FINAL DRAFT

VISION 2030 JAMAICA

ENERGY

SECTOR PLAN 2009 - 2030

Energy Task Force

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1. Introduction

1.1 Vision 2030 Jamaica – National Development Plan

Background

In 2006, the Government of Jamaica (GOJ) mandated the Planning Institute of Jamaica (PIOJ) to lead the preparation of a comprehensive long-term National Development Plan (NDP) which would place Jamaica in a position to achieve developed country status by 2030. Development of the Plan began in January 2007 and thirty-one Task Forces (TFs) including the Energy Task Force were established thereafter. The TFs represent sectors and areas critical to the achievement of the national goals and have been charged with responsibility for developing the relevant long-term sector plans.

The Energy Task Force commenced the plan preparation exercise in April 2007, leading to the completion and submission of a 1st draft report for the long-term development of the Energy sector in Jamaica. Following review and stakeholder consultation, and preparation of an action plan for the sector, the Energy Sector Plan for Vision 2030 Jamaica was completed in 2009.

This Sector Plan for Energy is one of the strategic priority areas of the ***Vision 2030 Jamaica - National Development Plan***. It is one of thirty-one sector plans that form the foundation for Vision 2030 Jamaica – a 21-year plan based on a fundamental vision to make *'Jamaica the place of choice to live, work, raise families, and do business,'* and on guiding principles which put the Jamaican people at the centre of the nation's transformation.

Under the Energy Sector Plan, Jamaica will reduce its dependence on imported petroleum, and create a modern, efficient, diversified and environmentally sustainable energy sector. The sector will: provide affordable and accessible energy supplies with long-term energy security; contribute to international competitiveness throughout the productive sectors of the economy; and improve the quality of life for citizens.

The preparation of the Plan was supported by a quantitative systems dynamics computer model – Threshold 21 Jamaica (T21 Jamaica) – which supports comprehensive, integrated planning that enables the consideration of a broad range of interconnected economic, social and environmental factors. The T21 Jamaica model is used to project future consequences of different strategies across a wide range of indicators, and enables planners to trace causes of changes in any variable or indicator back to the relevant assumptions and policy choices.

The Energy Sector Plan was developed using the following processes:

- Participation of Task Force Members[1] through Task Force Meetings[2] that were used to solicit ideas and views on Energy issues and challenges facing Jamaica as well as identifying a vision for Energy in Jamaica, and determining key goals, objectives and strategies for the sector
- Hosting of Energy Sector Workshops involving sector stakeholders
- Research on international best practices in Energy that could be adopted in the Jamaican context
- Review of relevant documentation on the Energy sector
- Development of a detailed Action Plan with responsible agencies and time-frames for implementation
- Harmonization with Jamaica's National Energy Policy 2009 -2030

This Sector Plan for Energy is structured in the following main chapters:

- Situational Analysis
- SWOT Analysis
- Strategic Vision and Planning Framework
- Implementation, Monitoring & Evaluation Framework
- Action Plan

1.2 Energy and National Development

The energy sector represents a critical component of the national development of any country. Energy is an essential input into all production processes, and is fundamental to the provision of social services that contribute to the well-being of urban and rural populations. The modes by which energy is produced, distributed and consumed also have wide-ranging implications for the long-term sustainability of the environment. The energy sector plan also will have implications for other areas of national development including transport, tourism, urban and regional planning, agriculture and mining. During the period 2004-2008 Electricity and Water represented on average 3.2% of Jamaica's Gross Domestic Product (GDP)[3]. Energy consumption also represents part of the contribution to GDP in other economic sectors, notably transport.

The planning for Vision 2030 Jamaica and the energy sector has taken place within the context of a global economic recession which commenced in US credit markets in 2007, and spread in 2008-2009 to affect the economies of developed and developing countries alike. The consequences for Jamaica are likely to include: reduced flows of direct investment; greater difficulty in sourcing financing from global capital markets; reduction in demand for Jamaica's exports; and a downturn in tourism earnings. The impact will limit the prospects for growth in our economy in the initial years of implementation of the National Development Plan, until recovery takes place.

[1] See Appendix 1 for List of Members of the Energy Task Force.
[2] See Appendix 2 for Listing of Task Force Meetings.
[3] Based on Contribution to Total Goods and Services Production in Basic Values at constant (2003) prices (PIOJ).

The International Energy Agency (IEA) projects that global energy demand will increase by over 50 % by 2030 based on current energy policies and growth trends, and fossil fuels will continue to dominate the fuel mix.[4] These trends imply continued growth in energy-related emissions of carbon dioxide (CO_2). The world today faces two main threats related to energy – inadequate and insecure supplies at affordable prices and global warming due to over-consumption of fossil fuels. The prospects for global energy markets heighten concerns about energy security and the impact of climate change on energy-dependent small island states such as Jamaica. As stated by the IEA, "The challenge for all countries is to put in motion a transition to a more secure, lower-carbon energy system, without undermining economic and social development."[5]

[4] United Nations Environment Programme and International Energy Agency, *Analysing Our Energy Future – Some Pointers for Policy-Makers* (2007).

[5] International Energy Agency, *World Energy Outlook 2007 - Executive Summary (*2007).

2. Situational Analysis – Jamaica's Energy Sector

2.1 Overview

The modern economic development of Jamaica has been almost entirely dependent on imported petroleum as its primary source of energy, currently accounting for approximately 95% of total energy consumption (see Table 1 below).[6] This dependency has left the island vulnerable to increases in the price of oil such as those experienced in 1973 and, more recently, in the past six (6) years from 2002, when the annual average spot peak price of crude oil on the international market increased by 288% from US$25 per barrel in 2002 to US$97 in 2008.[7] The energy sector may be broadly considered to include imported petroleum and refined petroleum products, electricity supply, renewable energy and other energy sources.

Table 1: Jamaica – Energy Consumption by Source

Energy Source	Average % of Total Energy Consumption 2003-2008
Petroleum Based	**95.2%**
Hydropower	0.4%
Wind	0.1%
Coal	1.0%
Charcoal	0.4%
Bagasse	1.8%
Fuelwood	1.1%
Total Alternative Energy	**4.8%**
Total	**100.0%**

Source: ESSJ 2007-2008

Petroleum Consumption

Jamaica imports petroleum as the primary fuel for its electricity system and for motor vehicles, as well as other petroleum products. Total imports of petroleum products were valued at US$2.71 billion in 2008, up from US$0.81 billion in 2003, with crude oil imports from Venezuela and Mexico accounting for approximately 28.5% of total imports. Imports of mineral fuels represented 31% of total merchandise imports in 2006. The high energy import bill contributes to Jamaica's balance of payments deficits and places pressure on foreign exchange reserves and exchange rates. Imports of Bunker C oil

[6] Based on Barrel of Oil Equivalent (BOE). It should be noted that there have been no data on the use of charcoal and fuelwood from 2006-2008, or on the use of bagasse in 2008.

[7] Economic and Social Survey of Jamaica, 2002 and 2008.

for use in the bauxite industry accounted for 19% of the value of total imports of petroleum products in 2008, while imports of refined petroleum products accounted for US$912 million or 34% of the value of total imports. The transport sector (including land, sea and air transport) is the largest consumer of petroleum in the Jamaican economy, accounting for 37% of the total quantity of petroleum consumption in 2008. The bauxite and alumina industry follows closely behind, accounting for 34% of petroleum consumption in 2008, while electricity generation accounted for 23%.

Electricity Supply

The Jamaica Public Service Company Limited (JPSCo) has been the main supplier of electricity since its establishment in 1923, and received an exclusive thirty-nine (39) year all-island electricity licence in 1978. JPSCo was privatized in 2001 with 80% ownership acquired by an American company, Mirant, which subsequently announced in July 2006 its intention to sell its shares in JPSCo. A new licence was granted to JPSCo in April 2001 for a twenty year period to 2020. While JPSCo retains a monopoly on the transmission and distribution of electricity, the production regime has been liberalized to include generation of electricity by private producers for their own use or for sale to the national grid. Total generating capacity in Jamaica is approximately 818 megawatts (MW), which includes 217 MW capacity provided by independent power producers. Total electricity output was estimated at 4,123 gigawatt hours (GWh) in 2008, of which some 31% was provided by non-JPSCo sources, up from 28% in 2005. Residential use accounted for approximately 33% of annual consumption (GWh) while large scale users (rates 40 and 50) accounted for 43%.

Jamaica requires efficient electricity supply at the generation, transmission and distribution stages for its long-term development. However, 50 % of the island's electricity-generating plant is over three decades old, has exceeded its intended useful economic life, and is considered relatively inefficient.[8] In addition, system losses in transmission and distribution represent 23% of total output (as estimated by the Office of Utilities Regulation), of which approximately 12.5% is represented by non-technical losses including theft. By comparison, while losses in developing countries such as the Dominican Republic and Guyana range as high as 25%-40%, the level of system losses in countries such as Canada and Mauritius average only 10%, and 8.5% in Trinidad and Tobago. Expansions of the generating plant carried out in recent years have not represented least-cost solutions, and have involved turbines using high-cost fuels.

The average price of electricity in Jamaica was estimated by the Office of Utilities Regulation (OUR) at US$0.31 per kilowatt hour (kWh) in 2008, up from US$0.24 per kilowatt hour (kWh) in 2006 (with generation cost of US$0.16 per kWh in 2006). Bulk electricity prices to energy-intensive industrial users in Jamaica averaged US$0.27-0.29 per kWh in 2008 (OUR), significantly higher than bulk electricity prices in Trinidad which range as low as US$0.02-0.03 per kWh. Available studies indicate that the price of electricity in Jamaica is in the mid-range of electricity prices in the Caribbean,[9] but higher than electricity prices in many developed and developing countries.[10] This reduces

[8] OUR (2007).

[9] Jha, Abhas Kumar (ed.), *Institutions, Performance, and the Financing of Infrastructure Services in the Caribbean: World Bank Working Paper No. 58* (2005).

[10] See for example IEA (2007).

the competitiveness of Jamaican firms in international markets. The country's electricity supply is still subject to periodic power fluctuations and outages that disrupt the operation of productive enterprises. The Global Competitiveness Report identifies the quality of electricity supply as an important contributor to economic growth and one in which Jamaica is at a competitive disadvantage.[11] In this context it will be imperative to undertake comprehensive upgrading of the island's electricity generation plant to reduce production costs and the average price of electricity to consumers. Lowering energy costs and improving the quality of electricity supply will be of fundamental importance to the economic development of the country and the long-term competitiveness of its productive enterprises.

Energy Conservation and Efficiency

As a country Jamaica is very inefficient in its use of energy. This is due to a range of factors, including: the high energy use of the bauxite and alumina industry; an inefficient public electricity system; inefficient energy technologies in manufacturing and other productive sectors; inefficient energy use in the public sector; low public awareness of the importance of energy conservation; and an inadequate policy framework to promote energy conservation and efficiency.

Jamaica's energy intensity index has increased steadily in recent years, and now indicates that the economy requires up to 20,000 British thermal units (BTU) to produce US$1.00 of output, compared to a global average of 4,600 BTU.[12] Increasing the efficiency of energy production and consumption in Jamaica will contribute to reducing the energy intensity of the economy.

Energy Security and Diversification

Energy security may be broadly defined as ensuring adequate and affordable energy supplies in order to sustain economic performance and national development.[13] Traditionally, Jamaica has depended on petroleum supplies from Venezuela, Mexico, Trinidad and Tobago and Ecuador, supplemented by purchases on the spot market. However, our long-term energy security is threatened by diminishing global oil reserves, increasing demand in developing countries (particularly China and India), political uncertainties in key oil-producing regions, and the potential impact of natural and man-made disasters on energy production and transport infrastructure.

The Energy Policy of 1995 has provided a framework for the sustainable management of energy sources in economic growth and for development of renewable energy resources. The goals of the policy are to: ensure stable and adequate energy supplies; diversify the energy base and encourage the development of indigenous energy resources; encourage efficiency in energy production, conversion and use; complement the country's industrial policy; minimize the adverse environmental effects; and establish an appropriate regulatory framework. However, despite the policy goal to diversify sources of energy and despite the economic and environmental costs of Jamaica's dependence on imported fossil fuels, alternative energy from all sources including hydropower, wind, coal, charcoal, bagasse and fuelwood only accounted for an average of 6.3% of Jamaica's total

[11] Porter and Schwab, *The Global Competitiveness Report 2008-2009* (2008).
[12] *The Jamaica Energy Policy Analysis 2005,* Cabinet Office. (2005).
[13] See for example, World Economic Forum, *The New Energy Security Paradigm* (2006).

energy consumption over the period 2002-2006. The country is currently preparing a new Energy Policy to guide the development of the sector. The major goals of the new policy, Jamaica's National Energy Policy 2009 -2030, are to: increase energy efficiencies; reduce energy costs; support diversification; develop renewable energy and other indigenous energy sources; and reduce Jamaica's energy intensity; while seeking to protect the environment.

The Least Cost Expansion Plan for the public electricity sector assumes an average annual growth rate of 4.2% in energy generation (OUR), with peak demand projected to more than double from 606.9 MW in 2006 to 1439.3 MW by 2027.[14] Significant expansion in generation capacity will be required to meet this increased long-term demand, including replacement of existing plant with more efficient generators, increase in supply by private producers, and increased use of renewable energy sources. There are a number of current plans to expand and improve electricity production, including petcoke, coal and biomass projects. Another option in the medium term is the installation of new combined cycle gas turbine generating plant based on proposed supply of natural gas to Jamaica from external sources, which would require installation of new import terminal facilities for natural gas. Another recent development in Jamaica's energy sector has been the commencement of activities related to the exploration for potential oil and gas deposits in on-shore and off-shore areas of Jamaica. The range of diversification options for Jamaica's energy sector includes natural gas, coal, petcoke and renewable energy resources.

