

AUDITOR GENERAL'S DEPARTMENT

PERFORMANCE AUDIT REPORT

**GOVERNMENT OF JAMAICA'S PROGRESS TOWARDS
VISION 2030 NDP OUTCOME NO. 10: DIVERSIFICATION OF ENERGY SUPPLY &
SUSTAINABLE DEVELOPMENT GOAL (SDG) No. 7: AFFORDABLE AND CLEAN ENERGY**

The Auditor General is appointed by the Governor General and is required by the Constitution, Financial Administration and Audit Act, other sundry acts and letters of engagement, to conduct audits at least once per year of the accounts, financial transactions, operations and financial statements of central government ministries and departments, local government agencies, statutory bodies and government companies.

The Department is headed by the Auditor General, Pamela Monroe Ellis, who submits her reports to the Speaker of the House of Representatives in accordance with Section 122 of the Constitution of Jamaica and Section 29 of the Financial Administration and Audit Act.

This report was prepared by the Auditor General's Department of Jamaica for presentation to the House of Representatives.



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Vision

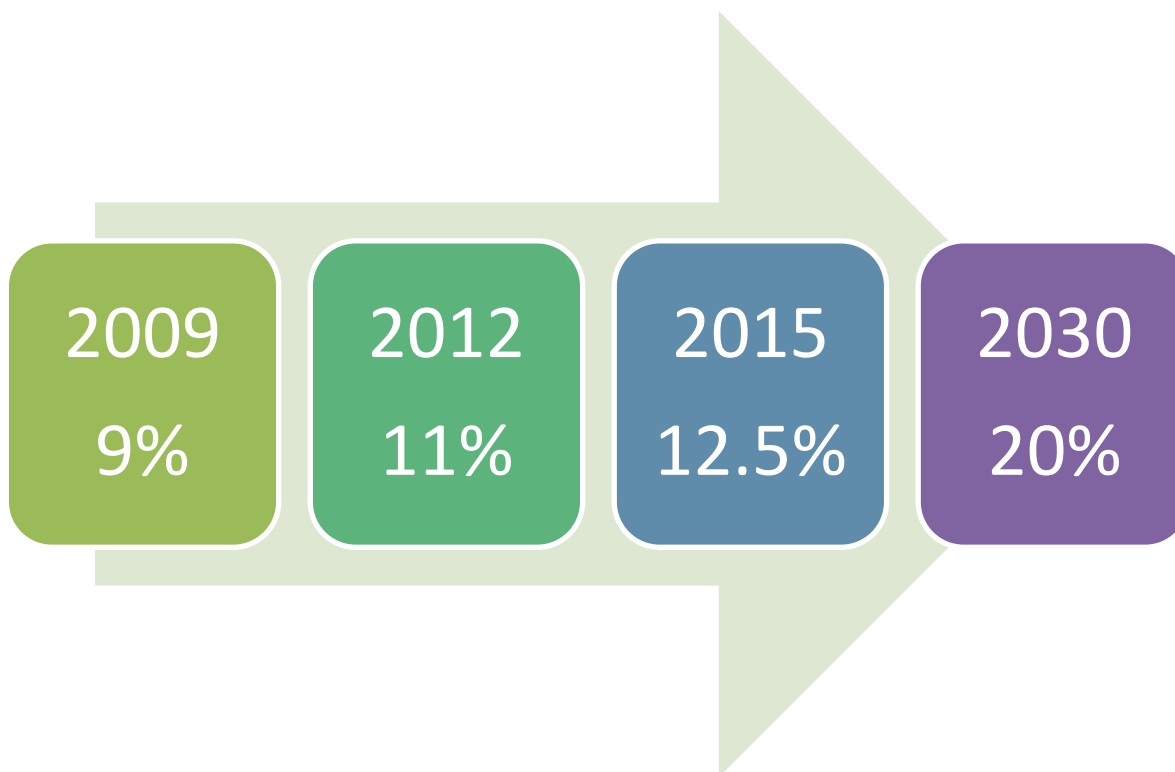
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JAMAICA'S RENEWABLE ENERGY MIX TARGETS



Auditor General's Overview

Jamaica's energy management framework and Jamaica's National Energy Policy seek to support the implementation of Vision 2030 Jamaica National Development Plan (NDP) and in particular, National Outcome # 10 – Energy Security and Efficiency. The vision for Jamaica's energy sector is "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".

In a context where the Ministry of Science, Energy and Technology (MSET) has overall responsibility for developing and overseeing Jamaica's energy policies, collaboration with other Ministries, Departments and Agencies (MDAs) is critical to achieving Jamaica's overall energy objective.

I commissioned a performance audit to determine whether the Government is on track to diversify the energy supply and among other benefits. The audit focused on National Outcome 10-1 "Diversify Energy Supply- to increase energy security and contribute to cost efficiency in the country's energy sector." In conducting the audit, we reviewed the activities undertaken by MSET, Petroleum Corporation of Jamaica (PCJ) and Petrojam Ethanol Limited (PEL) in pursuit of the NEP and considered concerns expressed by stakeholders related to cost of energy, uncertainty regarding the ethanol initiative and Jamaica's energy security.

Based on the findings, I acknowledge the important progress made in Jamaica's energy diversification programme, in terms of research, policy design and project implementation, particularly in energy areas such as wind, solar and natural gas, despite the relevant sub-policies to support the regulatory framework, remaining in draft since 2010. I however note the weaknesses in cross-government linkages between MSET and other stakeholders in implementing strategies for energy diversification. There was also lack of clarity regarding the entity responsible for measuring and reporting performance which contributed to the use of different measurement frameworks for energy consumption from renewable energy (RE) sources. Further, I expected PCJ to implement accountability mechanisms to ensure achievement of the delegated function, given that Petroleum Corporation of Jamaica (PCJ) delegated responsibility for ethanol to its subsidiary Petrojam Ethanol Limited (PEL). However, there were no agreed measurable objectives and performance targets to assess PEL's performance.

I urge MSET to consider for implementation the recommendations made in this report, which aim to address weaknesses identified by the audit. Sincere thanks to the management and staff of PCJ and PEL for the cooperation and assistance given to my staff during the audit. Thanks also to all stakeholders who provided valuable insight on the impact of the Government's energy diversification programme.



Pamela Monroe Ellis, FCCA, FCA, CISA
Auditor General

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Executive Summary



Key Audit Question

Is the Government on track to achieve its objective to diversify Jamaica's energy supply?

What we found

Jamaica's National Energy Policy (NEP), is an important element of the Country's energy management framework to support the achievement of Vision 2030 NDP, particularly National Outcome #10 – Energy Security and Efficiency. The vision for Jamaica's energy sector is “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 NEP provides a framework for sustainable management and development of viable energy resources consistent with National Outcome 10-1 “Diversify Energy Supply” to increase energy security and contribute to cost efficiency in the country's energy sector. It envisages the development of renewable energy (RE) sources such as wind, hydropower, solar, biomass energy and other renewables to help reduce Jamaica's dependency on imported petroleum over time. MSET's mandate is to facilitate implementation of the NEP (2010), including development of a modernized legislative framework and policy direction for the energy sector, in fulfillment of National Outcome #10.

1. We noted the important progress made in Jamaica's energy diversification programme, in terms of research, policy design, funding and project implementation; especially in energy areas such as wind, solar and natural gas.

