.5Mbd with a then current utilization of 72% along with a strong recommendation for a target of 87%, representing statistics and targets that far exceed current performance (Centennial report pp.42).

The Committee is of the opinion that responsibility for achieving required levels of plant utilization rests squarely on the shoulders of refinery management and is a result o f a combination of effective management factors, inclusive of refinery technical engineering capabilities and heavily dependent on organization processes, maintenance culture, systems and overall operational effectiveness in addition to the state of existing plant.

There are important operational and execution risks with significant financial impact in operating the refinery.

Future Strategic Options/Scenarios & Economic Analysis

The GCA consultants considered the feasibility of a number of refinery configurations and investment options. All of the future strategic options have assumed the continuation of CAF differential support from GoJ and the improvements of refinery availability to 78%.

1. *GCA developed an economic model that allowed us to calculate the expected future cash flows for the operation of the refinery. From these cash flows, economic comparisons were made as to the best option for Petrojam with and without new investments.*
2. *To determine the cash flows GCA had to determine operating costs and sustaining capital requirements for the refinery and the terminal. For the operating costs, GCA used historical costs escalating with inflation and for sustaining capital costs GCA estimates such costs as a percentage of replacement costs for the refinery and terminal.*
3. *Several cases were run using the developed yield, price and sales forecast data:*
    a. *No investment refinery running sweet crude.*
    b. *No investment refinery running sour crude.*
    c. *Investment in VDU with the refinery running a sour crude suitable to make asphalt.*
    d. *Investment in RUP with the refinery running an extra-heavy 16 °API crude suitable for such refinery configuration.*
    e. *Investments to process extra-light crudes" (GCA pp.15)*

VDU & RUP Projects

Petrojam has championed the long-conceived Refinery Upgrade Project (RUP). The refinery upgrade project was estimated to cost in excess of US$1.2B and would expand the refinery's capacity to 50 Mbd and allow the processing of very heavy crude oils primarily from Venezuela.

The VDU project is a subset of the wider RUP project designed to mitigate the challenges associated with the declining need for high-sulphur HFO products. Approval for the VDU has been granted by the GoJ, and as a result, provisions have been included in the national budget for 2019-20 for the execution of the VDU project.

This VDU addition to the refinery's current facility is projected to cost ~US$102M and would enable the refinery to process the streams originally intended to produce HFO to produce two other petroleum products, the first being a new product 'vacuum gas oil' (VGO), and secondly asphalt, an existing product, which would be produced in higher volumes than currently obtains.

The VDU project is inherently predicated on the consumption of 'sour' (high-sulphur) crude feedstocks such as those originating from Venezuela, a crude supply relationship that has continued for decades from the initial conception of the refinery in 1962. These high-sulphur crudes tend to produce high-sulphur finished products which are increasingly unattractive in the

international market that is predominantly requiring light and not heavy fuels.

There is no market in Jamaica for VGO and production would need to be exported to international markets such as other refineries on the USGC who could use this product. The volume of asphalt that would be produced would also far exceed local Jamaican demand, and thus a strategy to export asphalt would also be required, which is not an easy undertaking logistically and commercially. Both of these products would orient the refinery to supplying external markets and not the needs of the local Jamaican market.

The committee evaluated the financial projections of the VDU and RUP investment cases done by GCA and found that the proposed projects have significant negative returns on investment under the most recent price forecasts provided by price consultant IHS, with significantly worse results for the RUP project compared to the VDU project. The financial projections in the VDU feasibility studies have also assumed a refinery availability rate of 90%, far exceeding past and current capabilities and significantly improving the economics.

Other Potential Modes of Operation

The Consultants also put forth the following three investment and operating scenarios all of which yield positive net present value.

a. **Sweet crude** feedstock operations (Base case going forward with no major investment needed, but with refinery availability at a 78% target.
b. **Xtra-Light crude** feedstock operations (requiring a preliminary estimate of US$70M capital investment) and with a refinery availability at a 78% target. The consultants have informed the committee of a wide variety of potential suppliers for this type of Xtra-light crude.
c. **Shut-down** of the refinery and operation only as a terminal

Sweet Crude Feedstock Operations

The Consultants recommend a ‘sweet crude’ feedstock mode of operations for the immediate future for the refinery. The intention is to utilize ‘sweet’ (low Sulphur) crude feedstock that produces low-sulphur fuel oil products (LSFO) which are at a distinct market advantage to the current HFO products for which demand will be substantially reduced. This mode of operation requires no or minimal investment but requires a major change in the traditional sourcing of crude feedstocks for the refinery and an increase in refinery availability to 78%.