Renewable Energy and Alternative Energy Sources

An important aspect of the development of the energy sector will be the development of Jamaica's renewable energy sources. The use of renewable energy has a number of benefits, including reduction in dependence on imported petroleum and the associated foreign exchange import costs, reduction in greenhouse gas emissions associated with burning of fossil fuels, and long-term sustainability of supply. The main renewable energy resources for Jamaica include hydropower, wind, solar energy, and bio-fuels such as ethanol, bio-diesel, bagasse, fuelwood and biogas. The Government has established a target for renewable energy to supply 15% of the country's energy by the year 2020.

Over the long term Jamaica's energy sector also should have the flexibility and capacity to adopt and adapt to emerging technologies that support its policy goals. The increase in oil prices has stimulated technological advances in developing alternative energy sources, improving efficiency in energy production and consumption, and in other areas. Emerging technologies which could become relevant to the development of the energy sector in Jamaica over the planning timeframe to 2030 include fuel cells, second generation bio-fuels, and efficient solid state thermoelectric converters for solar energy. Unforeseen advances also could come from so-called "disruptive" technologies, which have the potential for significantly altering energy production, distribution and use.

[14] OUR (2007). The projections for peak demand are being revised and updated by the OUR to take into account the relatively flat demand since 2006, due in part to the rising price of oil and electricity.

2.2 Issues and Challenges

The structure of the energy sector clearly indicates the areas that present the main challenges for its long-term development and transformation. As indicated above the bulk of Jamaica's energy resources are consumed in three (3) areas:

- Transport sector
- Bauxite and alumina
- Electricity generation

The long-term planning for the energy sector therefore must be focused on these main areas, in order to achieve meaningful improvements. Reduction in the cost of electricity and other energy supplies must be a clear priority in the medium and long term. Additionally, while the development of alternative energy sources including renewable energy sources will be an important aspect of the long-term diversification of the sector, it is likely that fossil fuels will remain the main source of energy for Jamaica over the planning horizon through 2030. The overall goal for Jamaica is to develop an energy sector that can contribute to long-term economic competitiveness, improved quality of life and sustainable environmental management. This will involve addressing a wide range of separate challenges, including the following:

1. Increase in Energy Supply and Security

Jamaica must plan to increase its supply of energy to meet projected increases in long-term demand. At the same time Jamaica must seek to increase its energy security to reduce its vulnerability to potential disruptions in energy supplies. Over the long term geo-political factors have posed significant risks to the continuity and cost of global energy supplies. The measures that can contribute to achieving long-term increase in energy supply and security include:

- Replacement of existing plant with more efficient generators
- Construction of new energy-efficient generating facilities on a phased basis to meet increased demand
- Reduction in dependence on imported petroleum through diversification of energy sources such as natural gas, coal and renewable energy sources
- Maintenance and enhancement of bilateral agreements with regional energy partners including Mexico, Venezuela and Trinidad
- Exploration for exploitable fossil fuel energy resources in Jamaica

2. Reduction in Energy Costs

The cost of energy must be reduced significantly over the medium term to advance Jamaica's economic and social development. It is important to recognize that high energy costs are primarily associated with the cost of electricity generation, as Jamaica has relatively low gasolene prices and tax rates for a non-oil producing country. The reduction of energy costs will involve a number of measures including:

- Reduction in the cost of electricity generation in the public system and the bauxite and alumina industry through increasing the energy efficiency of the generating plant, switching to lower-cost fuels, or a combination of both

- Reduction of system losses in electricity transmission and distribution to international benchmark levels

3. Increase in Energy Efficiency in Supply and Demand

Jamaica also must achieve significant increases in efficiency in producing and using energy, which will involve a range of measures including:

- Upgrading of the petroleum refinery to increase capacity utilization and output of lighter and higher-value refined petroleum products in order to replace imports and compensate for the potential switch from oil-fired to natural gas power plants
- Encouragement of more fuel-efficient vehicles in the transport sector including the use of diesel and bio-fuels
- Implementation of demand side management programme including the use of energy-efficient appliances, equipment, and building designs, setting and enforcing standards for public sector organizations, and public awareness and educational programmes
- Use of the Energy Efficiency Fund to support energy conservation

4. Environmental Sustainability and Social Equity

The long-term development of the energy sector also must address the following environmental sustainability and social equity issues:

- Increase in contribution of renewable energy sources in Jamaica
- Completion of rural electrification including deep-rural households
- Reduction in adverse environmental effects from use of fossil fuels in manufacturing, bauxite and alumina plants, power generation and other industries
- Use of cleaner production processes
- Reduction in vehicle emissions through a combination of regulatory mechanisms including the National Vehicle Emissions Standards
- Introduction of bio-diesel and ethanol blends to replace methyl tertiary-butyl ether (MTBE) as fuel additive
- Compliance with international conventions on climate change and global warming

5. Appropriate Policy and Regulatory Framework

The energy sector will require an appropriate policy and regulatory framework to meet the range of challenges identified above, including the following:

- Regimes for pricing of electricity and petroleum products that will balance requirements for competitiveness with the long-term viability of the sector
- Appropriate tax and pricing structure for road users that reflect environmental costs and other externalities
- Institutional framework to coordinate policy with energy initiatives and provide integrated monitoring and enforcement of regulations
- Promotion of a market-based approach and increased competition in the sector including a transparent procurement process for new capacity and sourcing from private producers
- Rationalization of the number of existing Acts governing the sector through the introduction of new modern industry legislation

3. SWOT Analysis

Energy is an essential component in the industrialization and sustainable development of nations. A standard tool of strategic analysis is SWOT analysis, which seeks to identify the main strengths, weaknesses, opportunities and threats for a given entity, ranging from a nation to a sector to an individual enterprise. For the Energy Sector in Jamaica the identification of strengths and weaknesses represents the internal assessment of the sector, while the consideration of opportunities and threats represents the analysis of the external environment for the sector.

The SWOT analysis, along with the Situational Analysis, form the basis for identifying goals, objectives and strategies that may be employed to apply the strengths and address the weaknesses of the sector, capitalize on the opportunities, and mitigate the threats to the long-term development of the sector.

The SWOT analysis for Jamaica's energy sector is presented in Table 2 below.

Table 2: SWOT Analysis – Energy Sector

Internal Analysis	
Strengths • Existing sources of renewable energy • Well-established regulatory agency • Good human resources in sector • Ability to attract energy-related investment in Jamaica • Existing tertiary education and research institutions and programmes • Existing Energy Policy (1995) • Draft new Energy Policy (Jamaica's National Energy Policy 2009 -2030) • Current demand management initiatives • Improvement of major road network	**Weaknesses** • High dependence on imported petroleum • Lack of known indigenous fossil fuel sources • High energy import bill • High cost of electricity • Old/ageing electricity generation plant • Electricity system now experiences high heat rate (low generation efficiency) • High electricity system losses • High energy intensity of economy relative to productivity (as measured by the energy intensity index – ratio of energy consumption to GDP) • Lack of timely implementation of energy sector plans and projects • Inefficient energy use in production and consumption • Low level of adaptation of new energy technologies • Importation and use of energy-inefficient motor vehicles (based on type, size, age and fuel use) • Inefficient and inadequate public transportation system in KMA and other

	urban and rural areas • Inefficient movement of traffic in urban centres • Inefficient land transport modes for cargo and passengers • Use of charcoal and firewood as energy sources • Dependence of alumina sector on bunker oil • Energy inefficiencies in alumina sector • Lack of consensus or certainty about long-term future of energy sector • Slow development of renewable energy resources • Low levels of public action on energy conservation[15]
External Analysis	
Opportunities • Existence of technologies to exploit natural energy sources • Favourable relations with energy-rich countries in CARICOM, the Caribbean region and other regions • High demand for renewable fuels in the United States • Continued international interest in energy investments in Jamaica • Ability to earn carbon credits under the Kyoto Agreement • Potential for development of renewable energy sources • Ongoing improvements in mass transit and public transportation systems • Renewable fuel technologies for motor vehicles • Opportunities for cogeneration particularly in respect of sale/export to the national grid	**Threats** • Volatility of international petroleum supply prices • Linkage of Petrojam prices to Gulf reference prices • Jamaica's economic status as price-taker in international energy markets • Potential impact of natural hazards on energy sector • Geo-political influences on international energy supply and demand • Contribution of greenhouse gases to climate change • Potential impact of emissions and contaminations from sector, including contribution of greenhouse gases to climate change • Potential loss of international economic competitiveness of Jamaica due to high energy costs and inefficient energy use

[15] However, nearly 87% of respondents in the PIOJ/STATIN Household Energy Use Study (2006) said that fuel efficiency was important, very important or extremely important in their choice of vehicle to purchase, while 79% of households claimed to carry out energy saving practices.

4. Strategic Vision and Planning Framework

The long-term process of planning for the Energy Sector is guided by a Vision that describes a future for the sector that is desirable for its stakeholders and that can be achieved through their own efforts within a realistic time frame. The Sector Plan includes an overall Vision for the Energy sector, which is based on the National Energy Policy and also reflects the contributions of the stakeholders represented on the Energy Task Force and at the Energy Sector Workshop held during the Vision 2030 Jamaica planning process. The Vision also forms the basis for and has been fully harmonized with the Vision for Jamaica's National Energy Policy 2009 -2030.

4.1 Vision Statement

The Vision Statement for the Energy Sector for Vision 2030 Jamaica 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"***

4.1.1 Strategic Vision

The long-term strategic vision for the Energy Sector in Jamaica is built on a number of fundamental elements, including the following:

i) An energy sector that contributes to international competitiveness throughout all the productive sectors of the Jamaican economy through reduction in cost of energy supplies to levels comparable to international benchmarks.

ii) An energy sector that is driven by private sector investment within a modernized policy and regulatory framework that fosters competition and transparency.

iii) An energy sector that provides affordable energy supplies to all consumers throughout Jamaica, with the capacity to meet long-term growth in demand.

iv) An energy sector that provides long-term energy security to producers and consumers in Jamaica, including security of supply and long-term price stability.

v) An energy sector that is environmentally sustainable with significantly increased use of renewable energy sources and minimal harmful environmental impacts.

vi) An energy sector that reflects a sustainable improvement in the ways in which energy is used, through greater energy efficiency, reduced energy intensity and better energy conservation.

vii) An energy sector that possesses the flexibility and creativity to adopt and adapt new energy technologies that may emerge over the long term.

viii) An energy sector that is supported by greater awareness by the Jamaican public on the importance of energy and its use in their daily lives.

This strategic vision is expressed in the strategic framework for the Energy Sector for Vision 2030 Jamaica presented below.

4.2 Strategic Planning Framework

The strategic planning approach for the development of Jamaica's energy sector is founded on the development of an appropriate modernized policy, regulatory and institutional framework to guide the realization of the strategic vision for the sector. The starting point is the finalization of the new National Energy Policy which will provide the foundation of the policy framework for meeting the country's energy development needs, and the context for the development of supporting policies. These include the Energy Conservation and Efficiency Policy, Carbon Emissions Trading Policy, Renewable Energy Policy, Bio-fuels Policy, a comprehensive Electricity Policy, and a Power Sector Policy and Strategy.

The strategic approach for the development of Jamaica's energy sector, as presented in the Vision 2030 Jamaica Energy Sector Plan, is guided by Jamaica's National Energy Policy 2009 -2030.

4.2.1 Strategic Approach - Energy Security and Diversification

Vision 2030 Jamaica will diversify the country's energy supply to increase energy security and to contribute to cost efficiency in the energy sector. Diversification will comprise two components: diversification of energy sources, and diversification of energy suppliers. The precise trajectory for the diversification of the energy supply will be based on the completion of studies on the energy sector and on the evolution of international market conditions and technologies. The decisions on energy supply will depend on a range of factors, including relative fuel cost and efficiency, security of supply, infrastructure costs, environmental considerations and availability of appropriate technologies. It will be necessary, as a priority, to coordinate decision-making between the bauxite and alumina industry and the public electricity supply to resolve the fundamental medium-term fuel choice between coal and natural gas to replace dependence on petroleum.

In order to meet the projected growth in demand for energy, four broad diversification options are considered, as shown in Table 3 below.