- i.** In support of the NEP, five critical sub-policies namely Renewable & Alternative Energy; Biofuels; Carbon Emissions; Energy Efficiency and Conservation; Waste to Energy were drafted in 2010. However, these sub-policies are yet to be finalized.
- ii.** In 2012, Cabinet approved the establishment of the Jamaica Energy Council (JEC) to facilitate broad based consultation and coordination among key energy sector stakeholders and expedite decision-making concerning the implementation of the NEP 2009- 2030.
- iii.** MSET coordinated with the Ministry of Finance and Planning (MOFP) to obtain loan financing from the World Bank for on-lending by the DBJ managed National Energy Fund (NEF). At August 2017, loans disbursed totalled US\$5.3 million were made to small and medium-sized enterprises for RE energy and energy efficiency projects. The level of uptake indicates a demand for funding support for the energy diversification efforts.
- iv.** MSET in accordance with the NEP, commissioned research aimed at ascertaining the viability and full economic impact of available RE resources, such as wind; solar; hydro; biofuels and biomass. The research undertaken supported implementation of various projects such as the Liquefied Natural Gas Terminal in Montego Bay (November 2016); Wigton Windfarm commissioned 24 MW wind power plant June 2016; Blue Mountain Renewables (wind) and Solar Photo-voltaic Plant (August 2016) in furtherance of the energy diversification programme.

2. We however, found deficiencies in aspects of MSET’s regulatory and governance framework, as well as stakeholders’ involvement and communication.

- i. The NEP requires MSET to design incentives to encourage participation of local financial institutions in the financing of renewable and non-renewable energy projects. The development and communication of a comprehensive schedule of incentives would provide policy certainty and contribute to an investor friendly environment for energy diversification. Although MSET contacted MOFP seeking relief from import duties for equipment connected with renewable energy plants, to date MSET has not submitted a comprehensive programme of incentives for review and approval by MOFP, consistent with the requirements of the NEP.
- ii. The NEP envisaged that the development of biofuels such as ethanol and bio-diesel would be part of agriculture and land use policy and plans, especially given the conflicts between land and water use for food versus biofuels. We noted to this end, that a Joint Task Force was established in March 2009 with MSET and the Ministry of Agriculture in respect of biofuels development in Jamaica. Although matters related to land use such as mapping and agricultural zonation were deliberated, we found no evidence the process had advanced since 2009.
- iii. Jamaica’s NEP identifies indicators and targets which provides a monitoring and evaluation system for the energy sector. The targets would be set in collaboration with MSET’s departments and agencies along with other key ministries and their departments and agencies. Although not all targets have been defined in the NEP, four targets were established for energy sources; energy intensity, renewable energy mix, households with electricity and greenhouse emissions. We found that MSET did not measure two of the four targets, while the methodology for measuring the remaining two targets were inconsistent with NEP performance criteria.

The NEP targeted a RE mix of 12.5 per cent by 2015 in progression towards the goal of 20 per cent of Jamaica’s energy consumption being derived from RE by 2030. In reporting performance on consumption from the RE mix as at 2014-15, PCJ reported actual energy consumption of 8 per cent, while MSET indicated that the RE supply was 12.5 per cent, in line with target. We noted the disparity in the reported outcomes and found that while PCJ measured actual energy consumption, consistent with the NEP, MSET measured the composition of the energy mix using total installed capacity. This disparity in measurement raises questions regarding the reliability of the reported performance.

3. We found that PCJ's oversight framework for PEL was deficient in the context of a parent/subsidiary relationship.

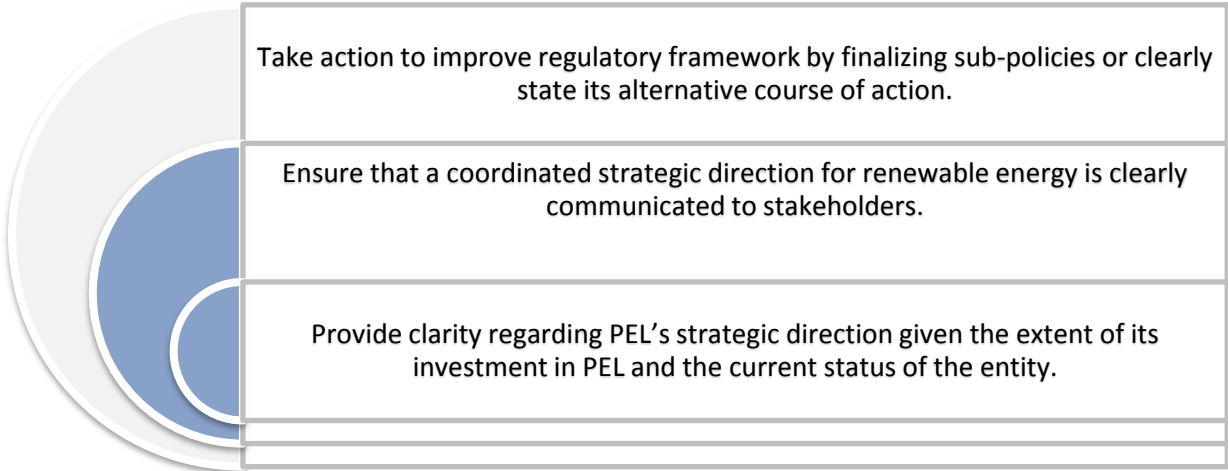
- i. PCJ, which was mandated to ensure accelerated implementation of the NEP, delegated responsibility for the ethanol initiative to its subsidiary PEL. In a context where PCJ would be accountable for the achievement of the ethanol initiative, given the parent/subsidiary relationship, we expected PCJ at a minimum, to have a governance framework for the delegated function. An appropriate accountability framework, which encompasses measurable targets is critical, given PEL's assumption of full ownership and control, consequent on the expiry of a partnership agreement in June 2008. PCJ instituted group Heads of Subsidiaries (HOS) meetings, to discuss financial and operational performance of all its subsidiaries including PEL. However, we found no agreed measurable objectives and performance targets by which PEL's performance would be objectively assessed.
- ii. PEL's strategic direction was determined by its Board of Directors, which is responsible for its Corporate Plans and development of measurable objectives and performance targets. However, to date, PEL's Corporate Plan (2015-2018) is yet to be approved by its Board; and there was no evidence that PEL submitted quarterly and bi-annual reports to MSET and the MOFPS, which represents a breach of the PBMA Act.

4. Since August 2013, PEL's Dehydration Plant, with a rated capacity of 40 million US gallons per year, has remained unutilized (mothballed). We noted that one of five tanks is utilized for storage of imported ethanol; one is leased to Petrojam; three are storing contaminated ethanol valued at \$62 million, since 2016.

- i. In 2013, PEL shifted from the production to the importation of ethanol, indicating that challenges such as unfavorable prices of raw material (feedstock) made it uneconomical to produce ethanol.
- ii. MSET stated that PEL intends to resume the ethanol production; and in 2016, PEL conducted a preliminary assessment of the plant to determine the required level of repairs to bring the plant in operating mode. To date, the plant has not resumed production of ethanol and there was no indication of an expected timeline for resumption.
- iii. PEL commissioned a study at a cost of \$12 million, which suggested feedstock options that were considered economical and suitable for local production. These recommendations were discussed at PEL's board level in November 2016, with PCJ and a representative of a sugar company. However, to date, PEL Board has not communicated its intention to stakeholders. Further, there is no evidence of medium-term or long-term strategies for the local supply of sugar cane as feedstock for the dehydration plant. This has created uncertainty for stakeholders in terms of strategic planning for feed stock production and the retail trade for petrol.