Xtra-Light Crude Investment Scenario

This investment option would upgrade the refinery to better utilise the available grades of light sweet crude that have become available from the US. This would allow the use of less viscous, lighter crudes that would produce a greater proportion of its products as transportation fuels rather than LSFO.

Terminal Only (Refiner shutdown) Scenario

It is possible to shut-down the refinery and operate only the terminal. This does not compromise energy security a there is a wide variety of sources of finished petroleum products that the country can secure continue to import at competitive prices. In this scenario the refinery is shut-down and all required products are imported.

Future Environmental Issues

Jamaican environmental regulations under which the refinery operates, and the environmental specification for its products, are deemed to be below current international best practice for refineries. In the absence of adequate environmental laws and enforcement in emerging economies such as Jamaica's, there have been calls for oil companies to voluntarily adopt best practices in emerging economies. The World Bank Group provides technical advice and reference to general and industry-specific examples of Good International Industry Practice (GIIP) as published in its document "ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINES PETROLEUM REFINING (2006)". It is expected that the environmental requirements in Jamaica will increase to meet international best practice for refineries and as such, capital provisions for environmental improvements to the refinery need to be made for any future operation of the refinery.

The Consultants considered the requirements from these environmental best practices and concluded that "*... The refinery will require investments to be able to produce 10wt. ppm sulfur gasolines and ULSD and eliminate the flaring of sour fuel gases. GCA has estimated US$236 MM will be eventually be needed to adjust these quality/environmental issues. These projects will have some economic benefit in capturing the refinery margin to make ULSD vs. ADO and in reducing the consumption of liquid fuels. Typically, these investments have a low (single digit) rate of return on investment."* (see GCA section 4.4 pp. 32-33)

Forecasted Performance of Potential Operating Modes (Investment Scenarios)

The Consultants calculated cash flows for the next five years are shown below for four cases including investments to meet environmental requirements. All figures shown in the first table below are for five years with the exception of rows 19 and 20 that correspond to the NPV 10 (10% interest rate) basis over 20 years with environmental capital requirements. GCA has assumed that investments in environmental projects would start in 2027. The second table below presents the

same analysis but excludes the environmental capital expenditures.

NPV Analysis including environmental capital provisions

1	Model Case before New Project Compl	Sweet PJ	Sweet PJ	Shutdown	Sweet PJ
2	Model Case - New Project	Xlight US$ 70 MM Environmental	Xlight US$ 250 MM Environmental	Shutdown	Sweet PJ
3	Domestic Demand Case	PJ Sales Forecast	PJ Sales Forecast	PJ Sales Forecast	PJ Sales Forecast
4	Price Set Selected	Jan-19	Jan-19	Jan-19	Jan-19
		Environmental	Environmental	N.A.	Environmental
5	Rank	1	2	3	4
6	5-Year Summary Table (US$MM)	XL-US$70 MM	XL-US$249 MM	Terminal	Sweet
7	Refinery Snapshot	5Y (2019-24)	5Y (2019-24)	5Y (2019-24)	5Y (2019-24)
8	Feedstock volume bpd	24,960	39,000	0	24,960
9	Utilisation Factor	78%	78%	0%	78%
10	Revenue on CIF basis	3,971	4,584	0	3,941
11	Feedstock costs on CIF basis	3,613	4,199	0	3,636
12	Gross Margin on CIF basis	357	385	0	306
13	Operating Costs	231	238	0	233
14	Capital Costs	109	295	0	37
15	BT Cash Flow on CIF basis	17	(148)	0	35
16	CAF effect on crude	(24)	(28)	0	(24)
17	CAF on Refinery products	137	143	0	135
18	BT Cash Flow post CAF	131	(33)	0	147
19	20 YR NPV 10 CIF Basis	(159)	(241)	0	(307)
20	20 YR NPV 10 post CAF	78	17	0	(83)
21	Terminal Snapshot				
22	Terminal & Rack Fees	206	206	206	206
23	Operating Costs	98	98	98	98
24	Capital Costs	23	23	23	23
25	BT Cash Flow	84	84	84	84
26	20 YR NPV 10	161	161	161	161
27	PJ Consolidated Snapshot				
28	BT Cash Flow on CIF basis	102	(64)	84	120
29	BT Cash Flow post CAF	215	51	84	231
30	Income Taxes	39	25	14	47
31	AT Cash Flow post CAF	176	26	71	184
32	20 YR NPV 10 CIF Basis	2	(80)	161	(146)
33	20 YR NPV 10 post CAF	239	178	161	78
34	Government Snapshot				
35	CAF Crude Imports	24	28	0	24
36	CAF Product Imports	119	114	257	122
37	Domestic Taxes	2,243	2,243	2,243	2,243
38	PJ Income Tax	39	25	14	47
39	Total Cash Flow to Government	2,425	2,410	2,513	2,435
40	Total Equity to Government	2,601	2,436	2,584	2,619
41	% Supplied by Refinery	54%	61%	0%	48%
42	% Supplied by Imports	46%	39%	100%	52%
43	Total	100%	100%	100%	100%