Table 3: Proposed Energy Source and Diversification Options to meet Projected Growth in Demand for Energy

ENERGY SOURCE	DIVERSIFICATION OPTIONS
Petcoke	Introduce 100MW cogeneration plant at Hunts Bay by 2012 based on expansion and upgrade of Petrojam refinery
Natural Gas	Introduce natural gas as a fuel choice for expansion of the public electricity supply and in the bauxite and alumina industry
Coal	Introduce coal as a fuel diversification option, including cogeneration, for alumina plants and public electricity supply based on clean coal technology[16]
Renewable Energy	Commission new renewable energy projects with total capacity of up to 70 MW by 2012 and increase renewable energy to 15 % of energy mix by 2020

During the medium term, diversification will be pursued based on the outlook for continued high and volatile prices for oil. Based on Jamaica's National Energy Policy 2009 -2030, the objective in the medium term is to pursue natural gas as the main alternative fuel choice because of:

- Availability
- Cost of fuel and capital
- Environmental impact criteria relative to the other alternatives

The planning horizon to 2030 represents a transitional period in the evolution of the world's energy supply. During this period, the world will be developing alternative energy sources that will represent long-term solutions to the economic and environmental problems caused by fossil fuels.[17] However, these alternative solutions are not yet ready for adoption for large-scale commercial use. Consequently it is likely that fossil fuels will remain the main source of energy for Jamaica until 2030, and the emphasis during

[16] Clean coal technology in the full sense involves reduction or removal of sulphur dioxide, nitrogen oxides and particulate emissions generated by coal-fired power plants, as well as carbon capture and storage (CCS) of the carbon dioxide generated by such plants. While several approaches for CCS have been developed they have not yet been made available on a large-scale commercial basis.

[17] Emerging technologies which could become relevant to the development of the energy sector in Jamaica over the planning timeframe to 2030 include fuel cells, second generation biofuels, and efficient solid state thermoelectric converters for solar energy. Unforeseen advances also could come from so-called "disruptive" technologies, which have the potential for significantly altering energy production, distribution and use. Jamaica's future energy options also may include nuclear energy in the form of small pebble-bed nuclear reactors (small tennis ball sized helium-cooled reactors consisting of only 9 grams of uranium per pebble to provide a low power density reactor in the size range of 70-200 MW) which are expected to become commercially available in the time window 2020 - 2025 (Wright 2007).

this transition period is to switch from inefficient use of fossil fuels to a far more efficient use of fossil fuels through fuel choice and energy conservation in order to reduce the economic and environmental costs.

The development of renewable energy represents a strategic response to energy security, economic and environmental challenges. 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 and create a more sustainable energy sector over time. Over the long term, our energy sector will have the flexibility and capacity to adopt and adapt to the emerging technologies that will reduce the country's dependence on fossil fuels permanently. Mechanisms to reduce carbon emissions, including carbon trading, will be developed.

Energy diversification in the transport sector will include use of ethanol and other renewable energy fuels for motor vehicles, potential conversion of fleet operators (e.g. buses and taxis) to compressed natural gas (CNG) and other alternative fuels, and promotion of hybrid vehicles.

To diversify its energy sources, Jamaica must maintain strategic foreign relations with its main existing energy suppliers and with potential suppliers for new diversified fuel types. These sources include the main oil, gas and coal suppliers in the Caribbean region, including Mexico and Venezuela, as well as other international sources. Diversification of energy sources also will involve continued exploration for indigenous sources of oil and gas.

4.2.2 Strategic Approach - Energy Conservation and Efficiency

Energy efficiency and conservation represents the best immediate hope to reduce the nation's use of oil and the attendant negative environmental impacts. Vision 2030 Jamaica seeks to increase the efficiency of the energy sector in the generation, transmission and distribution of electricity, in the use of energy in the transport sector, and in the consumption of electricity by industrial, commercial and residential consumers. This calls for renewed national efforts to conserve energy and use it as efficiently as possible.

Worldwide, energy efficiency has improved considerably since the 1970s in response to energy price increases, supply uncertainties, government policies and independent technological improvements. Technological advances have allowed for increases in energy efficiency, reducing energy demand while increasing economic activity. Studies have indicated that energy savings of 20 – 30% could be obtained globally over the next three decades through improvements in energy-using technologies and energy supply systems.

On a micro-level, energy consumption cost is a significant component of firms' operations and can influence profitability. Investment in proven energy conservation measures (such as use of cleaner technologies in manufacturing) can reap financial and environmental benefits, and contribute to enhanced economic competitiveness of firms.

Vision 2030 Jamaica will increase the efficiency of the electricity system by replacing old, oil-fired steam units with more cost- and fuel-efficient generating plants (such as

new, combined-cycle natural gas plants) and by reducing system losses in transmission and distribution. Greater energy efficiency and lower energy costs in the bauxite and alumina industry are necessary to maintain international competitiveness as well as to reduce national energy intensity, and will be addressed primarily by adopting more cost-efficient fuel sources for alumina plants.

The energy efficiency of the transport sector will be increased by: promoting imports of more efficient vehicles; levying taxes on petrol at levels to encourage conservation; providing adequate infrastructure for transition to alternative energy vehicles; promoting car-pooling opportunities; and increasing mass transit opportunities and utilization. Energy efficiency and conservation by consumers will be enhanced by demand side management programmes that: promote public awareness of the importance of responsible energy use; facilitate the introduction of energy-saving devices by the private sector and consumers; employ energy-saving approaches in building design and construction; and promote energy conservation in the public sector, particularly in the water supply and sanitation systems.

Jamaica will promote energy efficiency and conservation by the use of market mechanisms to increase competition and provide economic benefits, including greater participation by the private sector in power generation, and mechanisms for competition in power transmission and distribution. The role of independent power providers (IPPs) will be increased and consideration will be given to net metering or net billing by households and enterprises that provide electricity to the national grid.

Appendices 5 and 6 show Jamaica's Energy Demand Projections and Energy Supply Matrix to 2030 respectively as contained in the National Energy Policy 2009 -2030. These projections indicate the potential for improved performance by Jamaica's energy sector. The demand projections indicate that by implementing efficiency improvement and conservation programmes plus fuel diversification, Jamaica could achieve reductions of over US$1 billion in its annual energy import bill by 2020 compared to the costs without such programmes. By 2030, the share of petroleum in the country's energy supply mix could fall from the current 95% to as low as 30%, with natural gas accounting for as much as 42% of the mix and renewables 20%.[18]

4.2.3 Goals and Outcomes

The seven (7) main goals and associated outcomes of the Energy Sector Plan are presented below. These goals are taken from Jamaica's National Energy Policy 2009 - 2030, on which the strategic framework for the Energy Sector Plan is based. The Sector Goals represent the ultimate desired state of the Energy sector through which we realize the Sector Vision. The Sector Outcomes represent the desired results which we seek to achieve under each goal. A range of indicators and targets aligned to the Sector Outcomes provide quantitative milestones against which progress in implementing the Energy Sector Plan over time may be measured.

[18] Jamaica's National Energy Policy 2009 -2030.

Table 4: Energy Sector Goals and Outcomes

GOALS	OUTCOMES
1.0:- ***Jamaicans use energy wisely and aggressively pursue opportunities for conservation and efficiency***	**1.1:- Increased awareness of and informed behaviour by large and small consumers on energy issues**
2.0:- ***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***	**2.1:- Implementation of least economic cost solutions for the supply of energy, including source, conversion and distribution**
	2.2:- Modernized, reliable and efficient energy infrastructure and services in productive sectors
	2.3:- Implementation of appropriate safe and reliable energy distribution systems
3.0:- ***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***	**3.1:- Development of appropriate renewable energy sources**
4.0:- ***Jamaica's energy supply is secure and sufficient to support long-term economic and social development and environmental sustainability***	**4.1:- Diversified energy sources by type and geographic location**
	4.2:- Identification and development of indigenous non-renewable sources of energy
	4.3:- Application of emerging appropriate energy technologies
5.0:- ***Jamaica has a well-defined and established governance, institutional, legal and regulatory framework for the energy sector, that facilitates stakeholder involvement and engagement***	**5.1:- Establishment of policy statements, enforceable laws, regulations and institutions that create equitable and transparent opportunities for all stakeholders in the energy sector**
6.0:- ***Government ministries and agencies are a model/leader in energy conservation and environmental stewardship in Jamaica***	**6.1:- Effective energy conservation and environmental stewardship by Government ministries and agencies**
7.0:- ***Jamaica's industry structures embrace eco-efficiency for advancing international competitiveness, and move toward building a green economy***	**7.1:- Internationally competitive industries and firms that apply eco-efficiency and contribute to the creation of a green economy**
	7.2:- Reduction in emissions, effluents and leaks from the energy sector

4.2.4 Integration with the National Development Plan

Under Vision 2030 Jamaica, each Sector Plan is integrated with the strategic framework of the National Development Plan. The Energy Sector Plan is aligned with the National Development Plan under the following National Goal and National Outcome:

National Goal #3: Jamaica's Economy is Prosperous
National Outcome #10: Energy Security and Efficiency

There are two (2) National Strategies under this National Outcome:
National Strategy 10-1: Diversify the Energy Supply
National Strategy 10-2: Promote Energy Efficiency and Conservation

Consequently the implementation of the Energy Sector Plan will contribute primarily to the achievement of National Goal #3 and National Outcome #10 of the National Development Plan.

4.3 Sector Indicators and Targets

The proposed indicators and targets for the Energy Sector Plan over the period 2009 - 2030 are presented in Table 5 below. These proposed indicators and targets are consistent with the indicators contained in Jamaica's National Energy Policy 2009 -2030.

Table 5: Energy Sector Plan – Proposed Indicators and Targets

Proposed Outcome Indicators	Baseline	Targets			Comments
	2007 or Most current	2012	2015	2030	
Energy Sources					
Energy intensity index (EII) BTU/US$1 Unit of output (Constant Year 2000 $US)	15392	14000	12700	6000	Target set to approach average EII for the top 5 non-oil producing nations by 2030
Percentage diversification (%)					
Percentage of energy from indigenous sources, including cogeneration (%)					
Fuel reserve Barrels/1000 population	592 21 days	846 30 days	2537 90 days	5074 90 days	Jamaica presently has approximately 21 days reserve. The targets are set to allow for 1 month's supply by 2012, and 6 months' supply by 2030, estimated at current

Proposed Outcome Indicators	Baseline	Targets			Comments
	2007 or Most current	2012	2015	2030	
					(2008) use.
Renewable Energy					
Percentage of renewables in energy mix	5.6%	11%	12.5%	20%	Local targets are based on the Draft Energy Policy for 10% by 2010 and 15% by 2020. The 2030 target is set using the same annual average incremental increase.
Energy Consumption from Renewable Sources as Percentage of Total Energy Consumption (%)					
Electricity					
Average Heat Rate for Electricity Generation – Public Providers (BTU/KWh)					
Average Heat Rate for Electricity Generation – Public and Private Providers (BTU/KWh)					
System Losses in Electricity Transmission and Distribution – Technical (%)					
System Losses in Electricity Transmission and Distribution Non-Technical (%)					
System Losses in Electricity Transmission and Distribution – Total					
Public Electricity System – Average Service Availability Index (%)					
Public Electricity System – Average Service Reliability Index (%)					
Public Electricity System – Capacity Factor (%)					
Public Electricity System – Load Factor (%)					
Public Electricity System –					

Proposed Outcome Indicators	Baseline	Targets			Comments
	2007 or Most current	2012	2015	2030	
Customer Average Interruption Duration Index (minutes)					
Percentage of Total Households with Electricity (%)	92	94	100		
Efficiency Improvement of Large Customers/Sectors					
Bauxite Sector					
Energy Intensity Index of the Bauxite Industry (BTU/$US1.00 unit of output in Constant Year $US)					
Transport					
Percentage of vehicles using biofuels					
% of fuel efficient vehicles as a % of total vehicles on the roads					
Percentage of energy from biofuels					
% change in energy consumption by NWC					
Hotels					
Energy Efficiency Index					
Percentage of energy from renewable sources					
Percentage of heating provided by solar water heating					
Industries					
Energy Efficiency Index					
Percentage of energy from renewable sources					
Percentage of energy from other indigenous sources					
% increase in the use of cleaner technologies by industry					
Cement Manufacturing					
Energy Efficiency Index					
Percentage of energy from renewable energy					

Proposed Outcome Indicators	Baseline	Targets			Comments
	2007 or Most current	2012	2015	2030	
Percentage of energy from other indigenous sources					
Sugar					
Energy Efficiency Index					
Percentage of energy from bagasse					
Percentage of energy from renewable energy					
Percentage of energy from other indigenous sources					
Offices and Commercial Space					
Energy Efficiency Index					
Households					
Energy Efficiency Index					
Percentage of Household Income Spent on Fuel (%)					
Percentage of Household Income Spent on Electricity (%)					
Percentage of households using LNG					
Average percentage of energy consumption from indigenous sources					
Environment					
Greenhouse gas emissions (Mt per annum)	5	5	4.5	3.5	
Other					
Annual Oil Imports as Percentage of Merchandise Export Earnings (%)					
Annual Oil Imports as Percentage of GDP (%)					

5. Implementation, Monitoring & Evaluation Framework for the Energy Sector

5.1 Implementation Framework

The implementation of the Energy Sector Plan is an essential component of the implementation, monitoring and evaluation framework for the Vision 2030 Jamaica – National Development Plan. The Plan is implemented at the sectoral level by ministries, departments and agencies (MDAs) of Government as well as non-state stakeholders including the private sector, NGOs and CBOs. The involvement of stakeholders is fundamental to the successful implementation of the National Development Plan and the Energy Sector Plan.