What should be done

Given that thirteen years remain to achieve the **VISION 2030 NDP**
Government should:



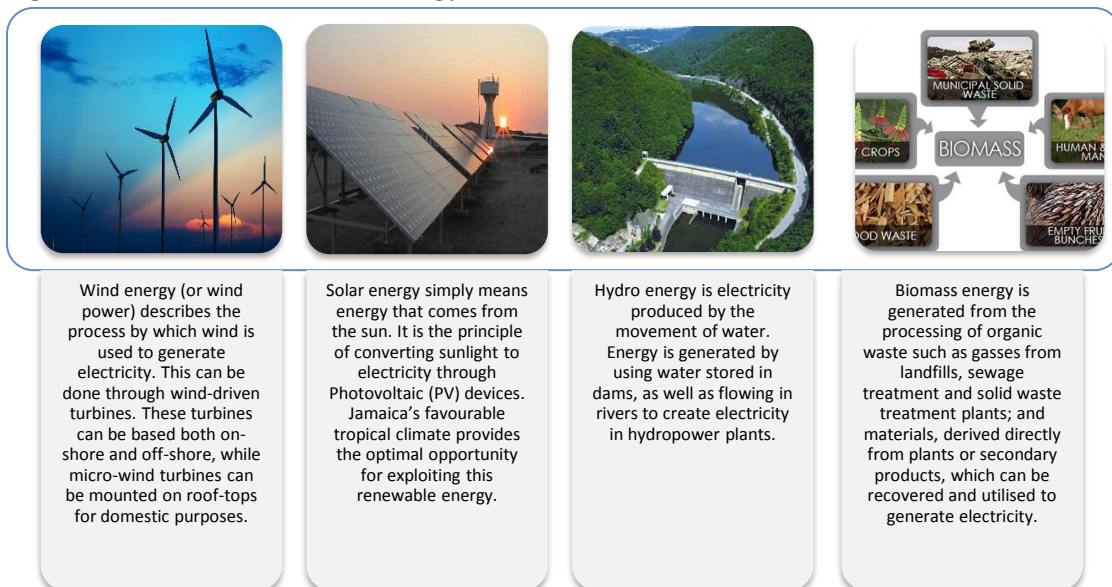
Part One

Introduction

Vision 2030 Jamaica National Development Plan for the Energy Sector

- 1.1 The Government’s vision for the energy sector as documented in Vision 2030 Jamaica National Development Plan (NDP) is ‘a modern, efficient, diversified and environmentally sustainable energy sector’. This vision which is aligned to the United Nations Sustainable Development Goal # 7 - Affordable and Clean Energy (ensure access to affordable, reliable, sustainable and modern energy for all), represents a priority for meeting Jamaica’s energy needs.
- 1.2 The National Energy Policy (NEP), which was approved by Parliament in 2010, outlines the framework for achieving Jamaica’s Vision 2030 objective. The Policy, seeks to diversify Jamaica’s energy supply in order to increase energy security and contribute to cost efficiency in the Country’s energy sector. This would be achieved through increased use of solar energy, biogas, wind, hydropower and other renewable energy (RE) sources which among other benefits, will reduce Jamaica’s dependency on imported petroleum which is highly vulnerable to supply disruptions and price increases. Among the important initiatives identified for the petroleum sector, was the local production of ethanol for blending with gasoline at the ratio of 10 per cent (E10).

Figure 1: Jamaica’s Renewable Energy Sources

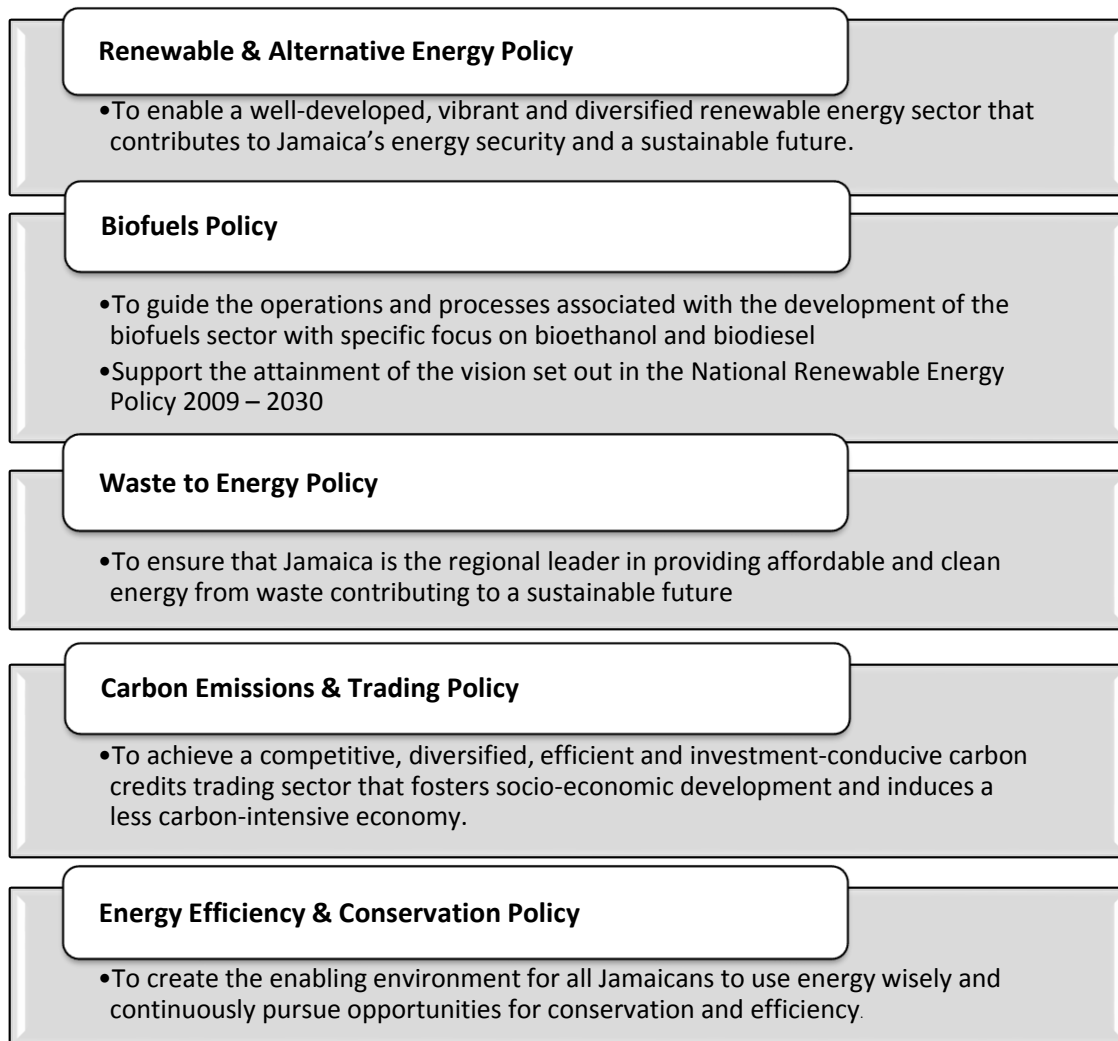


Source: AuGD compilation of definitions

1.3 The NEP provides the enabling environment, including legislative support for the achievement of the National Outcome #10: *Secure and Sustainable Energy Supply*. The Policy examines the energy situation faced by Jamaica and proposes a range of options and strategies which the Government is committed to pursue over the short, medium and longer term. In support of the NEP, five sub-policies were drafted in 2010, although these are yet to be finalized (**Figure 2**).

“The NEP... provides the enabling environment, including legislative support for the achievement of ... secure and sustainable energy.”