Source: GCA

NPV Analysis without environmental capital

1	Model Case before New Project Completion	Sweet PJ	Sweet PJ	Sweet PJ	Shutdown
2	Model Case - New Project	Xlight US$ 70 MM	Xlight US$ 250 MM	Sweet PJ	Shutdown
3	Domestic Demand Case	J Sales Foreca	J Sales Foreca	J Sales Foreca	J Sales Foreca
4	Price Set Selected	Jan-19	Jan-19	Jan-19	Jan-19
5	Rank	1	2	3	#N/A
6	**5-Year Summary Table (US$MM)**	**XL-US$70 MM**	**XL-US$249 MM**	**Sweet**	**Terminal**
7	**Refinery Snapshot**	**5Y (2019-24)**	**5Y (2019-24)**	**5Y (2019-24)**	**5Y (2019-24)**
8	**Feedstock volume bpd**	**24,960**	**39,000**	**24,960**	**0**
9	**Utilization Factor**	**78%**	**78%**	**78%**	**0%**
10	Revenue on CIF basis	3,969	4,584	3,941	0
11	Feedstock costs on CIF basis	3,613	4,199	3,636	0
12	Gross Margin on CIF basis	355	385	305	0
13	Operating Costs	231	238	233	0
14	Capital Costs	109	295	37	0
15	BT Cash Flow on CIF basis	15	(148)	35	0
16	CAF effect on crude	(24)	(28)	(24)	0
17	CAF on Refinery products	140	143	135	0
18	BT Cash Flow post CAF	131	(33)	147	0
19	20 YR NPV 10 CIF Basis	(73)	(188)	(208)	0
20	20 YR NPV 10 post CAF	176	70	24	
21	**Terminal Snapshot**				
22	Terminal & Rack Fees	206	206	206	206
23	Operating Costs	98	98	98	98
24	Capital Costs	23	23	23	23
25	BT Cash Flow	84	84	84	84
26	20 YR NPV 10	161	161	161	161
27	**PJ Consolidated Snapshot**				
28	BT Cash Flow on CIF basis	100	(64)	120	84
29	BT Cash Flow post CAF	215	51	231	84
30	Income Taxes	39	25	47	14
31	**AT Cash Flow post CAF**	**176**	**26**	**184**	**71**
32	20 YR NPV 10 CIF Basis	88	(28)	(47)	161
33	20 YR NPV 10 post CAF	337	231	185	161
34	**Government Snapshot**				
35	CAF Crude Imports	24	28	24	0
36	CAF Product Imports	117	114	122	257
37	Domestic Taxes	2,243	2,243	2,243	2,243
38	PJ Income Tax	39	25	47	14
39	**Total Cash Flow to Government**	**2,423**	**2,410**	**2,435**	**2,513**
40	**Total Equity to Government**	**2,599**	**2,436**	**2,619**	**2,584**
41	% Supplied by Refinery	57%	61%	51%	0%
42	% Supplied by Imports	43%	39%	49%	100%
43	Total	100%	100%	100%	100%