Components of Vision 2030 Jamaica

The Vision 2030 Jamaica - National Development Plan has three (3) components:

1. **Integrated National Development Plan:**
   The integrated National Development Plan presents the overall plan for Vision 2030 Jamaica, integrating all 31 sector plans into a single comprehensive plan for long-term national development. The integrated National Development Plan presents the National Vision, the four National Goals and fifteen National Outcomes, and the National Strategies required to achieve the national goals and outcomes.
2. **Medium Term Socio-Economic Policy Framework (MTF):**
   The Medium Term Socio-Economic Policy Framework (MTF) is a 3-yearly plan which summarizes the national priorities and targets for the country and identifies the key actions to achieve those targets over each 3-year period from FY2009/2010 to FY2029/2030.
3. **Thirty-one (31) Sector Plans:**
   At the sectoral level Vision 2030 Jamaica will be implemented through the strategic frameworks and action plans for each sector as contained in the respective sector plans. Vision 2030 Jamaica includes a total of thirty-one (31) sector plans covering the main economic, social, environmental and governance sectors relevant to national development.

5.1.1 Accountability for Implementation and Coordination

The Cabinet, as the principal body with responsibility for policy and the direction of the Government, has ultimate responsibility for implementation of the National Development Plan. Each ministry and agency will be accountable for implementing the National Development Plan (NDP) through various policies, programmes and interventions that are aligned with the strategies and actions of the NDP and the sector plans. A robust

results-based monitoring and evaluation system will be established to ensure that goals and outcomes of the Plan are achieved. This system will build on existing national and sectoral monitoring and evaluation frameworks and will be highly participatory.

5.1.2 Resource Allocation for Implementation

Vision 2030 Jamaica places great emphasis on ensuring that resource allocation mechanisms are successfully aligned and integrated with the implementation phase of the National Development Plan and sector plans. The requirements to ensure resource allocation for implementation will include alignment of organizational plans in the public sector, private sector and civil society with the National Development Plan, MTF and sector plans; coherence between the various agency plans with the National Budget; rationalization of the prioritization process for public sector expenditure; and increased coordination between corporate planners, project managers and financial officers across ministries and agencies.

5.2 Monitoring and Evaluation Framework

5.2.1 Institutional Arrangements

A number of institutions and agencies, including the following, will be involved in the monitoring and evaluation framework for the National Development Plan and the Energy Sector Plan:

1. **Parliament**: The Vision 2030 Jamaica Annual Progress Report will be presented to the Parliament for deliberations and discussion.

2. The **Economic Development Committee (EDC)** is a committee of Cabinet chaired by the Prime Minister. The EDC will review progress and emerging policy implications on the implementation of Vision 2030 Jamaica and the relevant sector plans.

3. The **Vision 2030 Jamaica Technical Monitoring Committee (TMC)**, or Steering Committee, is to be chaired by the Office of the Prime Minister and will provide oversight for the technical coordination and monitoring of the Plan and reporting on the progress of implementation.

4. The **Vision 2030 Jamaica Technical Secretariat** to be institutionalized within the PIOJ will play a leading role in coordinating implementation, analyzing social and economic data and information, consolidating sectoral information into comprehensive reports on the achievements and results of Vision 2030 Jamaica, maintaining liaisons with sectoral focal points in MDAs, and supporting the establishment and operation of Thematic Working Groups.

5. **Ministries, Departments and Agencies (MDAs)** represent very important bodies within the implementation, monitoring and evaluation system. They are the Sectoral Focal Points that will provide data/information on a timely basis on the selected sector indicators and action plans, and be responsible for the timely preparation of sector reports that will feed into the Vision 2030 Jamaica Annual Progress Report. For the Energy Sector Plan, the main MDAs comprising the relevant Sectoral Focal Point will include the Ministry of Energy and Mining, the Petroleum Corporation of Jamaica (PCJ) and the Office of Utilities Regulation (OUR).

6. **Thematic Working Groups (TWGs)** are consultative bodies aimed at providing multi-stakeholder participation in improving the coordination, planning, implementation and monitoring of programmes and projects relevant to the NDP and sector plans, including the Energy Sector Plan. TWGs will be chaired by Permanent Secretaries or senior Government officials and shall comprise technical representatives of MDAs, National Focal Points, the private sector, Civil Society Organizations and International Development Partners. TWGs will meet a minimum of twice annually.

5.2.2 Indicator Framework and Data Sources

Appropriate indicators are the basic building blocks of monitoring and evaluation systems. A series of results-based monitoring policy matrices will be used to monitor and track progress towards achieving the targets for the NDP and sector plans, including the Energy Sector Plan. The performance monitoring and evaluation framework will be heavily dependent on line/sector ministries for quality and timely sectoral data and monitoring progress.

The results-based performance matrices at the national and sector levels comprise:

- At the national level, 60 proposed indicators aligned to the 15 National Outcomes
- At the sector level, a range of proposed indicators aligned to the sector goals and outcomes
- Baseline values for 2007 or the most recent past year
- Targets which outline the proposed values for the national and sector indicators for the years 2012, 2015 and 2030
- Data sources which identify the MDAs or institutions that are primarily responsible for the collection of data to measure and report on national and sector indicators
- Sources of targets
- Links to existing local and international monitoring frameworks such as the MDGs

Some gaps still exist within the performance matrix and a process of review to validate the proposed indicators and targets is being undertaken. This process is very technical and time consuming and requires significant cooperation and support from stakeholders and partners. The performance monitoring and evaluation framework will be heavily dependent on ministries for quality and timely sectoral data and monitoring progress. The

system will benefit from our existing and relatively large and reliable statistical databases within the Statistical Institute of Jamaica (STATIN) and the PIOJ.

5.2.3 Reporting

The timely preparation and submission of progress reports and other monitoring and evaluation outputs form an integral part of the monitoring process.

The main reports/outputs of the performance monitoring system are listed below.

1. **The Vision 2030 Jamaica Annual Progress Report** will be the main output of the performance monitoring and evaluation system.

2. **The annual sectoral reports** compiled by the Sectoral Focal Points for submission to the Vision 2030 Jamaica Technical Monitoring Committee. These will be integrated into the Annual Progress Report.

3. **Other products** of the performance monitoring system include issues/sector briefs and research reports.

5.2.4 Capacity Development

There is recognition that building and strengthening technical and institutional capacity for the effective implementation, monitoring and evaluation of the NDP and the Energy Sector Plan is critical for success. This calls for substantial resources, partnership and long-term commitment to training MDA staff. Training needs will have to be identified at all levels of the system; a reorientation of work processes, instruments, procedures and systems development will have to be undertaken; and staffing and institutional arrangements will need to be put in place. Partnership with the Management Institute for National Development (MIND) and other institutions also will be required to provide training to public sector staff and others in critical areas such as results-based project management and analysis, monitoring and evaluation, and data management.

5.3 The Way Forward

The Energy Sector Plan represents the basis for implementation of the Vision 2030 Jamaica – National Development Plan in the Energy sector. Some key steps in the implementation process for the Energy Sector Plan include:

1. Undertake consultations with stakeholders in the sector to present and review the Energy Sector Plan for Vision 2030 Jamaica.

2. Engage with key stakeholders including relevant Ministries, Departments and Agencies (MDAs) to finalize sector-level indicators and targets for the Energy Sector Plan for 2012, 2015 and 2030.

3. Mainstream the Energy Sector Strategic Framework and Action Plan into the Corporate/Business and Operational Plans of the relevant MDAs as the mechanism for implementation in the public sector.

4. Ensure participation by key energy sector stakeholders in the establishment and ongoing operation of the implementation, monitoring and evaluation framework for Vision 2030 Jamaica, including the Sectoral Focal Point and Thematic Working Group for the Energy Sector Plan.

6. Action Plan for the Energy Sector

The Action Plan represents the main framework for the implementation of the Energy Sector Plan for Vision 2030 Jamaica. The tracking of implementation of the Energy Sector Plan will take place through the Action Plan as well as the framework of sector indicators and targets. The Action Plan is harmonized with the Strategic Framework for Jamaica's National Energy Policy 2009 -2030.

The Action Plan contains the elements listed below.

i. Sector Goals
ii. Sector Outcomes
iii. Sector Strategies
iv. Sector Actions
v. Responsible Agencies
vi. Time-Frame

VISION 2030 JAMAICA
ENERGY SECTOR PLAN
REVISED DRAFT STRATEGIC FRAMEWORK AND ACTION PLAN

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

Outcome 1.1
Increased awareness of and informed behaviour by large and small consumers on energy issues

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
1.1.1 Develop and implement programmes to influence market and non-market behaviour toward and to promote efficient use of energy	1.1.1.1 Develop and implement programmes to influence market behaviour toward and promote efficient use of energy including the use of energy-efficient appliances, equipment, and building designs; setting and enforcing standards for public sector organizations; and public awareness and educational programmes	MEM, PCJ, CO	Years 1-3 Ongoing
	1.1.1.2 Develop and implement a relevant and sustained public energy information programme and information database	MEM, PCJ, CO	Years 1-3 Ongoing
	1.1.1.3 Implement demand side management programmes that promote public awareness of the importance of responsible energy use	MEM, PCJ, CO, OPM	Years 1-3 Ongoing
	1.1.1.4 Develop an energy information clearing house	MEM, PCJ, OPM	Years 1-3 Ongoing
	1.1.1.5 Review, evaluate and improve previous and existing	PCJ, MEM	Years 1-3

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	demand-side energy management programmes for performance, strengths, weaknesses and lessons learnt		Ongoing with major review every 3 years
	1.1.1.6 Incorporate international best practices and findings of market surveys and consumer focus groups in design and implementation of demand side management programmes	MEM, PCJ	Years 1-3 Ongoing
	1.1.1.7 Develop and implement effective education and training programmes on energy conservation at all levels of the education system	MEM, MOE, MIND	Years 1-3 Ongoing
1.1.2 Provide incentives/ disincentives for the development and use of innovative technologies to improve energy efficiencies	1.1.2.1 Provide incentives/disincentives for the use of innovative/clean technologies in power generation, mining and manufacturing to improve energy efficiencies	MFPS, MEM	Years 1-3 Ongoing
	1.1.2.2 Create relevant legislation to support required investments in energy efficiency	MEM, PCJ	Years 1-3 Ongoing
1.1.3 Facilitate the introduction of energy-saving devices	1.1.3.1 Provide incentives for the installation of energy conservation and efficiency and renewable energy devices and equipment, including LED, solar panels, solar water heaters, solar lights and solar street lighting installed where applicable, in the public and private sectors and in communities	MFPS, MEM	Years 1-3 Ongoing
	1.1.3.2 Promote DBJ/PetroCaribe SME Energy Fund	MEM, PCJ, DBJ	Years 1-3
1.1.4 Employ energy-saving approaches in building design and construction	1.1.4.1 Update, apply and enforce the Energy Efficiency Building Code to support efficient use of energy in buildings	MEM, MTW, NEPA, LAs, OPM, CO, BSJ, Private Sector	Years 1-3 Ongoing
	1.1.4.2 Strengthen capacity of local authorities to enforce building code on an ongoing basis	LAs, OPM, BSJ, MEM, MTW	Years 1-3 Ongoing
	1.1.4.3 Conduct periodic review and update of building code	LAs, OPM, BSJ, MEM, MTW	Every 5 years

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
1.1.6 Promote energy conservation and efficiency in the public sector, particularly in the water supply systems	1.1.6.1 Ensure that public sector agencies develop and implement energy conservation and efficiency and environmental stewardship action plans	MEM, OUR, PCJ, OPM, CO, MDAs, MIND	Years 1-3 Ongoing
	1.1.6.2 Infuse energy conservation issues in sectoral policy development (e.g. in tourism policy, health policy, water policy etc.)	MFPS, MEM, MTW	Years 1-3 Ongoing
1.1.7 Develop and implement appropriate tax and pricing structure for road users that reflect environmental costs and other externalities	1.1.7.1 Undertake studies and conduct consultations with stakeholders on taxation levels for petroleum fuels (such as gasolene, diesel, kerosene, natural gas) with a view to instituting a system designed to enhance efficiency and conservation that is consistent with regional and international trends and best practices	MFPS, MEM, MTW, PCJ, OUR	Years 1-3 Ongoing
1.1.8 Promote and implement greater energy conservation and efficiency and lower energy costs in the transport sector	1.1.8.1 Promote greater vehicle fuel efficiency	MTW, MEM	Years 1-3 Ongoing
	1.1.8.2 Establish tax on petrol at levels to encourage conservation and higher utilization of and development of public transport	MFPS, MTW, MEM	Years 1-3 Ongoing
	1.1.8.3 Encourage the import and facilitate the use of more fuel-efficient vehicles in the transport sector as well as the use of diesel, bio-fuels and CNG when it becomes available	MTW, MEM	Years 1-3 Ongoing
	1.1.8.4 Promote use of alternative fuels in transport sector	MTW, MEM	Years 1-3 Ongoing
	1.1.8.5 Provide adequate infrastructure for transition to alternative energy vehicles	MTW, MEM, NWA, Private Sector	Years 1-3 Ongoing
	1.1.8.6 Promote carpooling opportunities (preferential tolls, HOV lanes)	MTW, NWA, TA	Years 1-3 Ongoing
	1.1.8.7 Carry out study of urban transport needs and mass transit options	MTW	Years 1-3

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	1.1.8.8 Increase mass transit opportunities and utilization	MTW	Years 1-6 Ongoing
	1.1.8.9 Develop urban mass transit system based on recommended option	MTW	Years 1-6 Ongoing
	1.1.8.10 Encourage flexihours in labour markets in coordination with school transport	MTW, MEM, MOE, MLSS	Years 1-3 Ongoing
	1.1.8.11 Promote imports of more fuel efficiency vehicles	MFPS, MTW, MEM	Years 1-3 Ongoing
	1.1.8.12 Levy taxes on petrol at appropriate levels to encourage conservation	MFPS, MTW, MEM	Years 1-3 Ongoing
	1.1.8.13 Undertake infrastructure improvement and introduce mobile weighing mechanism to monitor and enforce maximum axle weight standards	MTW, ITA, TA, MEM	Years 1-3 Ongoing
1.1.10 Establish and strengthen the institutional framework and capacity to realize these energy conservation and efficiency objectives	1.1.10.1Develop institutional capacity to implement demand-side energy management programmes	MEM, PCJ, CO, MIND, Tertiary Institutions	Years 1-3 Ongoing