Figure 2: Draft Sub-Policies to National Energy Policy

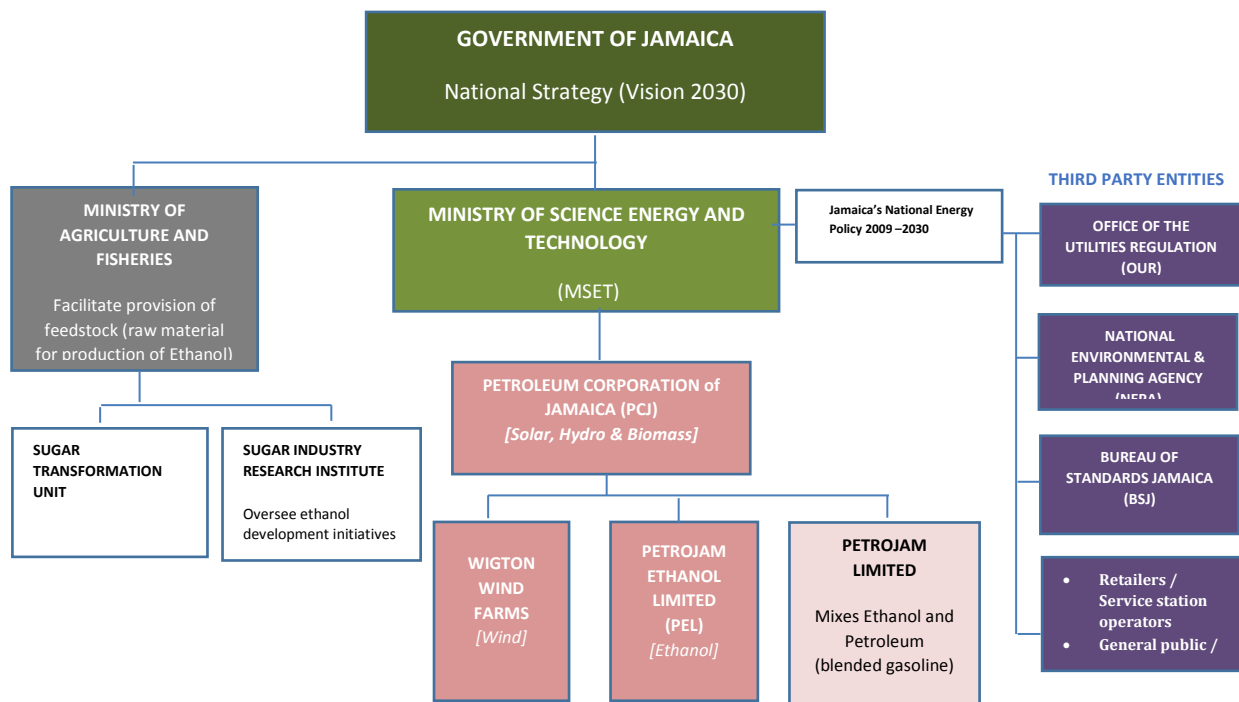


Source: AuGD compilation

Implementation of the NEP

- 1.4 The NEP stipulates that the Ministry in charge of energy (MSET) “will be accountable for implementing the National Energy Policy through various plans, programmes and interventions that are aligned with the Strategic Framework of the Policy and consistent with Vision 2030 Jamaica – NDP.” MSET along with its agencies, is also tasked with the responsibility for establishing the legislative and policy framework, to support and to implement the strategies, plans and programmes for achieving the NEP’s seven policy goals. In this regard, MSET and its agencies are expected to work with several other Government agencies as well as other partners and stakeholders in the public and private sector to ensure policy coherence and efficient policy implementation.
- 1.5 The Petroleum Corporation of Jamaica (PCJ) since 2002, is the main agency responsible for implementation of the National Energy Policy 2009-2030. PCJ’s mandate is to develop RE sources to accelerate implementation of the NEP. Integral to the GOJ’s overall energy objective, is collaboration with other Ministries, Departments and Agencies (MDAs) within the energy and agriculture sectors, as well as establishing linkages with other sectors such as transport, finance and planning. **(Figure 3 and Appendix 1).**

Figure 3: Mapping - key stakeholders for energy security and diversification



Source: AuGD compilation

Audit Rationale

- 1.6 Various stakeholders have expressed concerns regarding Government's progress in diversifying its energy sources in a context of volatility in global oil prices and trends towards renewable and clean energy. Vision 2030 NDP articulated Jamaica's objective of a modern, efficient, diversified and environmentally sustainable energy sector by 2030.
- 1.7 In addition, there is uncertainty regarding the production of ethanol locally as well as concern as to whether Government obtained value for money on its investment in Petrojam Ethanol plants. This is in a context where Government commission various studies to identify viable alternatives for feedstock and feasibility of investing in renewables.

Audit Objectives

- 1.8 We conducted a performance audit to determine the Government's strategic objectives to achieve Vision 2030 and the NEP outcomes regarding energy diversification, with emphasis on RE activities in biofuels. In the context of advancements in other areas of RE activities such as wind, solar and hydro energy supply, the audit sought to evaluate whether:
- i. There was clear policy environment, governance and implementation of RE sources and the processes adopted for implementation of the NEP;
 - ii. There was evidence of long-term cross government planning, communication and linkages among key stakeholders in developing strategies for energy diversification;
 - iii. Progress made in increasing the contribution of RE sources in Jamaica's energy mix, relative to stated targets.

Audit Scope and Methodology

- 1.9 The audit work focused on assessing the implementation of strategies to achieve Vision 2030 and NEP outcomes over a five-year period (2012/13 to 2016/17). In some instances, we reviewed documents for earlier periods based on the nature and/or extent of relevance to the audit topic. Our assessment of these areas reflected on two of the Auditor General's strategic priority themes namely, Governance and Resource Management.
- 1.10 We planned and conducted our audit in accordance with the Government Auditing Standards, which are applicable to Performance Audit, as well as standards issued by the International Organization of Supreme Audit Institutions (INTOSAI). Given our focus, our assessment included review of internal and external documents, interviews with senior management and staff, observations and analysis of information provided by MSET, PCJ and PEL. A meeting was held on June 08, 2017 at the offices of the Auditor General's Department to obtain the views of stakeholders in the energy/ethanol sector.

1.11 The audit did not:

- i. Consider the efficacy of the NEP and related draft sub policies;
- ii. Consider the implementation of the various energy projects nor examine whether such projects achieved the intended outcomes; and
- iii. Verify the integrity of reported renewable energy mix information supplied by MSET and PCJ.

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Part Two

Progress towards Vision 2030

Research, Development and Implementation of RE projects

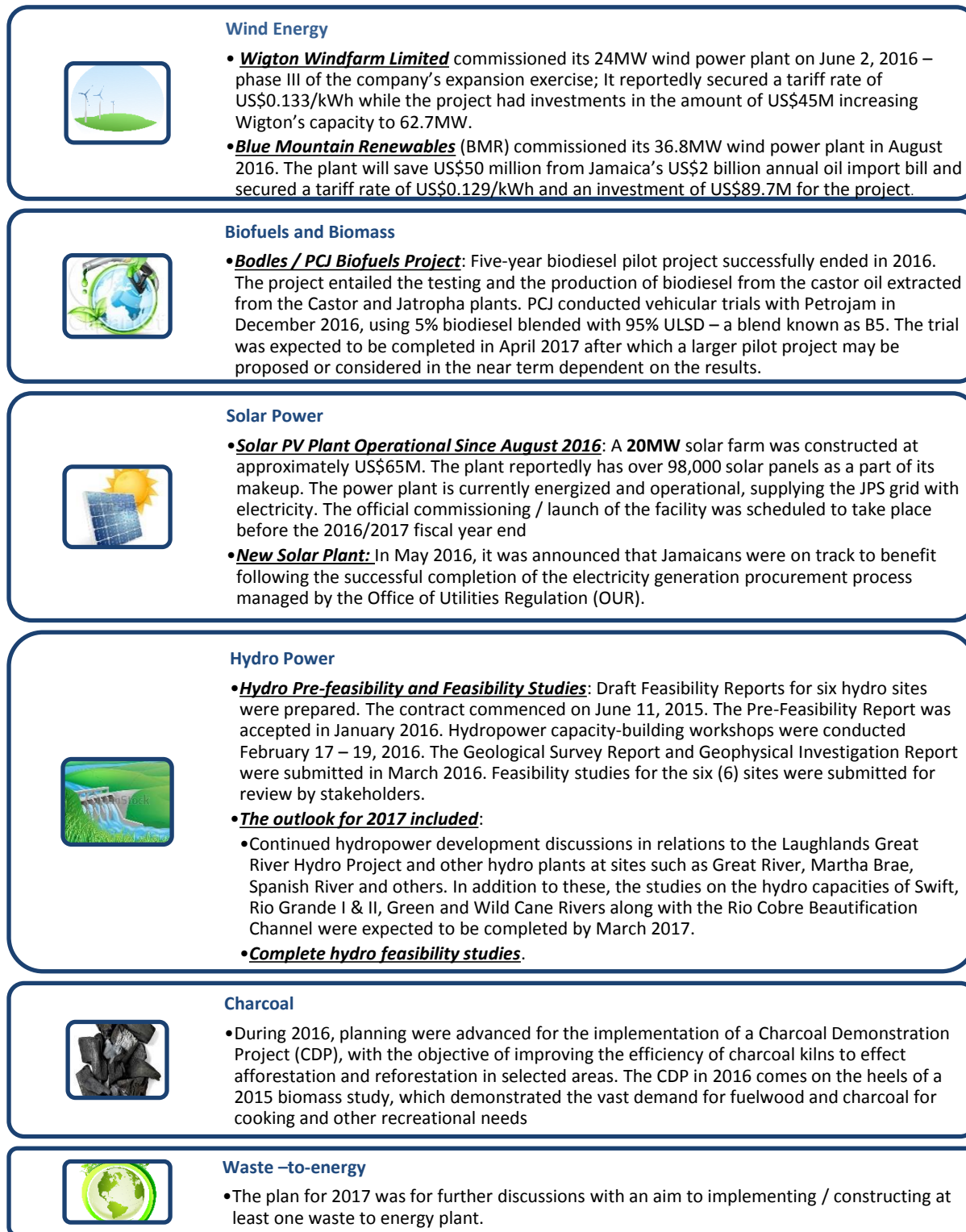
- 2.1 There has been notable progress towards diversification of Jamaica's energy supply, in fulfilment of Jamaica's Vision 2030 NDP for greater energy security, despite gaps in some areas of renewables, such as the biofuels sector.
- 2.2 Advances have been made in the area of liquefied natural gas (LNG), in keeping with the NEP's encouragement to research, develop and implement RE projects. For instance, the LNG Terminal in Montego Bay was commissioned in November 2016 to supply imported LNG to the Bogue Power Plant, in September 2017, licence granted to a private power company to supply 94 MW of electricity, using LNG and MSET advised that the Old Harbour Plant, which is over 40 years old, is being replaced with a new LNG fired plant that has the capacity to generate up to 192.6 MW of electricity for supply to the National Grid.