Analysis & Sensitivities

The PRC drew a number of conclusions based on the foregoing analysis:

1. Given the imperative to reduce the negative environmental impact of current refinery operations the PRC took the view, in analysing and selecting among the different scenarios for recommendation to GOJ, that the focus should be on those scenarios which include the capital expenditures required to mitigate current negative environmental impacts.
2. The maintenance of the CAF differential is essential to the refinery's economic viability. In all refinery operating scenarios (See NPV comparison on CIF basis and post CAF basis, lines 19 and 20 of the first table above), as can be observed in line 19, without the CAF differential all refinery operating scenarios result in significant negative net present values.
3. GCA also ran sensitivities with respect to a number of the operating parameters, the results of which are reflected in the table below:

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Selected Cases, NPV(10) US$MM Post CAF	Base	Opex Less 20%	Pct. Utilizati on 85%	Capex Increase 20%	Capex Reducti on 10%	Add Environme ntal Capex	Fuel Oil Reduction	Base Price Scenario October 2018	Base Price Scenario Futures March 2019
Base Price scenario									
Sweet	24	125	41	N/A	N/A	(83)	24	(98)	102
XL US$70MM	176	276	208	165	181	78	176	100	98
XL US$249MM	70	177	89	31	90	17	70	23	(60)
VDU	(73)	36	(39)	(89)	(64)	(171)	(74)	(93)	44

Source: GCA analysis

The PRC concluded from these sensitivity runs that reductions in operating expenses and the improvement in utilization rates of the refinery are the factors that would most contribute toward improving the refinery's profitability. The current low utilization level of 63% in refinery availability is unsustainable for all investment scenarios and must be increase substantially to at least a targeted 78%. The Committee notes that this low level of availability has long been a significant issue for the refinery, for more than a decade, as noted in the Centennial (2009) report.

4. Although the projected investment cases have assumed continuation of the CAF differential policy by GoJ and that refinery management will quickly achieve the 78% minimum refinery availability, the differences in NPV between the refinery operating scenarios and the terminal only scenario are not large. The best case is the Xtra-Light case which yields a US$78M net present value accumulated in the 20 year period, over the terminal only case. This yields an average of US$3.9M increase in NPV per year from investing in the best-performing of the refinery operating scenarios.

5. The Committee also considered the terminal only versus other refinery operating investment cases (sweet, xlight70, xlight250) and noted that a commercial operator would demand a lower discount rate for terminal only/refinery shutdown operations with lower risk versus refinery operating scenarios with inherent operational and execution risks. Adjusting relative discount rates to reflect this reality would further reduce the attractiveness of refinery operations relative to a terminal-only scenario.

6. The PRC also noted that the terminal-only scenario produces the highest levels of cash-flow to GOJ (line 39), arising primarily from higher CAF revenues on finished product imports. In such a scenario, and if GOJ were willing to sacrifice all or part of these additional revenues, the option would exist to further reduce fuel costs to the economy with attendant benefits in terms of improved competitiveness of the broader economy.

PIOJ Analysis

in keeping with its mandate, the PRC requested that Planning Institute of Jamaica (PIOJ) undertake an analysis of the likely economic impact of a number of investment and the three operating scenarios which the PRC was reviewing. The PRC also sought help in assessing the impact on the national economy of 'other adjustments' to prices deduced by GCA.

The PIOJ quickly obliged the Committee and supplied the following conclusions summarised as follows :-

Crude estimates based on projection of petroleum demand and production from GCA's suggest that:

- *GDP is expected to be highest under Scenario I: Sweet & Xlight during the period FY2020/21–FY2039/40*
- *the higher selling price above the estimated import parity price led to GDP being 0.4% lower than what it could have been during FY2014/15–FY2017/18"*

Governance & Management

The PRC was called upon to examine the existing institutional and management arrangements with a view to recommending systemic improvements in the interest of good governance as well as the structure, corporate positioning and ownership of the refinery.