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

Outcome 2.1
Implementation of least economic cost solutions for the supply of energy, including source, conversion and distribution

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
2.1.1 Implement least economic cost solutions for the supply of energy, including source, conversion and distribution	2.1.1.1 Establish a framework for timely development, decision-making and implementation of Least Economic Cost Expansion Plan (LCEP) for generation, transmission and distribution of electricity	MEM, OUR	Years 1-3
	2.1.1.2 Utilize LCEP only as a baseline for capacity requirements and not as a selector of technology, make final technology decisions on the basis of competition, taking into account energy security considerations	MEM, OUR	Years 1-3 Ongoing
	2.1.1.3 Develop framework for timely decision-making and implementation of LCEP	MEM, OUR	Years 1-3
2.1.2 Retire the old generation plants and replace them with modern plants through a competitive basis to improve the conversion efficiency	2.1.2.1 Establish a system to identify and replace old and inefficient units/plants with more fuel efficient and cost efficient technologies and plants	MEM, OUR	Years 1-3 Ongoing
	2.1.2.2 Complete the Petrojam petroleum refinery upgrade project (RUP) to increase capacity utilization and output of lighter and higher-value refined petroleum products in order to replace imports and compensate for the potential switch from oil-fired to natural gas power plants	Petrojam, MEM	Years 1-3

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
2.1.3 Establish a combined cycle capacity to replace old and inefficient units/plants with more fuel efficient and cost efficient technologies and plants	2.1.3.1 Establish a program to acquire combined cycle capacity to replace old and inefficient JPSCo units at Old Harbour plant	MEM, OUR, JPSCo, Private Sector	Years 1-3 Ongoing
2.1.4 Strengthen regulatory enforcement powers to ensure timely implementation of agreed benchmarks and standards	2.1.4.1 Review quality standards for energy supplies	MEM, OUR, BSJ, PCJ	Years 1-3 Ongoing
	2.1.4.2 Review industry standards: • Systems losses • Heat rates • Customer minutes lost • Voltage stability	MEM, OUR, BSJ	Years 1-3 Ongoing
	2.1.4.3 Benchmark local fuel quality standards to international norms	MEM, OUR, BSJ, PCJ	Years 1-3 Ongoing
	2.1.4.4 Implement national standards for petroleum industry	MEM, OUR, BSJ, PCJ	Years 1-3 Ongoing
	2.1.4.5 Strengthen the capacity of the government's electrical inspectorate and the petroleum safety inspectorate to adequately monitor and control incidences of illegal operations	MEM, OUR, Petrojam, JGRA	Years 1-3 Ongoing
2.1.5 Liberalize energy industry and markets to promote competition	2.1.5.1 Establish the framework for a competitive and a transparent bidding process for future generation capacity	MEM, MFPS, OPM, OUR, PCJ	Years 1-3
	2.1.5.2 Set up framework to ensure level playing field for investors	MEM, MFPS, OPM, OUR, PCJ	Years 1-3
	2.1.5.3 Develop a system of selection of players that is objective and efficient	MEM, MFPS, OPM, OUR, PCJ	Years 1-3
	2.1.5.4 Ensure that dispatch arrangements promote utilization of most cost-efficient units	OUR, MEM, JPSCo, IPPs	Years 1-3 Ongoing

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	2.1.5.5 Identify and reserve sites for generation and make available to potential power producers	NEPA, LAs, MEM, OPM, OUR	Years 1-3 Ongoing
	2.1.5.6 Ensure land zoning includes planning for energy development sites	NEPA, LAs, MEM, OPM, OUR	Years 1-3 Ongoing
	2.1.5.7 Unbundle existing vertically integrated industry structures and establish and implement common carrier and common access principles, where demonstrated to be technically and economically feasible	MEM, MFPS, OPM, OUR, PCJ, Private Sector	Years 1-3 Ongoing
	2.1.5.8 Unbundle generation and transmission & distribution creating an energy efficient electricity structure	MEM, MFPS, OPM, OUR, PCJ, Private Sector	Years 1-3 Ongoing
	2.1.5.9 Apply virtual unbundling of utility until expiration of licence	OUR, MEM, JPSCo, IPPs, Private Sector	Years 1-3 Ongoing
	2.1.5.10 Apply rules equally to all energy players	MEM, OUR	Years 1-3 Ongoing
	2.1.5.11 Develop possible use of Smart Grid applications including Broadband over Power Line (BPL) technologies	OUR, MEM, JPSCo, IPPs, Private Sector	Years 1-3 Ongoing
2.1.6 Implement appropriate energy distribution and transmission systems	2.1.6.1 Review and complete Rural Electrification Programme (REP) including use of alternative energy sources such as photovoltaic systems, wind/solar hybrid systems, propane/diesel powered appliances and biogas	REP, MEM	Years 1-3
	2.1.6.2 Focus on providing energy for specific purposes, such as tele-communications and health facilities in remote areas	PCJ, REP, MEM	Years 1-3 Ongoing
	2.1.6.3 Align retail distribution system for transport fuel with development of land transport network	MTW, MEM, NEPA, LAs, Private Sector	Years 1-3 Ongoing

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	2.1.6.4 Provide areas for service station development when constructing highways	MTW, MEM, NEPA, LAs	Years 1-3 Ongoing
	2.1.6.5 Encourage greater energy efficiency in the transport sector	MTW, MEM	Years 1-3 Ongoing
2.1.7 Establish necessary enabling environment to encourage local and foreign financing of the energy sector projects	2.1.7.1 Institute an efficient pricing strategy/indexation and regulation of all energy sectors including petroleum	MEM, MTW, MFPS, OUR	Years 1-3 Ongoing

Outcome 2.2
Modernized, reliable and efficient energy infrastructure and services in productive sectors

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
2.2.1 Encourage greater energy efficiency and lower energy costs in the bauxite and alumina industry and the manufacturing sector	2.2.1.1 Coordinate energy planning for bauxite and alumina industry with expansion of public electricity supply	MEM, JBI, OUR, Bauxite Companies, PCJ, JPSCo	Years 1-3 Ongoing
	2.2.1.2 Develop regime for cogeneration projects and apply regulations	MEM, JBI, OUR, Bauxite Companies, PCJ, JPSCo	Years 1-3 Ongoing
	2.2.1.3 Provide shared infrastructure for fuel supply	MEM, PCJ, JBI, JPSCo, Bauxite Companies, PAJ	Years 1-3 Ongoing
	2.2.1.4 Encourage broader use of cogeneration output of energy by manufacturers	MEM, SRC, PCJ, JMA	Years 1-3 Ongoing

2.2.2 Encourage integrated energy industrial parks with cogeneration facilities	2.2.2.1 Facilitate cogeneration opportunities which meet established guidelines	MEM, PCJ, NEPA, JTI, MIIC	Years 1-3 Ongoing
	2.2.2.2 Undertake development of appropriate legislative provisions	MEM, PCJ, NEPA, JTI, MIIC	Years 1-3 Ongoing
	2.2.2.3 Identify industrial locations	MEM, PCJ, NEPA, LAs, MIIC, JTI	Years 1-3 Ongoing
	2.2.2.4 Zone industrial parks adjacent to power plant sites	MEM, PCJ, NEPA, LAs, MIIC, JTI	Years 1-3 Ongoing

Outcome 2.3
Implementation of appropriate safe and reliable energy distribution systems

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
2.3.1 Ensure continuity and consistency of energy supply and distribution at the most economically available prices	2.3.1.1 Ensure that electricity planning process provides adequate generation, transmission and distribution capacity and efficient layout to meet current and anticipated demand	MEM, OUR, JPSCo, IPPs	Years 1-3 Ongoing
	2.3.1.2 Ensure that electricity planning process minimizes blackouts and interruptions of supply	MEM, OUR, JPSCo, IPPs	Years 1-3 Ongoing
	2.3.1.3 Set appropriate standards, incentives and penalties for energy providers for reliability and quality of supply	MEM, MFPS, OUR	Years 1-3 Ongoing
	2.3.1.4 Ensure energy systems designs allow for quick recovery following natural disasters	JPSCo, OUR, IPPs, ODPEM, MEM, Petrojam, JGRA	Years 1-3 Ongoing
	2.3.1.5 Ensure adequate maintenance programmes are in place for distribution infrastructure	JPSCo, OUR, IPPs	Years 1-3 Ongoing
	2.3.1.6 Replace existing wooden poles with concrete poles	JPSCo	Years 1-3 Ongoing

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	2.3.1.7 Establish strategic fuel reserves for the country for all fuels, including provisions of the Generation Code for the electricity sector	JPSCo, IPPs, Petrojam, Bauxite companies	Years 1-3 Ongoing
	2.3.1.8 Make contingency arrangements to lower the risk of disruption to critical utilities and essential services in the event of disasters and other emergency situations	JPSCo, OUR, IPPs, ODPEM, MEM, Petrojam, JGRA	Years 1-3 Ongoing
	2.3.1.9 Reduce system losses	JPSCo	Years 1-3 Ongoing
	2.3.1.10 Implement demand-side management programmes relating to load control	PCJ, JPSCo, MEM	Years 1-3 Ongoing

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

Outcome 3.1
Development of appropriate renewable energy (RE) sources

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
3.1.1 Strengthen economic and scientific data through resource assessments on the country's energy resource potential	3.1.1.1 Develop an inventory of all potential sources of wind, solar and renewable technologies and ranked according to their economics with full economic impact analysis	PCJ, CERE, MEM, OUR, OPM	Years 1-3
	3.1.1.2 Implement activities outlined in the ECLAC 2005 study	PCJ, CERE, MEM, OUR, Power producers	Years 1-6
	3.1.1.3 Conduct detailed resource assessment study including for transport sector on a 5-yearly basis starting 2010	MEM, MTW, PCJ, Power producers, OUR	Every 5 years from 2010
	3.1.1.4 Carry out continual measurement of basic (non-investment grade) resource data	PCJ	Years 1-3 Ongoing
	3.1.1.5 Provide project information on projects identified in the ECLAC study to prospective investors and promote projects to investors through investment seminars, advertising and other channels	PCJ, CERE, MEM, OUR	Years 1-3 Ongoing
	3.1.1.6 Develop and apply criteria for project selection	PCJ, CERE, MEM, OUR	Years 1-3 Ongoing
3.1.2 Develop renewable energy diversification priorities	3.1.2.1 Prioritize renewable energy sources by economic feasibility criteria, environmental considerations including carbon abatement	PCJ, CERE, MEM, OUR, OPM	Years 1-3

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
based on cost, efficiency, environmental considerations and appropriate technologies and competitiveness	3.1.2.2 Introduce incentives, where feasible, and a plan of action for implementation to foster the development of wind, solar and other renewable technologies	PCJ, CERE, MEM, OUR, MFPS, OPM	Years 1-3
	3.1.2.3 Implement priority indigenous renewable energy projects of the Centre of Excellence for Renewable Energy	CERE, PCJ, MEM, OUR, Private Sector	Years 1-3 Ongoing
	3.1.2.4 Develop priority hydro power sites	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.5 Develop priority wind power sites	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.6 Promote residential use of wind turbines and hybrid systems including development and distribution of wind and solar radiation maps	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.7 Promote the use and benefits of solar water heaters	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.8 Mandate that all new hot water installations be solar in all public buildings	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.9 Promote the development and use of bio-digesters for the production of bio-gas amongst farmers and other potential users	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.10 Develop range of bio-fuels including bio-mass	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.11 Encourage the production of bio-gas from public sewage systems	CERE, PCJ, MEM, OUR, JTI, DBJ, Private Sector	Years 1-6 Ongoing
	3.1.2.12 Promote the efficient conversion of Waste-to-Energy	CERE, PCJ, MEM,	Years 1-6

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	from solid waste disposal sites	OUR, JTI, DBJ, Private Sector	Ongoing
	3.1.2.13 Introduce bio-diesel and ethanol blends to replace methyl tertiary-butyl ether (MTBE) as fuel additive	MEM, MTW, Petrojam, JGRA, PCJ	Years 1-6 Ongoing
	3.1.2.14 Review targets for renewables periodically	MEM, PCJ, OUR, OPM	Every 5 years
3.1.3 Introduce standards and procedures to put renewable energy on the national grid through appropriate program of incentives	3.1.3.1 Develop appropriate pricing mechanism for selling renewable energy to the national grid	MEM, PCJ, OUR	Years 1-3
3.1.4 Promote the development of small renewable generation capacity through the introduction of a liberal and fast track approval process and streamlining the procedures and standards	3.1.4.1 Enhance the development of efficient and low cost renewable plants with a size of 15 MW or more on a competitive basis through a level playing field	MEM, PCJ, OUR, CERE	Years 1-3
	3.1.4.2 Introduce strategy that ensures that renewable energy plants of less than 15MW will be built on no-objection basis using base opportunity cost and negotiable premium cap and 15MW or more to be obtained on a competitive basis through the OUR process	MEM, PCJ, OUR, CERE	Years 1-3
3.1.5 Encourage research, development and timely and efficient implementation of qualified renewable energy projects	3.1.5.1 Include Energy as a subject in the CXC curriculum	MEM, MOE, PCJ, MFPS, CXC	Years 1-3 Ongoing
	3.1.5.2 Support research at the tertiary level with respect to renewable energy	MEM, MOE, Tertiary Institutions, PCJ, CERE, MFPS, SRC	Years 1-3 Ongoing
	3.1.5.3 Implement incentives to encourage tertiary institutions to develop research programmes for the application and implementation of renewable energy technologies	MEM, MOE, Tertiary Institutions, PCJ, CERE, SRC, MFPS	Years 1-3 Ongoing