MSET did not develop an inventory of potential renewable energy sources

- 2.3 NEP requires MSET to develop an inventory of all potential sources of wind, solar and renewable technologies and ranked according to their economics with full economic impact analysis. Although MSET has facilitated the development of full feasibility studies, MSET is yet to provide an inventory of potential renewable energy sources to enable investors to identify economically viable projects. However, we were able to obtain information from the Jamaica Sustainable Energy Roadmap¹, detailing wind and solar potential sites. The report indicated that 18 sites were assessed by PCJ's subsidiary Wigton Wind Farm, of which five, had the strongest resources (wind speed). Also, seven sites with strong solar potential were assessed; signaling that solar PV could be an electrification solution for decentralized generation and rural communities. Other RE projects and studies, along with accomplishments, as at October 2017 are noted below (**Figures 4**).

¹ (Worldwatch Institute)

Figure 4: Accomplishments as at October 2017



Monitoring and Accountability

- 2.4 MSET developed National Energy Action Plans (NEAP) for the periods 2009-12 and 2013-16 identifying specific tasks and resources required to achieve its stated targets. This was in line with our expectation of a system of good corporate governance, which coordinates the activities of Implementers, create transparency and manages the risks of the diversification programme. MSET's monitoring and oversight roles requires submission of reports from agencies under its energy portfolio. We found that PCJ's corporate and operational plans were approved by MSET and MOFP, and requisite quarterly and annual reports were provided.

Legislative and Regulatory Framework

- 2.5 Goal No. 5 of the NEP requires Jamaica to have a well-defined and established governance, institutional, legal and regulatory framework for the energy sector, that facilitates stakeholder involvement and engagement. This would necessitate a cohesive operational structure, which facilitates effective collaboration with other MDA's, towards the achievement of the energy goals. To its credit, MSET has developed the NEP, which was approved by Cabinet in 2010, and was actively involved in developing the Electricity Act (2015) and the amended Electricity Licence, which was gazetted in Parliament in January 2016. However, the regulations pursuant to the Electricity Act are yet to be finalised.
- 2.6 In 2012, Cabinet approved the establishment of the Jamaica Energy Council (JEC) to facilitate broad based consultation and coordination among key energy sector stakeholders and expedite decision-making concerning the implementation of the NEP. The JEC includes representatives from PCJ, MSET and Ministries responsible for finance, agriculture, local government and the environment. The Permanent Secretary of MSET is the designated head of the Secretariat, who in consultation with the Chairman of the JEC (portfolio Minister for Energy), plan and arrange meetings and ensure that all the administrative arrangements are effectively and professionally discharged. MSET provided minutes of a meeting in May 2012, which alluded to an April 2012 meeting; however, we have no evidence of subsequent meetings as no minutes were presented, despite our request.
- 2.7 Despite the aforementioned actions/achievements in paragraph 2.2, it was not evident that MSET, as a foundation step had embarked on a cohesive plan, engaging all stakeholders and leveraging the knowledge and resources of the key partners. Instead we identified poor strategy development and implementation plan; this we believe compromised the opportunity to engage limited resources to work towards the successful achievement of the NEP goals. A discussion with stakeholders during a focus group meeting revealed insufficient engagement by MSET and PCJ in formulating strategies and plans towards the delivery of the NEP goals. While we were not able to validate these assertions, they point to critical gaps that must be addressed to facilitate the timely delivery of the NEP objectives.

- 2.8 One of the basic principles of the NEP was to establish linkages with other sector of the economy to achieve policy coherence and fulfill its goals. The NEP envisaged that the development of biofuels such as ethanol and bio-diesel would be part of agriculture and land use policy and plans, especially given the conflicts between land and water use for food versus biofuels. As such, we expected that being the lead agency for effecting the NEP goals, MSET would liaise with the Ministry responsible for agriculture to review its land use policies and plans, in respect of requirements for the biofuels sector. We noted to this end, that a Joint Task Force was established in March 2009 with MSET and the Ministry of Agriculture in respect of biofuels development in Jamaica. Although discussions included land use issues such as mapping and agricultural zonation were deliberated, we found no evidence the process had advanced since 2009.
- 2.9 The NEP determined that a programme of incentives would be necessary to stimulate investment and drive the implementation of energy projects, and as such, requires MSET to work alongside the MOFP in the development and implementation of a programme of incentives to encourage participation of local financial institutions in the financing of energy projects. It is crucial that a comprehensive schedule of incentives be developed and communicated to stakeholders as potential investors need policy certainty, and this would contribute to an investor friendly environment for energy diversification. Although MSET's records indicated contact with the MOFP seeking relief from import duties applied to equipment connected with renewable energy plants, to date MSET has not submitted a comprehensive programme of incentives for review and approval by MOFP, consistent with the requirements of the NEP.
- 2.10 With 13 years remaining for the achievement of the Vision 2030 objectives, we expect that MSET would intensify its coordinating efforts with other MDA's to diversify and increase energy supply and contribute to cost efficiency in the energy sector. Of note, MSET coordinated with the MOFP to obtain loan financing totaling US \$5.6 M from the World Bank for on-lending by the DBJ managed National Energy Fund (NEF). At August 2017, loans disbursed totalled US\$5.3 million were made to small and medium-sized enterprises for RE energy and energy efficiency projects. The level of uptake indicates a demand for funding support for the energy diversification efforts, part of which could be provided by a programme of incentive.

Sub-policies for the RE sector

- 2.11 The creation of an enabling legislative and regulatory framework was identified as a priority, to support the introduction of incentives and a plan of action for implementation to foster the development of wind, solar and renewable technologies, and thereby enable sustainable development of the energy sector. However, despite drafting five key sub-policies in 2010 to support the legislative framework for developing RE sources, MSET did not place any emphasis on finalizing these policies and as such the five sub-policies have remained in draft since 2010.