The Committee is of the opinion that the role of the Board is critical to Petrojam's future viability and sustainability. Petrojam operates in a highly competitive international business environment with strong and aggressive competitors around the world. The petroleum industry is very specialized and dynamic with projected fundamental worldwide changes to the industry over the next 10-20 years. Advances in logistic and shipping makes competition from its competitors increasingly easier.

The issue of past governance and management of Petrojam has been a concern in the deliberations of the Committee and it is clear that there has been a serious breakdown in governance of the Company and that the Board has been non-functional for sometime. The allocation of an equal number of board members to GoJ and PDVSA (3 each) has provided a weak governance framework for the Company and its implementation has been problematic.

The Committee highlights the following issues as essential to good governance of Petrojam

1. Adherence to established GoJ guidelines, policies and processes

As long as Petrojam remains a Company under the GoJ's control it must adhere to all applicable policies, guidelines and standards. The historical challenge has been a lack of adherence to and implementation of these guidelines and policies, rather than their existence. Specifically, the Committee notes that Petrojam must conform to:

- Public Bodies Management and Accountability Act
- Financial Audit and Administration Act
- GoJ's Accountability Framework
- The Corporate Governance Framework for Public Bodies
- All the laws of Jamaica and in particular all Laws and Regulations concerning the Petroleum Trade

2. Board Tenure - Technical Expertise and Experience

Recruit to the board persons who are technically competent and experienced in the Petroleum industry worldwide and independent of Company management. Ensure the long-term tenure of such appointments so that continuity in strategy may be maintained

3. Management Responsibility & Performance

Petrojam management, separate from its board, need to clearly own, champion and be measured as to their ability to execute the various improvement (financial reporting, costs, refinery utilization among others) programs as a critical priority. There is no economic future for the refinery if these programs are not successful, and in the short-term management needs to be held accountable for such.

Recommendations

The Committee's analysis demonstrates that for Petrojam refinery to become commercially viable, its operating efficiencies must improve, the CAF fiscal regime must be maintained and an investment (Xtra-Light scenario) of approximately US$78M must be made. The Committee makes the following recommendations:

1. The PRC is of the view that transfer of active management of the refinery and terminal to the private sector provides the only credible opportunity to improve the operating performance of both entities while also mitigating the operating and project execution risks to GOJ. Irrespective of GOJ's policy decision to maintain the CAF Margin or otherwise, the PRC therefore recommends that GOJ exit active management of both the terminal and the refinery through a lease of Petrojam's underlying assets.

2. The PRC recommends that the GoJ commission a Petroleum Industry Enterprise Team to chart a course for the government's exit from the operational management of Petrojam. The Enterprise Team should also engage a suitable transaction advisor such as the International Finance Corporation (IFC) to assist in identifying a suitable lessor with an appropriate PPP transaction framework.

If the transaction advisors are unable in their market investigation to determine sufficient interest in the option to lease, then the refinery should be shut down and a terminal only operation should be implemented.

The PRC's observation of other similar transactions (e.g. Sangster and Norman Manley Airport concessions) suggest that such an effort will only be accomplished over a period of 18 to 24 months. We therefore make the following subsidiary recommendations for implementation by Petrojam/GOJ during or as part of the divestment process:

3. Pricing

I. With the exception of price adjustments related to terminal fees, rack fees and the CAF margin, no other price adjustments should be applied by Petrojam, without the oversight of an independent authority.

II. Petrojam should with immediate effect begin reporting the impact of all price adjustments separately on its financials. Keeping track of such adjustments above CIF pricing allows for a better understanding of the contribution of these market adjustments and facilitates the ongoing management and reporting of their impact.

III. GOJ should immediately begin the process of establishing an appropriate regulatory framework for the petroleum industry including oversight with a "maximum price" at the terminal rack that incorporates CIF costs, terminal fees and taxes, but restricts or eliminates the use of "other adjustments" which are to be approved only by the nominated regulator.

IV. Regulations should also require that all terminals operating in Jamaica be obliged to post prices at the same time.

V. Pending legislation and implementation of a revised regulatory framework, GOJ should appoint an independent expert to the current Pricing Committee at Petrojam. This independent expert should be mandated to ensure that the prices posted by Petrojam adhere to the GOJ's new pricing policy.