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	3.1.5.4 Participate in international research findings through conferences, short courses, seminars, etc.	MEM, MOE, Tertiary Institutions, PCJ, CERE, SRC, MFPS	Years 1-3 Ongoing
	3.1.5.5 Establish studentships and scholarships in the field of RE locally and internationally	MEM, MOE, Tertiary Institutions, PCJ, CERE, MFPS	Years 1-3 Ongoing
	3.1.5.6 Incorporate inputs from new and adapted research in decisions on RE implementation	MEM, PCJ, CERE, SRC	Years 1-3 Ongoing
	3.1.5.7 Promote adoption and adaption of suitable technologies for renewable energies subject to best practices	PCJ, MEM, CERE, SRC	Years 1-3 Ongoing
	3.1.5.8 Ensure that there are appropriate skill sets in relevant agencies to develop RE programmes, including by conducting human resource assessments	MEM, PCJ, CERE, MFPS, Tertiary Institutions	Years 1-3 Ongoing
3.1.6 Enhance contribution of energy sector to climate change mitigation and adaptation	3.1.6.1 Comply with international conventions on climate change and global warming	MEM, PCJ, CERE, MFPS, MFAFT, OPM, NEPA, Met Office, Forestry Dept.	Years 1-3 Ongoing
	3.1.6.1 Promote participation in carbon abatement mechanisms including carbon trading	MEM, PCJ, CERE, MFPS, MFAFT, OPM, NEPA, Met Office, Forestry Dept.	Years 1-3 Ongoing

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

Outcome 4.1
Diversified energy sources by type and geographic location

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
4.1.1 Determine the fuel diversification strategy for the short, medium and long term	4.1.1.1 Develop a framework for the introduction of natural gas	MEM, PCJ, OUR, OPM	Years 1-3
	4.1.1.2 Promote strategic partnerships between the public and private sectors to finance and develop energy diversification projects	MEM, PCJ, OUR, OPM, JTI, DBJ	Years 1-3 Ongoing
	4.1.1.3 Develop the institutional capacity and regulatory framework to explore the establishment of small nuclear power generation plants in the event that nuclear power generation proves feasible for Caribbean Small Island Development States (SIDS)	MEM, PCJ, OUR, OPM, UWI	Years 1-15
4.1.2 Develop diversification priorities in a timely way based on cost, efficiency, environmental considerations and appropriate technologies	4.1.2.1 Undertake Liquefied Natural Gas (LNG) Project	MEM, PCJ, OUR, OPM, Private Sector	Years 1-10
	4.1.2.2 Undertake expansion of the Petrojam refinery and petcoke cogeneration plant	Petrojam, MEM, MFPS	Years 1-3
	4.1.2.3 Construct new energy-efficient generating facilities on a phased basis to meet increasing demand	JPSCo, IPPs, Private Sector, MEM, PCJ, OUR	Years 1-10
	4.1.2.4 Develop and implement a fast track generation plant retirement and replacement program	JPSCo, IPPs, Private Sector, MEM, PCJ, OUR	Years 1-10

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
4.1.3 Research and develop alternate fuels for the transportation sector	4.1.3.1 Promote ethanol and biodiesel substitution in transport sector	MEM, PCJ, MTW, Petrojam, JGRA, Private Sector	Years 1-3 Ongoing
	4.1.3.2 Develop liquid fuels from organic matter and CNG as alternate fuels for the transportation sector	MEM, PCJ, MTW, Petrojam, JGRA, Private Sector	Years 1-3 Ongoing
4.1.4 Diversify energy sources by type and geographic location	4.1.4.1 Secure long-term contracts for diversified energy raw material and energy products from regional and extra-regional suppliers	MEM, PCJ, MFPS, OPM, MFAFT, Petrojam, Private Sector	Years 1-10
	4.1.4.2 Use appropriate procurement guidelines to secure best terms and conditions for long-term contracts for energy supplies	MEM, PCJ, MFPS, MFAFT, Petrojam, Private Sector	Years 1-10 Ongoing
	4.1.4.3 Identify and engage appropriate multiple supply sources for each fuel	MEM, OUR, PCJ, MFPS, MFAFT	Years 1-10 Ongoing
	4.1.4.4 Review and revise existing regulations to make provisions that ensure adequate inventory levels to cushion any short-term disruption in supply	MEM, OUR, PCJ, JPSCo, IPPs, Petrojam	Years 1-3 Ongoing
4.1.5 Establish an enabling environment for the development of the renewable resources through private sector participation	4.1.5.1 Introduce incentives, where feasible, and a plan of action for implementation to foster the development of wind, solar and renewable technologies	MEM, CERE, PCJ, MFPS	Years 1-3
	4.1.5.2 Promote use of DBJ/PetroCaribe SME Energy Fund for renewable energy projects	MEM, CERE, PCJ, MFPS, DBJ, JTI	Years 1-3 Ongoing
	4.1.5.3 Develop and implement a public education programme through the print media, television, radio and island-wide meetings/seminars	MEM, CERE, PCJ, OPM, JIS	Years 1-3
4.1.5 Engage in multilateral, regional and bilateral	4.1.5.1 Align foreign policy with energy policy to ensure energy security	MEM, MFAFT, OPM, OUR, PCJ, MFPS	Years 1-3 Ongoing

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
partnerships and cooperative arrangements that best advance Jamaica's energy interests	4.1.5.2 Ensure good diplomatic relations with multiple energy producing countries	MFAFT, MEM, OPM	Ongoing
	4.1.5.3 Align energy policy with foreign policy, for example through participation in PetroCaribe work groups	MEM, MFAFT, OPM, OUR, PCJ, MFPS	Years 1-3 Ongoing
	4.1.5.4 Ensure that funds retained under the PetroCaribe Accord are utilized to meet the development objectives of the agreement	MEM, MFAFT, OUR, PCJ, MFPS	Years 1-3 Ongoing
	4.1.5.5 Identify financing opportunities from multilateral and bilateral sources	MEM, MFAFT, PCJ, MFPS, Private Sector	Years 1-3 Ongoing

Outcome 4.2
Identification and development of indigenous non-renewable sources of energy

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
4.2.1 Identify and develop indigenous non-renewable sources of energy and necessary enabling environment to encourage private sector participation	4.2.1.1 Undertake comprehensive oil and gas exploration programme	Private sector, PCJ, MEM, JTI	Years 1-20
	4.2.1.2 Refine and package data on exploration possibilities	PCJ, MEM, JTI	Years 1-10 2nd Phase
	4.2.1.3 Review and apply appropriate models for production and development of potential oil and gas resources	PCJ, MEM	Years 1-20
	4.2.1.4 Provide legislation and incentives framework for exploration and production including production sharing arrangements	PCJ, MEM, MFPS, OPM	Years 1-6
	4.2.1.5 Review options for other potential indigenous non-renewable sources of energy	MEM, PCJ	Years 1-6 Ongoing

Outcome 4.3
Application of emerging appropriate energy technologies

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
4.3.1 Undertake performance review of new and emerging energy technologies on an ongoing basis	4.3.1.1 Research and review relevant publications, monitor energy applications and benchmark against existing energy technologies	MEM, PCJ, Tertiary Institutions, Private Sector	Years 1-6 Ongoing
	4.3.1.2 Prepare periodic (annual) reports on new and emerging energy technologies	MEM, PCJ, Tertiary Institutions, Private Sector	Years 1-6 Ongoing
	4.3.1.3 Review development of appropriate nuclear technologies on an ongoing basis	MEM, PCJ, OUR, UWI	Years 1-15 Ongoing
4.3.2 Build institutional, financial and human resource capacity for research and development and adoption and adaptation of new energy technologies	4.3.2.1 Strengthen energy research function within organizational structures of relevant institutions	PCJ, SRC, MEM, Tertiary Institutions, Private Sector	Years 1-6 Ongoing
	4.3.2.2 Strengthen appropriate education and training and human resource development in energy research and development skills	PCJ, SRC, MEM, Tertiary Institutions, Private Sector, MIND	Years 1-6 Ongoing
	4.3.2.3 Encourage financial institutions and the private sector to provide financial support for energy research and development	PCJ, SRC, MEM, MFPS, Tertiary Institutions, Private Sector	Years 1-6 Ongoing
	4.3.2.4 Encourage application of appropriate energy technologies, skills, and results of research and development	PCJ, SRC, MEM, MFPS, JTI, Tertiary Institutions, Private Sector	Years 1-6 Ongoing
	4.3.2.5 Facilitate stronger links with energy sector and academic institutions to drive the adoption and adaptation of new technologies in the energy sector	PCJ, SRC, MEM, MFPS, JTI, Tertiary Institutions, Private Sector, MIND	Years 1-6 Ongoing

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

Outcome 5.1

Establishment of policy statements, enforceable laws, regulations and institutions that create equitable and transparent opportunities for all stakeholders in the energy sector

STRATEGIES	ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
5.1.1 Develop comprehensive, modernized policy framework for the energy sector	5.1.1.1 Finalize, promulgate and implement new National Energy Policy	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.1.2 Approve and promulgate Energy Conservation and Efficiency Policy	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.1.3 Develop and promulgate Carbon Emissions Trading Policy	MEM, PCJ, OUR, OPM, CO, NEPA, Met Office	Years 1-3
	5.1.1.4 Develop and promulgate Renewable Energy Policy	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.1.5 Develop and promulgate Bio-fuels Policy	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.1.6 Develop, promulgate and implement Power Sector Policy and Strategy	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.1.7 Develop and promulgate Electricity Policy and Act	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.1.8 Implement policy regarding the development and export of cogeneration and renewables electricity to the national grid by private sector and citizens at large	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.1.9 Review related policies for other sectors including transport, mining, agriculture, tourism and industrial policy, and make recommendations to harmonize with energy policy	MEM, PCJ, OUR, OPM, CO, MTW, MOAF, MOT, MIIC	Years 1-3 Ongoing

STRATEGIES	ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	5.1.1.10 Ensure stakeholder participation in policy development for the energy sector, including conformance with the Consultation Code of Practice for the Public Sector	MEM, PCJ, OUR, OPM, CO	Years 1-3 Ongoing
	5.1.1.11 Develop and operate monitoring and evaluation framework for energy policy implementation including criteria for evaluating policy implementation, effective database system and ongoing monitoring & data collection	MEM, PCJ, OUR, OPM, CO	Years 1-3 Ongoing
	5.1.1.12 Conduct periodic policy reviews and use findings to refine and develop new policy initiatives	MEM, PCJ, OUR, OPM, CO	Years 1-3 Ongoing (Review of Energy Policy every 5 years)
5.1.2 Promote a market based approach and increased competition in the sector including a transparent procurement process for new capacity and sourcing from private producers (both renewable and non-renewable energy sources)	5.1.2.1 Conduct studies to include net metering and wheeling in the tariff rates and introduce appropriate mechanisms for net metering and wheeling procedures and standards to encourage the development of renewable energy and cogeneration opportunities	MEM, OUR, Private Sector	Years 1-3
	5.1.2.2 Update the policy document and implement the policy regarding the development and export of cogeneration electricity to the national grid	MEM, OUR	Years 1-3
5.1.3 Develop comprehensive, modernized legislative framework for the energy sector	5.1.3.1 Finalize and promulgate Electricity Act (based on 2004 Draft)	MEM, OUR	Years 1-3
	5.1.3.2 Amend Electricity Lighting Act	MEM, OUR	Years 1-3
	5.1.3.3 Review Transport and Mining Legislation to ensure that energy policy considerations are adequately reflected	MEM, MTW	Six (6) – Nine (9) months

STRATEGIES	ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	5.1.3.4 Develop legislative framework for natural gas and other fuels	MEM, PCJ, OUR, OPM, CO	Years 1-6
	5.1.3.5 Review all energy sector legislation to ensure harmony and consistency with policy and laws	MEM, PCJ, OUR, OPM, CO	Years 1-9
	5.1.3.6 Establish requirements for new electricity generating plant (over minimum scale of 1 MW) to be approved by regulator	MEM, OUR	Years 1-6
5.1.4 Amend existing legislation and regulations or promulgate new ones where necessary to ensure responsible market behaviour and promote industrial harmony	5.1.4.1 Rationalize the number of existing Acts governing the sector through the introduction of new modern industry legislation	MEM, PCJ, OUR, OPM, CO	Years 1-9
	5.1.4.2 Remove inconsistencies in the legislative framework	MEM, PCJ, OUR, OPM, CO	Years 1-9
	5.1.4.3 Review on an ongoing basis the existing legal framework for performance, strengths, weakness, and lessons learnt, to formulate and implement programmes of legal reforms	MEM, PCJ, OUR, OPM, CO	Years 1-9
5.1.5 Develop comprehensive, modernized regulatory framework for the energy sector	5.1.5.1 Empower the regulatory agencies with enforcement powers to improve the efficiency of the system and compliance with established benchmarks, procedures and standards	MEM, PCJ, OUR, OPM, CO	Years 1-6 Ongoing
	5.1.5.2 Develop necessary regulatory framework for the introduction of diversification fuels	MEM, PCJ, OUR, OPM, CO	Years 1-6 Ongoing
	5.1.5.3 Reduce system losses on the power system by introducing stiff penalties for power thefts and enhancing the enforcement powers of the regulatory agencies	MEM, PCJ, OUR, OPM, CO	Years 1-3
	5.1.5.4 Enhance the enforcement powers of the regulator to ensure compliance with established procedures and standards as well as the efficiency monitoring mechanisms on a continued basis	MEM, PCJ, OUR, OPM, CO	Years 1-3 Ongoing