- 2.12 The continued delay in completing the renewable energy sub-policies could suggest a lack of strategic direction and policy coherence for stakeholders who would require certainty of policy for their own long term strategic planning. MSET did not provide upon request, the reasons for the delays in completing the policies, however, in its response dated October 24, 2017, stated that:

While it is acknowledged that the sub-policies of the NEP remain in draft since 2010, this is a matter that the newly constituted and staffed Policy Division of this Ministry has been tasked to address and the finalization of these sub-policies will further be informed by the several studies which have been conducted.

Energy Sector Indicators and Targets

- 2.13 The NEP provides indicators and targets for the energy sector as a basis for the monitoring and evaluation system. The targets would be set in collaboration with MSET's departments and agencies along with other key ministries and their department and agencies. Whereas not all targets were defined in the NEP, four targets were established for energy sources, energy intensity, renewable energy mix, households with electricity and greenhouse emissions. We found that MSET did not measure two of the four targets, while the methodology for measuring the remaining two targets were inconsistent with NEP performance outcome.
- 2.14 The NEP targeted a RE mix of 12.5 per cent by 2015 in progression towards the goal of 20 per cent of Jamaica's energy consumption being derived from RE by 2030 (**Table 1**). It is expected that the increased use of renewables will result in lowering the level of air pollution and better compliance with international conventions on climate change². In reporting performance, PCJ reported 8 per cent consumption of the RE mix, while MSET stated that the RE supply was 12.5 per cent as at 2014-15, in line with target (**Figure 5**). We found that PCJ measures actual energy consumption, consistent with the NEP, whereas MSET measures the composition of the energy mix using total installed capacity. This disparity in measurement raises questions regarding the reliability of the reported performance.

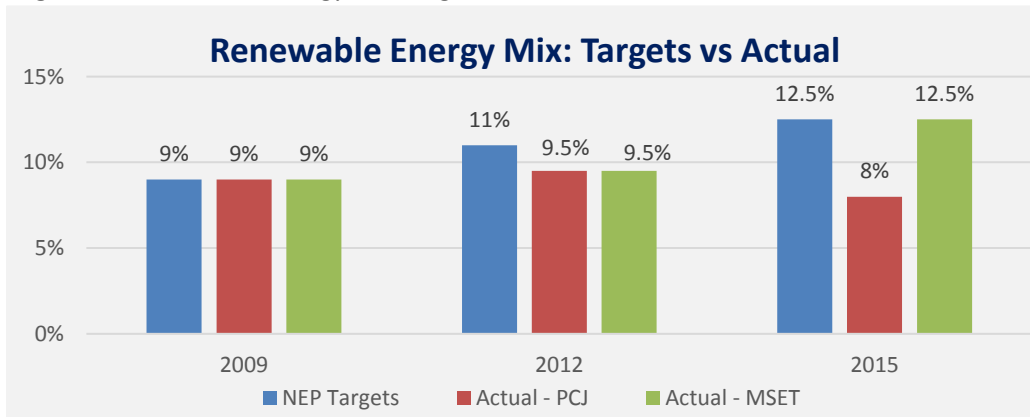
² Jamaica made voluntary commitment to the 2015 United Nations Climate Change Convention to reduce its carbon emissions intensity by 2030

Table 1: Projected targets and percentages for renewable energy supply

Sector Indicators	Baseline	Targets			Performance to date
	2008	2012	2015	2030	
1 Energy intensity index (EII) BTU/US\$1 Unit of output (Constant Year 2000 \$US)	15,392	14,000	12,700	6,000	MSET records indicated no current performance ; MSET Strategic Plan for 2015-18 also indicated no current performances for the respective financial years and extended the projected target of 12,700 BTU.US\$ and 3 months reserves to 2018 .
2 Percentage of renewables in energy mix	5.6%	11%	12.5%	20%	MSET and PCJ reported conflicting outcomes regarding the percentage of Jamaica's energy supply from renewable sources as at 2015.
3 Percentage of Total Households with Electricity (%)	92	94	100	-	For 2015-16, MSET reported that approximately 97.6% of rural areas now have electricity. The reported performance refers to geographical areas, as opposed to number of households.
4 Greenhouse gas emissions (Mt per annum)	5	5	4.5	3.5	MSET 2013-16 and 2015-18 Strategic Plans indicated no current performance regarding reduction in CO ₂ and other emission and extended the sectoral targets of CO ₂ emissions of 19,150 tonnes/year to 2018. This indicator has been reintroduced in MTF 2015-2018, despite data availability challenges.

Source: AuGD compilation from MSET Strategic Plans and PIOJ's Medium Term Socio-Economic Policy Framework (MTF) 2015-2018

Figure 5: Renewable Energy Mix targets vs actual



Source: AuGD compilation of NEP, MSET and PCJ's information



Part Three

Case Study: Operational Performance of Petrojam Ethanol Limited (PEL)

Background

- 3.1 In 1984, ethanol was included in the list of commodities eligible for duty free access to the USA under the Caribbean Basin Initiative. To take advantage of the initiative, PEL established two plants in 1987 with a combined capacity of 52 million gallons per year, to supply ethanol to the US market, utilizing feedstock imported from the Caribbean, Europe and Brazil. By 1997, one of the plants became obsolete, while the other was mothballed due to inefficiencies in production and environmental concerns from the use of benzene (**Figure 6**). PEL was able to access approximately 5 million US gallon per year ethanol from a European supplier; however, this arrangement was discontinued in 2004 owing to European countries developing their own biofuels programme.
- 3.2 In 2005, PEL and a Brazilian company established a partnership to secure feedstock from Brazil for processing ethanol in a newly constructed 40 million US gallon plant in Kingston. Upon expiry of the agreement in June 2008, the plant with a value of US\$9.3 million (\$823 million) became fully owned by PEL (**Appendix 2**). MSET posits that since 2009, there were significant increase in sugar and ethanol prices resulting in unfavourable market conditions or the purchase of the feedstock. As a result, PEL's operation thereafter focused on supplying anhydrous ethanol for local gasoline blending from imports, consistent with Government E10 policy requiring all gasoline sold in the Country to contain 10 per cent ethanol for motor vehicles. This gasoline substitute is to help reduce the Country's import burden of fuel and MTBE (Methyl Tertiary Butyl Ether), an additive to boost octane in gasoline. At the time of the policy decision, a significant portion of the ethanol was expected to be used would be produced locally³.

PEL shifted from the production to the importation of ethanol, contrary to the intent of vision 2030

³ Vision 2030 NDP (page 181)

- 3.3 PEL was able to access feedstock utilizing a tolling arrangement from various suppliers; however, this arrangement was discontinued in 2013 as MSET indicated that PEL ceased production of ethanol as it was deemed uneconomical to purchase feedstock, owing to the significant increases in the sugar and ethanol prices from Brazil and removal of the incentives under the Caribbean Basin Initiative (CBI). However, MSET did not provide any details of the analysis or economic assessment, which informed its decision.

Monitoring of PEL's delegated function

- 3.4 PEL was delegated responsibility for the ethanol initiative by PCJ, which was mandated to ensure accelerated implementation of the National Energy Policy. PEL did not demonstrate a long term strategy to encourage the production of ethanol, which would ensure the continued operation of its 40 million US gallon capacity ethanol plant. Further, there was limited evidence of PEL's exploring opportunities with local producers of feedstock, despite various studies in that regard and in a context where the supply from overseas was volatile. PEL commissioned a study at a cost of \$12 million, which suggested feedstock options that were considered economical and suitable for local production. These recommendations were discussed at PEL's board level in November 2016, with PCJ and a representative of a sugar company. However, there was no clear indication that a decision was taken to accept the recommendations, or whether stakeholders were informed as to a decision. We found that other reports outlined Jamaica's potential for growing crops for producing biofuels was significant. We found no evidence that PCJ instituted effective oversight over PEL's delegated function. As such, the lack of strategic focus was further highlighted by PEL's inability to present Corporate and Operational Plans covering the 2017-18 financial year, identifying efforts to formulate and implement medium-term or long-term strategies for the local supply of sugar cane as feedstock for the dehydration plant.
- 3.5 PCJ did not implement an accountability mechanism to allow for effective monitoring of the delegated function. PCJ instituted group Heads of Subsidiaries (HOS) meetings, this was solely to discuss financial and operational performance of all its subsidiaries including PEL. However, we found no agreed measurable objectives and performance targets by which PEL's performance would be objectively assessed, which breached Sections 6(b) and 6(c) of the Public Bodies Management and Accountability (PBMA) Act, which states:

“every Board shall develop adequate information, control, evaluation and reporting systems within the body; develop specific and measurable objectives and performance targets for that body.”