VI. Also as part of the regulatory design process, the Ministry of Energy should examine opportunities for increasing the number of marketing companies and instituting other measures to increase competition in the distribution and retail value chain.

4. Petrojam should make every effort in the short run to maximise processing of sweet crudes to reduce production of HFO and increase production of more marketable LSFO. ie. the 'Sweet' operating scenario

5. Petrojam should immediately commence commercial investigation of the best arrangements for long term supply of sweet crude feedstocks.

6. Petrojam should also commence market investigations for the potential sale of low sulphur fuel oil.

7. Further detailed feasibility studies should be conducted, as part of the efforts of the Enterprise Team, to include a detailed engineering design which would determine the process plant improvements required for the refinery to enable processing extra-light crudes such as the Eagleford or Permean crudes from the USA. Such a study would clarify in greater detail the investments required and schedule for the refinery modifications, as well as the yields that could be obtained by the refinery for various products.

8. The Committee **does not** recommend the continued pursuit of the VDU or RUP projects.

9. Petrojam management should be tasked to undertake a major cost reduction effort with a targeted 20% reduction in current operating costs of the refinery.

10. Petrojam management should be tasked to implement an 'operations improvement program'. Management should define with refinery consultants Solomon Associates the potential

improvement in the operation that can be achieved and prepare a defined work plan to achieve such improvements. These improvements should be closely monitored at the Board level and play an important role in overall management of performance for the organization

11. Further analyse the potential improvements in the operation of the terminal to allow for a lower cost operation including demurrage costs, reception of larger product cargoes, product blending capabilities and rack loading operations.

12. A fully functioning Board for Petrojam needs to be appointed as soon as possible, with an appropriate mix of private and public sector individuals with the requisite skills. The board should have in its composition or as an advisor, expert petroleum industry advice and perspective independent of the Company's management.

Appendices

Appendix-1 : Glossary of Terms

°API	API degrees	**NCI**	Nelson Complexity Index
4Q	Fourth Quarter	**NG**	Natural Gas
ADO	Automotive Diesel Oil	**NPV**	Net Present Value
API	American Petroleum Institute	**OECD**	Organization for Economic Cooperation and Development
Bbl/sd	Barrels processed per day	**OGJ**	Oil and Gas Journal
BBP	Refinery Billing Price	**OPEC**	Organization of Petroleum Exporting Countries
Bpd	Barrels per day	**Opex**	Operating costs
CAF	Customs Administrative Fee	**P&L**	Profit and Loss statement
Capex	Capital expenditures	**PDVSA**	Petroleos de Venezuela
CD Hydro	Catalytic Distillation	**PCJ**	Petroleum Corporation of Jamaia
CIF	Cost, Insurance and Freight	**PJ**	Petrojam
E10 87	Gasoline 87 Octane with 10% Ethanol	**ppm**	Parts per million
E10 90	Gasoline 90 Octane with 10% Ethanol	**PRC**	Petrojam Review Committee
EIA	Energy Information Administration	**RPP**	Refinery Product Price
FO	Fuel Oil	**RSP**	Refinery Selling Price
GCT	General Consumption Tax	**RUP**	Refinery Upgrading Project
GOJ	Government of Jamaica	**SCFH**	Standard Cubic Feet per hour
HFO	Heavy Fuel Oil	**SCT**	Special Consumption Tax
HSFO	High Sulfur Fuel Oil	**SRU**	Sulfur Recovery Unit
IRR	Internal Rate of Return	**TGU**	Tail gas Treating Unit
J$	Jamaican Dollar	**ULSD**	Ultralow sulfur diesel
LNG	Liquefied Natural Gas	**US$**	US Dollar
LSFO	Low Sulfur Fuel Oil	**USGC**	United States Gulf Coast
M	Thousand	**VDU**	Vacuum Distillation Unit
Mbd	Thousand barrels per day	**VGO**	Vacuum Gas Oil
MDO	Middle Distillate Oil		
MM	Million		
MoE	Ministry of Energy		
MoFP&PS	Ministry of Finance, Planning and the Public Service		
MOGAS	Motor gasoline		