STRATEGIES	ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
	5.1.5.5 Monitor and regulate procurement and pricing of energy products and inputs	MEM, PCJ, OUR, OPM, CO	Years 1-6 Ongoing
5.1.6 Review on an ongoing basis the existing internal regulatory framework for performance, strengths, weaknesses and lessons learnt, while recognizing the implications of external dimensions, and formulate and implement programmes of regulatory reforms	5.1.6.1 Conduct regulatory impact assessment (RIA) on relevant existing regulations	MEM, OUR, PCJ, OPM, CO, NEPA, BSJ, MFAFT	Years 1-3 Ongoing
	5.1.6.2 Conduct RIAs on proposed regulations	MEM, OUR, PCJ, OPM, CO, NEPA, BSJ, MFAFT	Years 1-3 Ongoing
	5.1.6.3 Ensure that internal regulatory framework conforms with mandatory requirements of international protocols (e.g. Kyoto Protocol, bilateral agreements, Basel Convention, WTO etc.)	MEM, OUR, PCJ, OPM, CO, NEPA, BSJ, MFAFT	Years 1-3 Ongoing
	5.1.6.4 Adopt and adapt relevant agreed international best practice in regulation including consultations	MEM, OUR, PCJ, OPM, CO, NEPA, BSJ, MFAFT	Years 1-3 Ongoing
5.1.7 Establish regulatory regimes for the petroleum sector in order to ensure efficient procurement, sourcing, indexation and pricing of petroleum and petroleum products on most competitive basis and in a transparent manner	5.1.7.1 Develop regimes for pricing of electricity and petroleum products that will balance requirements for competitiveness with the long-term viability of the sector	MEM, OUR, PCJ, OPM	Years 1-3
5.1.8 Review and modify existing institutional	5.1.8.1 Develop the institutional framework to coordinate policy with energy initiatives and provide integrated monitoring and enforcement of regulations	MEM, OUR, PCJ, OPM, CO	Years 1-3 Ongoing

STRATEGIES	ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
framework and industry structure for energy sector toward achievement of policy objectives	5.1.8.2 Assess institutions to determine that there is efficient interaction, adequate resources and skill sets to achieve policy implementation, monitoring and regulation	MEM, OUR, PCJ, OPM, CO	Years 1-3 Ongoing
	5.1.8.3 Assess performance of institutions against international benchmarks and mandates	MEM, CO, individual agencies	Every 3-5 years
	5.1.8.4 Identify the industry structures that best facilitate/suit/match policy objectives	MEM, OUR, PCJ, OPM, CO	Years 1-3 Ongoing
	5.1.8.5 Provide appropriate incentives for industry stakeholders to facilitate sector development including diversified, renewable and low cost energy sources and demand side management programmes	MEM, OUR, PCJ, OPM, CO, MFPS	Years 1-3 Ongoing

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

Outcome 6.1

Effective energy conservation and environmental stewardship by Government ministries and agencies

STRATEGIES	ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
6.1.1 Implement Government of Jamaica Policy on Environmental Stewardship (2008)	6.1.1.1 Ensure that Ministries and Agencies develop and implement environmental stewardship action plans, with special emphasis on energy and fleet management	MEM, OUR, PCJ, OPM, CO, MDAs, MIND	Years 1-3 Ongoing
	6.1.1.2 Develop and implement a specific programme of energy management for the National Water	NWC, MEM, CO	Years 1-3

	Commission, the single largest consumer of energy in the public sector, focusing on intensification of loss reduction, improvement in pumping efficiency and the introduction of a distributed storage programme which will facilitate better management of pumping operations		
	6.1.1.3 Fast track the implementation of energy efficiency programmes (the recommendations of the energy audits undertaken) in hospitals and other areas of the public sector, based on the findings of various earlier studies and energy audits	MEM, OUR, PCJ, MOHE, MTW, OPM, CO, MDAs	Years 1-3 Ongoing
	6.1.1.4 Establish energy conservation and efficiency (ECE) protocols for the operation of public sector facilities and entities including the appointment of an energy coordinator for each facility	MEM, OUR, PCJ, OPM, CO, MDAs	Years 1-3 Ongoing
	6.1.1.5 Expand the role of the Energy Efficiency Unit (EEU) within the Petroleum Corporation of Jamaica (PCJ) to provide technical assistance for ECE initiatives in the public and private sectors	PCJ, MEM	Years 1-3 Ongoing

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

Outcome 7.1
Internationally competitive industries and firms that apply eco-efficiency and contribute to the creation of a green economy

STRATEGIES	ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
7.1.1 Provide incentives/ disincentives for the development and use of innovative technologies to improve energy efficiencies	7.1.1.1 Provide incentives/disincentives for the use of innovative/clean technologies in key energy-intensive sectors including mining and manufacturing to improve energy efficiencies	MEM, MIIC, MFPS, JTI	Years 1-3 Ongoing
	7.1.1.2 Facilitate greater energy efficiency and lower energy costs in all sectors	MEM, MIIC, MFPS, JTI	Years 1-3 Ongoing
	7.1.1.3 Provide incentives for the usage of renewable energy in productive sectors	MEM, MIIC, MFPS, JTI, NEPA	Years 1-3 Ongoing
	7.1.1.4 Provide incentives where applicable to encourage employment of high levels of capital to increase use of cleaner technologies	MEM, MIIC, MFPS, JTI	Years 1-3 Ongoing
	7.1.1.5 Facilitate sourcing of low cost development funds for productive enterprises for energy technology projects	MEM, MIIC, MFPS, JTI, JMA, JEA, SBAJ, JBDC, DBJ, EXIM	Years 1-3 Ongoing
7.1.3 Develop the capacity of local companies to improve their processes and energy efficiencies	7.1.3.1 Promote best practices in design of new production facilities and retro-fitting of existing facilities to maximize energy efficiency	MEM, MIIC, MFPS, JTI, JMA, JEA, Private Sector	Years 1-3 Ongoing
	7.1.3.2 Adopt Cleaner Production Mechanism (CPM) through promotion of incentives (Carbon Credits) and capital financing available	MEM, MIIC, MFPS, JTI, JMA, JEA, SRC, MFAFT, OPM, NEPA, Met Office, Forestry Dept.	Years 1-3 Ongoing

7.1.4 Develop green jobs based on renewable energy resources	7.1.4.1 Promote the development and implementation of environmental management systems in the productive sectors (ISO 14001)	MEM, MIIC, MFPS, MOT, JTI, JMA, JEA, SRC, NEPA, BSJ, Private Sector	Years 1-3 Ongoing
	7.1.4.2 Promote use of environmentally sustainable packaging	MEM, MIIC, MFPS, SRC, NEPA, BSJ, Private Sector	Years 1-3 Ongoing

Outcome 7.2
Reduction in emissions, effluents and leaks from the energy sector

STRATEGIES	SPECIFIC ACTIONS	RESPONSIBLE AGENCIES AND STAKEHOLDERS	TIME-FRAME
7.2.1 Review, establish, implement, monitor and enforce standards for emissions, effluents and leaks from the energy sector	7.2.1.1 Establish and update monitoring standards and reporting schedule for emissions, effluents and leaks from the energy sector	MEM, OPM, NEPA, LAs	Years 1-3 Ongoing
	7.2.1.2 Strengthen capacity of monitoring agencies including investment in monitoring equipment	MEM, OPM, MFPS, NEPA, LAs	Years 1-3 Ongoing
	7.2.1.3 Strengthen enforcement of remedies and penalties for non- conformance to standards	MEM, OPM, NEPA, LAs	Years 1-3 Ongoing
	7.2.1.4 Introduce National Vehicle Emissions Standards and Regulations to reduce vehicular emissions	MEM, MTW, OPM, NEPA, LAs	Years 1-3 Ongoing
7.2.2 Promote use of appropriate technology to reduce emissions, effluents and leaks from the energy sector	7.2.2.1 Marshall research information on available appropriate technology to reduce emissions, effluents and leaks from the energy sector, and make information available to the market through various media and channels	MEM, PCJ, OPM, NEPA, LAs	Years 1-3 Ongoing

7. Appendices

7.1 Appendix 1 – List of Task Force Members

• Dr. Raymond Wright	Special Projects Manager, Petroleum Corporation of Jamaica (Task Force Chairperson)
• Mr. Wayne McKenzie	General Manager, Jamaica Energy Partners (Task Force Vice-Chairperson)
• Dr. Ruth Potopsingh	Group Managing Director, Petroleum Corporation of Jamaica (PCJ)
• Mr. Conroy Watson	Senior Director, Energy, Ministry of Industry, Technology, Energy, and Commerce (MITEC)
• Mr. J. Paul Morgan	Director General, Office of Utilities Regulation (OUR)
• Mr. Hopeton Heron	Senior Research Officer, Electricity, Centre of Excellence for Renewable Energy, Petroleum Corporation of Jamaica
• Mr. Timothy Mehl	General Manager, Jamaica Private Power Company Limited
• Mr. Gary Jackson	General Manager, Wigton Wind Farm
• Mr. Errol Edwards	President, Jamaica Gasolene Retailers Association (JGRA)
• Mr. Jinda Maharaj	Technical Operations Manager, Caribbean Cement Company Limited
• Mr. Winston Watson	Managing Director, Petrojam Limited
• Mr. Robert Kerr	Senior Consultant, Investment Promotion, Jamaica Trade and Invest (JTI)
• Mr. Zia Mian	National Energy Security Advisor, Ministry of Foreign Affairs and Foreign Trade
• Mr. Raymond Silvera	Deputy Director General, Office of Utilities Regulation (OUR)
• Mr. Wilfred Bassaragh	Chief Technical Officer, Jamaica Energy Partners
• Mr. Stephen Wedderburn	Manager, Planning and Implementation Unit, PCJ
• Mr. Dwight DaCosta	Director, Systems Planning and Control, JPSCo
• Mr. Raymond McFarlane	Senior Systems Planner, Generation, JPSCo
• Mr. Sam Davis	Head, Government and Regulatory Affairs, JPSCo
• Ms. Kimberley Chai	Process Engineer, Petrojam Limited
• Mrs. Yvonne Barrett-Edwards	MITEC
• Mr. Omar Alcock	MITEC
• Ms. Gina-Lee Lawrence	Petroleum Corporation of Jamaica (PCJ)
• Mr. Kelvin Salmon	Petroleum Corporation of Jamaica (PCJ)

• Prof. Anthony Clayton	University of the West Indies (UWI)
• Mr. Kwame Miller	Jamaica Bauxite Institute
• Mr. Leonard Green	Jamaica Gasolene Retailers Association (JGRA)
• Mr. Trevor Heaven	Jamaica Gasolene Retailers Association (JGRA)
• Mr. Dwight Lewis	Petroleum Corporation of Jamaica (PCJ)
• Mr. Trevor Baker	Jamaica Gasolene Retailers Association
• Ms. Janelle Case	Jamaica Public Service Company Limited
• Mr. David Barrett	Finder Caribbean Limited
• Dr. Gavin Gunter	PCJ
• Ms. Donna Johnson	Administrative/Operations Officer, Wigton Wind Farm Limited
• Mr. Cietor Whitelock	Jamaica Private Power Company
• Mrs. Seveline Clarke-King	PIOJ
• Mrs. Rose Marie Broadbell	PIOJ
• Mr. Michael Ramsay	PIOJ
• Mr. Richard Lumsden	PIOJ
• Dr. Peter-John Gordon	PIOJ

Note: Positions of Task Force Members are given as at the time of their appointment to the Energy Task Force.