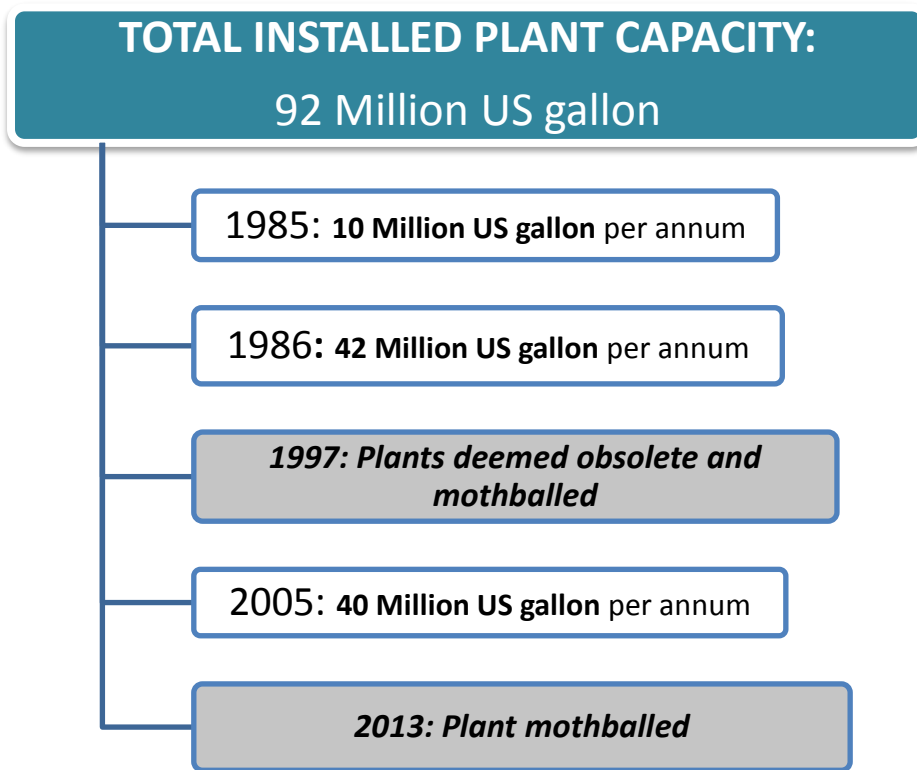
- 3.6 Further, PEL's Corporate Plan (2015-2018) is yet to be finalized by its own Board and submitted to MSET and MOFPS for approval. PEL provided no evidence that the required quarterly and bi-annual reports were prepared and submitted to MSET and the MOFPS, another breach of the PBMA Act.

3.7 In the absence of agreed targets to monitor performance and a Committee's terms of reference, we were not assured of the effectiveness of the HOS meeting or whether PCJ has in place adequate oversight mechanism, given the parent/subsidiary relationship. In correspondence dated October 24, 2017, MSET stated that although PEL is a subsidiary of PCJ, it is a separate, independent legal entity with its own board of directors appointed by the Minister with responsibility for energy and as such the Board and not PCJ is responsible for providing the strategic direction.

Vision 2030 NDP objective and PEL’s ethanol production status

3.8 PEL’s status and Vision 2030 NDP objective for locally produced ethanol are misaligned. In 2013, PEL shifted from the production to the importation of ethanol. PEL indicated that challenges such as unfavourable prices of raw material (feedstock) made it uneconomical to produce ethanol (**Appendix 3**). Hence, since August 2013, PEL’s Dehydration Plant, with a rated capacity of 40 million US gallons per year, has remained unutilized (mothballed). In this regard, we were not assured that value for money was obtained from the investment in the ethanol plant.

Figure 6: PEL’s investment in the ethanol sector



Source: AuGD compilation of PEL’s information

3.9 The cessation of production not only highlights a lack of clarity regarding the Government's posture towards RE as it relates to ethanol, but is also contrary to the intent of Vision 2030 NDP National Outcome #10-1, to produce ethanol locally.

3.10 By way of correspondence dated October 24, 2017, MSET indicated that:

The rationale for the shift from production of ethanol to importation was based on an economic assessment that revealed that importation of ethanol would be cheaper than production from feedstock.

This shift occurred in 2013. Jamaica had been benefiting from the Caribbean Basin Initiative and the Volumetric Ethanol Excise Tax Credit ("VEETC"); however, in 2010, the VEETC was not extended. With the removal of this tax, PEL's profitability decreased and hence it became necessary for it to import dry ethanol from the United States to supply the local market.

PEL asserts that it has only conducted one (1) study on the use of local feedstock to produce ethanol. PEL has represented to this Ministry that its intention is to resume the production of anhydrous ethanol and this is reflected in its draft Corporate Plan (2015-2018), which contemplates the inclusion of locally produced ethanol.

3.11 MSET stated that PEL intend to resume the ethanol production and that PEL's draft Corporate Plan (2015-2018) reflected this decision. PEL did not provide an approved Corporate and Operational plans for 2015-18 for review, despite requests. Further, PEL did not provide evidence that it conducted any feasibility study to inform plans to resume the production of ethanol, including identification of feedstock source, since plant closure in 2013. However, in 2016, PEL conducted a preliminary assessment of the plant to determine the required level of repairs to bring the plant in operating mode; but did provide an estimate of cost.

Inconsistent quality assurance practices as well as inefficient use of ethanol storage tanks and production staff

3.12 PEL has established a quality assurance mechanism, wherein the imported ethanol is checked to assess the quality of the imported product and the lab reports and resulting quality certificates were prepared. The two critical checkpoints occur when the product is discharged from the Ship to PEL's storage tanks, and from the storage tanks to the customer. This is done to ensure that the imported ethanol meets the stipulated standard for use. From a sample of eight ethanol purchases over the period April 2014 to June 2017 valuing approximately \$39.3 million, PEL was only able to provide six (75 per cent) of the required quality certificates and lab reports for ethanol discharged into its tanks, while only five (62.5 per cent) of the required lab reports attesting to the quality of the product from the tank to the customer, was provided for review. As a result, we were unable to determine whether the requisite quality checks were conducted, in all instances for ethanol

purchased. Further, we noted that three of PEL's five storage tanks were being used to store approximately 4,000 barrels of contaminated ethanol since 2016, with an estimated cost of \$62 million. Of the remaining two tanks, one was used for storing ethanol imported by PEL while the other leased to Petrojam. In October 2017, PEL advised that it is exploring options to dispose of the 'off-spec ethanol', in accordance with safety and environmental standards.

3.13 Further, despite the shift to importation, PEL has maintained its complement of nine production staff and in 2015, with the approval of its Board of Directors, changed their status to permanent employment from contractual arrangements⁴. In addition, PEL is seeking to employ production/operations staff to replace two whom had resigned in March 2017.

⁴ These contractual arrangements exist from as far back as 2005

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Appendices

Appendix 1: Key responsibilities in Energy Diversification

ENTITIES

STATUTES, POLICIES, CORPORATE PLANS & STRATEGIC OBJECTIVES

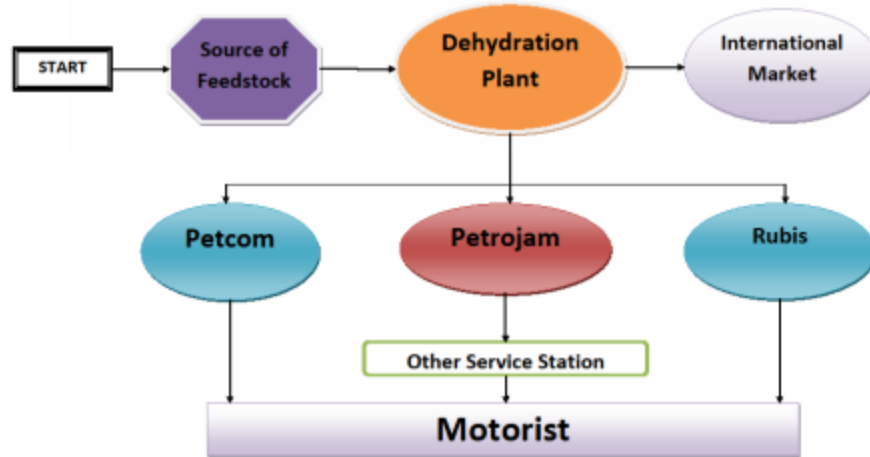
<p>Government of Jamaica (GOJ)</p>	<p>Vision 2030: National Outcome # 10: Energy Security and Efficiency of Vision 2030 Jamaica indicates that the long-term planning for the energy sector must focus on the heaviest users of energy – transport, the bauxite and alumina industry and electricity generation – to achieve meaningful improvements. Use of locally-produced ethanol as an oxygenate and octane enhancer and increased use of solar energy, biogas, photovoltaic devices, wind, hydropower and other renewable energy sources will be explored to help reduce our dependency on imported petroleum over time.</p>
<p>Ministry of Science Energy and Technology (MSET)</p>	<p>Jamaica’s National Energy Policy 2009 –2030: Jamaica’s first long term Energy Policy and is structured to ensure that Jamaica achieves by 2030: 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.</p> <p>National Biofuels Policy 2010-2030 (draft): This Biofuels Policy will guide the operations and processes associated with the development of the biofuels sector with specific focus on bioethanol and biodiesel. This will involve partnerships among the energy and agriculture sectors as well as linkages with other sectors such as transport, finance and planning. The rollout of E10 by the Government of Jamaica in November 2009 mandated the use of ethanol blended fuel for motor engines throughout the island, phasing out the use of the environmentally harmful petroleum-based Methyl Tertiary Butyl Ether (MTBE).</p>
<p>PETROLEUM CORPORATION of JAMAICA (PCJ)</p>	<p>Mandate: The mandate of PCJ is to develop and promote indigenous energy resources, to prevent adverse effects on the environment and to assist the government in realizing the goals of the National Energy Policy.</p> <p>Vision and Mission: PCJ’s vision is to be Jamaica’s foremost energy authority. PCJ’s mission is to facilitate Jamaica’s energy security through the development, promotion and use of the diverse energy resources while maintaining financial viability.</p> <p>Role and Function: The PCJ is the government entity charged with facilitating energy security. Our primary focus is to reduce the country’s dependence on imported fuel while securing the affordable, sustainable energy supplies, which are necessary to realize economic growth.</p>
<p>PETROJAM ETHANOL LIMITED (PEL)</p>	<p>Vision and Mission: PEL’s vision is to be the ethanol product supplier of choice in Jamaica, best at what we do, while its mission is to utilize the opportunities created by and available to Petrojam Ethanol Limited, for the production, exportation and sale of ethanol to maximize profit margins in the interest of all stakeholders. PEL will conduct its affairs in a manner beneficial to Jamaica at all times. The Company will act with integrity and will strive for excellence in all its operations.</p> <p>Objectives: To source feedstock (hydrous ethanol) from international suppliers and form local suppliers when available:</p> <ul style="list-style-type: none"> • To maximize its processing capacity for the dehydration of the hydrous ethanol into anhydrous ethanol • The marketing and sale of ethanol locally, to the United States and other markets available to the company • To source feedstock (hydrous ethanol) from international suppliers and from local suppliers when available

Appendix 2: Chronology of PEL's Operations

DATE	EVENT	AUDIT COMMENTS
1984	Ethanol included in list of commodities allowed duty-free access to the United States under the Caribbean Basin Initiative (CBI).	To facilitate Caribbean economic development.
1985	<ul style="list-style-type: none"> Petrojam Ethanol Limited (PEL) a subsidiary of PCJ was established. Installed first plant, purchased from a Brazilian company with annual capacity of 10 million gallons. 	-
1986	<ul style="list-style-type: none"> Installed second plant, purchased from a US company with annual capacity of 42 million gallons. PEL 'identified' a sugar factory in Belize, with abundant sugar cane production capacity. 	<ul style="list-style-type: none"> To take advantage of the opportunity for 'duty-free' access to the USA. CBI legislation modified to require more CBI sourced feedstock than Jamaica could produce. Feedstock processed in dehydration facility consisting of two (2) plants with combined capacity of 52 million gallons of ethanol per year.
1987	Operations began with the use of ethanol feedstock sourced in the Caribbean, Europe and Brazil.	<ul style="list-style-type: none"> To ensure adequate supply of Caribbean sourced feedstock. It was also noted that in 1985, PCJ (PEL's parent company), acquired Bernard Lodge Sugar Factory, which was rehabilitated to produce 15 million gallons of hydrous ethanol each year.
1989	<ul style="list-style-type: none"> PEL leased Belizean factory for an initial five (5) years, with purchase option; Undertook programme of growing sugar cane and making high grade molasses; Operations commenced in 1989 and continued until 1997. 	-
1997	The 42 million US gallon plant mothballed since 1997 and 10 million US gallon plant deemed obsolete.	<ul style="list-style-type: none"> Due to 'inefficiencies in production and environmental concerns from the use of benzene.' During period of inactivity, PEL maintained its stake in the ethanol business through toll processing arrangements with other ethanol dehydration plants in Jamaica.
2004	Discontinued the supply of feedstock from European Commission (EC) for tolling arrangements.	<ul style="list-style-type: none"> Europe developing their own biofuels programme. Quota for ethanol imports from CBI countries into US market more than 50% below target.
2005	PEL and a Brazilian company established partnership to: <ul style="list-style-type: none"> Secure the supply of hydrous alcohol from producers primarily in Brazil at competitive prices, Dehydrate it into fuel ethanol at the PEL plant in Jamaica for an agreed processing fee Jointly market finished product in the US at acceptable margin. 	<p>As part of the arrangement:</p> <ul style="list-style-type: none"> The Brazilian company financed construction of a new 40 million US gallon per year ethanol dehydration plant; Services related to the procurement of feedstock and the sale of anhydrous ethanol split on a 50/50 basis.
2006	The Government decided to phase out MTBE6 as an octane enhancer in gasoline and replace it with ethanol creating E10: a mixture of 10% ethanol and 90% gasoline.	<ul style="list-style-type: none"> Due to environmental concerns. This phasing out commenced in the third quarter of 2006, (pg. 56, National Energy Policy)
2008	Arrangement with the Brazilian company expired June 30, 2008 and ethanol dehydration plant fully owned by PEL.	
2009	<ul style="list-style-type: none"> PEL acquired 100% ownership of the dehydration facilities. Production of ethanol ceased. Analysis of business alternatives for PEL 	<ul style="list-style-type: none"> It was deemed uneconomical to purchase feedstock, owing to the significant increases in the sugar and ethanol prices from Brazil. Unclear what was the conclusion of analysis and if it made commercial sense to take on this risk, since PEL and other CBI producing countries were unable to operate economically.
2012	PEL entered into a toll processing (processing of ethanol for third parties) with a US company.	-
2013		

Appendix 3: PEL's Supply chain depicting operations before and after the shift from production of ethanol

PEL Supply Chain-Production and Distribution of Ethanol



PEL Supply Chain-Importation and Distribution of Ethanol