7.2 Appendix 2 – List of Attendees at Energy Sector Workshops

ENERGY TASK FORCE WORKSHOP
DATE: Wednesday, May 16, 2007
VENUE: Terra Nova Hotel
17 Waterloo Road, Kingston 10

ATTENDEES

1. Dr. Raymond Wright	Petroleum Corporation of Jamaica (PCJ) (Task Force Chairperson)
2. Mr. Wayne McKenzie	Jamaica Energy Partners (JEP) (Task Force Vice-Chairperson; Workshop Chairperson)
3. Dr. Ruth Potopsingh	PCJ
4. Ms. Gina-Lee Lawrence	PCJ
5. Ms. Denise Tulloch	PCJ
6. Dr. Gavin Gunter	PCJ
7. Mr. Dwight Davis	PCJ
8. Mr. Hopeton Heron	PCJ
9. Mr. Omar Alcock	Ministry of Ind., Tech, Energy & Commerce

10. Mrs. Yvonne Barrett-Edwards	Ministry of Ind., Tech, Energy & Commerce
11. Mr. Zia Mian	Ministry of Foreign Affairs & Foreign Trade
12. Prof. Anthony Clayton	UWI
13. Mr. Timothy Mehl	Jamaica Private Power Company (JPPC)
14. Mr. Wilfred Bassaragh	JEP
15. Ms. Donna Johnson	Wigton Wind Farm
16. Mr. Jinda Maharaj	Carib Cement
17. Mr. Kenneth Henry	Petrojam
18. Ms. Kimberley Chai	Petrojam
19. Mr. Robert Kerr	Jamaica Trade & Investment (JTI)
20. Mr. Kwame Miller	Jamaica Bauxite Institute (JBI)
21. Mr. Worrell Lyew You	Jamaica Bauxite Institute
22. Mr. Raymond Silvera	Office of Utilities Regulation (OUR)
23. Mr. Peter Espeut	C-CAM
24. Mr. Gregoire Adrien	C-CAM
25. Ms. Stacy Rose	Ministry of Agriculture & Lands
26. Dr. Cezley Sampson	Cabinet Office
27. Mr. Dwight DaCosta	JPSCo
28. Mr. Raymond McFarlane	JPSCo
29. Mr. Sam Davis	JPSCo
30. Mr. Verman Mighty	Windalco
31. Ms. Natalie Sparkes	Windalco
32. Mr. Vaughn James	Windalco
33. Ms. Denise Arana	Development Bank of Jamaica (DBJ)
34. Mr. Quamie Mortley	Alpart
35. Mr. Roy Nicholson	Mines & Geology Division
36. Mr. David Barrett	Finder Caribbean Ltd.
37. Mr. Bert Ramsay	Trans Resources
38. Mr. Michael Ramsay	Planning Institute of Jamaica (PIOJ)
39. Ms. Tameka Walker	PIOJ
40. Mrs. Seveline Clarke-King	PIOJ
41. Mrs. Rose Marie Broadbell	PIOJ
42. Mr. Richard Lumsden	PIOJ
43. Ms. Carmen Williams	PIOJ

ENERGY TASK FORCE WORKSHOP
DATE: Wednesday, March 19, 2008
VENUE: Planning Institute of Jamaica (PIOJ)
16 Oxford Road, Kingston 5

ATTENDEES

1. Mr. Frank Sugranes	Jamaica Private Power Company (JPPC)
2. Mr. Ciector Whitelock	Jamaica Private Power Company (JPPC)
3. Mr. Omar Alcock	Ministry of Energy, Mining and Telecommunications
4. Ms. Gina-Lee Lawrence	Petroleum Corporation of Jamaica, (PCJ)
5. Mr. Omar Grey	Jamaica Public Service (JPSCo)
6. Mr. Raymond McFarlane	Jamaica Public Service (JPSCo)
7. Dr. Raymond Wright	Petroleum Corporation of Jamaica, (PCJ)
8. Mr. Zia Mian	Cabinet Office
9. Dr. Gavin Gunter	PCJ
10. Mr. Hopeton Heron	PCJ
11. Mr. Dwight DaCosta	Jamaica Public Service (JPSCo)
12. Mr. Audley Harris	Petroleum Corporation of Jamaica (PCJ)
13. Mr. Sam Davis	Head, Government and Regulatory Affairs, JPSCo
14. Mrs. Yvonne Barrett-Edwards	Ministry of Energy, Mining and Telecommunications
15. Mr. Stephen Sterling	PCJ
16. Mr. Conroy Watson	Senior Director, Energy, Ministry of Energy, Mining and Telecommunications
17. Dr. Philip Baker	Jamaica Bauxite Institute (JBI)
18. Dr. Cezley Sampson	Cabinet Office
19. Hon. Clive Mullings	Minister of Energy, Mining and Telecommunications
20. Mr. Stephen Wedderburn	Manager, Planning and Implementation Unit, PCJ
21. Mr. Raymond Silvera	Office of Utilities Regulations (OUR)
22. Mrs. Seveline Clarke-King	PIOJ
23. Mrs. Rose Marie Broadbell	PIOJ
24. Mr. Richard Lumsden	PIOJ

7.3 Appendix 3 – Listing of Task Force Meetings

- April 4, 2007
- April 18, 2007
- May 16, 2007 (Energy Sector Workshop)
- May 31, 2007
- June 6, 2007
- June 20, 2007
- June 27, 2007
- July 4, 2007
- July 26, 2007
- August 30, 2007
- September 6, 2007
- September 13, 2009
- October 25, 2007
- December 19, 2007
- March 19, 2008 (Energy Sector Workshop)
- May 29, 2008
- June 11, 2008
- June 16, 2008
- July 2, 2008
- January 15, 2009
- January 26, 2009
- February 5, 2009

7.4 Appendix 4 – List of Acronyms and Abbreviations

BOE	Barrel of Oil Equivalent
BSJ	Bureau of Standards Jamaica
CERE	Centre of Excellence for Renewable Energy
CNG	Compressed natural gas
CO	Cabinet Office
CXC	Caribbean Examinations Council
DBJ	Development Bank of Jamaica
ECE	Energy conservation and efficiency
ESSJ	Economic and Social Survey Jamaica
EXIM	Export-Import Bank of Jamaica
GDP	Gross Domestic Product
GOJ	Government of Jamaica
GWh	Gigawatt hours
IPP	Independent Power Producer

ITA	Island Traffic Authority
JBDC	Jamaica Business Development Centre
JBI	Jamaica Bauxite Institute
JEA	Jamaica Exporters' Association
JGRA	Jamaica Gasolene Retailers Association
JMA	Jamaica Manufacturers' Association
JPSCo	Jamaica Public Service Company Limited
JTI	Jamaica Trade and Invest
KMA	Kingston Metropolitan Area
kWh	Kilowatt hours
LA	Local authority
LNG	Liquefied natural gas
MDAs	Ministries, departments and agencies
MEM	Ministry of Energy and Mining
MFAFT	Ministry of Foreign Affairs and Foreign Trade
MFPS	Ministry of Finance and Public Service
MIIC	Ministry of Industry, Investment and Commerce
MIND	Management Institute for National Development
MOAF	Ministry of Agriculture and Fisheries
MOE	Ministry of Education
MOHE	Ministry of Health and Environment
MOT	Ministry of Tourism
MTW	Ministry of Transport and Works
NEPA	National Environment and Planning Agency
NWA	National Works Agency
NWC	National Water Commission
ODPEM	Office of Disaster Preparedness and Emergency Management
OPM	Office of the Prime Minister
OUR	Office of Utilities Regulation
PAJ	Port Authority of Jamaica
PCJ	Petroleum Corporation of Jamaica
Petrojam	Petrojam Limited
PIOJ	Planning Institute of Jamaica
RE	Renewable energy
REP	Rural Electrification Programme
SBAJ	Small Business Association of Jamaica
SRC	Scientific Research Council
TA	Transport Authority
UWI	University of the West Indies

7.5 Appendix 5 – Jamaica's Energy Demand Projections to 2030

The energy demand projections below are taken from Jamaica's National Energy Policy (Draft, July 8, 2009).

"Three growth scenarios have been developed to project future energy demand:

1. business as usual (S1)
2. implementing efficiency improvement and conservation programs (S2)
3. efficiency improvement plus fuel diversification (S3)

Under business as usual (assuming the price of oil at US$ 100/barrel in 2008 dollars), the cost of imported energy is projected to increase from US$2.7 billion in 2008 to US$4.6 billion by 2020.

The implementation of an effective efficiency improvement and conservation program is projected to reduce the energy demand by two million barrels of oil equivalent (boe) in 2015 and by 6 million boe in 2020. The resulting reduction in the energy import bill is projected at US$129 million in 2015 rising to US$555 million by 2020. The introduction of a national diversification program is projected to increase the annual savings by US$711 million in 2015 and US$1.7 billion by 2020. Investments in these programs are considered cost-efficient. The projection summary is presented in the Table below."

Jamaica's National Energy Policy (Draft, July 8, 2009), p. 18.

Table 6: Jamaica's Energy Demand Projections to 2030

Jamaica Energy Demand Projections - 2030										
	GDP Growth	Energy Demand Growth (% pa)			Energy Demand (Million boe)					
Year	%	S 1	S 2	S 3	S 1	S 2	S 3	S1	S2	S3
2005	1.0	6.5	6.5	6.5	28.0	28.0	28.0			
2006	2.7	3.9	3.9	3.9	29.1	29.1	29.1			
2007	1.4	0.7	0.7	0.7	29.9	29.9	29.9			
2008	-0.6	-7.0	-7.0	-7.0	27.8	27.8	27.8	27.8	2,613	2,613	2,613
2009	-2.3	-5.0	-5.0	-5.0	22.0	22.0	22.0	22.0	2,068	2,068	2,068
2010	0.1	0.2	0.2	0.1	22.0	22.0	22.0	22.0	2,072	2,072	2,068
2011	3.0	5.9	5.1	3.9	23.4	23.2	23.2	22.9	2,195	2,177	2,149
2012	3.0	5.9	5.1	3.9	24.7	24.3	24.3	23.7	2,325	2,288	2,232
2013	3.0	5.9	5.1	3.9	26.2	25.6	25.6	24.7	2,463	2,405	2,320
2014	3.0	5.9	5.1	3.9	27.8	26.9	26.9	25.6	2,609	2,528	2,410

Jamaica Energy Demand Projections - 2030											
	GDP Growth	Energy Demand Growth (% pa)			Energy Demand (Million boe)						
Year	%	S 1	S 2	S 3	S 1	S 2		S 3	S1	S2	S3
2015	5.5	10.9	9.4	7.2	30.8	29.4	29.4	27.5	2,893	2,764	2,582
2016	5.0	9.9	8.5	6.5	33.8	31.9	31.9	29.3	3,179	2,999	2,750
2017	5.0	9.9	8.5	6.5	37.2	34.6	34.6	31.2	3,493	3,254	2,929
2018	5.0	9.9	8.5	6.5	40.8	37.6	37.6	33.2	3,838	3,530	3,119
2019	5.0	9.9	8.5	6.5	44.9	40.7	40.7	35.3	4,218	3,830	3,322
2020	5.0	9.9	8.5	6.5	49.3	44.2	43.4	37.6	4,635	4,079	3,538
2021	5.0	9.9	8.5	6.5	54.2	48.0	47.1	40.1	5,093	4,426	3,768
2022	5.0	9.9	8.5	6.5	59.5	52.0	51.1	42.7	5,596	4,802	4,013
2023	5.0	9.9	8.5	6.5	65.4	56.5	55.4	45.5	6,149	5,210	4,274
2024	5.0	9.9	8.5	6.5	71.9	61.3	60.1	48.4	6,757	5,653	4,551
2025	5.0	9.9	8.5	6.5	79.0	66.5	65.3	51.6	7,425	6,134	4,847
2026	5.0	9.9	8.5	6.5	86.8	72.1	70.8	54.9	8,159	6,655	5,162
2027	5.0	9.9	8.5	6.5	95.4	78.3	76.8	58.5	8,966	7,221	5,498
2028	5.0	9.9	8.5	6.5	104.8	84.9	83.3	62.3	9,852	7,835	5,855
2029	5.0	9.9	8.5	6.5	115.2	92.1	90.4	66.3	10,826	8,501	6,236
2030	5.0	9.9	8.5	6.5	126	100.0	98.1	70.7	11,896	9,223	6,641
Growth Scenarios:		S 1 - Business as Usual (BAU)									
		S 2 - Efficiency Improvement Measures and fiscal Regimes									0.933
		S 3 - Efficiency improvement plus fuel diversification							**Increased Renewables**		
				22.0	22.0	22.0	22.0	2010	2,072	2,072	2,071
				23.4	23.2	23.2	22.9	2011	2,172	2,154	2,126
	Assuming 6% renewables.			24.7	24.3	24.3	23.7	2012	2,276	2,240	2,185
	GDP growth after 2020 constant			26.2	25.6	25.6	24.7	2013	2,384	2,328	2,245
				27.8	26.9	26.9	25.6	2014	2,498	2,420	2,307
			Renewables 12.5%	30.8	29.4	29.4	27.5	2015	2,693	2,573	2,404
				33.8	31.9	31.9	29.3	2016	2,942	2,775	2,545
				37.2	34.6	34.6	31.2	2017	3,214	2,994	2,695
				40.8	37.6	37.6	33.2	2018	3,512	3,230	2,854
				44.9	40.7	40.7	35.3	2019	3,814	3,464	3,004
			Renewables 15%	49.3	44.2	44.2	37.6	2020	4,191	3,758	3,199
				54.2	48.0	47.1	40.1	2021	4,578	3,979	3,387
				59.5	52.0	51.1	42.7	2022	5,001	4,291	3,586
				65.4	56.5	55.4	45.5	2023	5,430	4,601	3,774
				71.9	61.3	60.1	48.4	2024	5,823	4,871	3,922
			Renewables 20%	79.0	66.5	65.3	51.6	2025	6,319	5,220	4,125
				86.8	72.1	70.8	54.9	2026	6,944	5,664	4,394
				95.4	78.3	76.8	58.5	2027	7,630	6,145	4,679
				104.8	84.9	83.3	62.3	2028	8,385	6,668	4,983
				115.2	92.1	90.4	66.3	2029	9,214	7,235	5,307
			Renewables 20%	126.6	100	98.1	70.7	2030	10,124	7,850	5,652

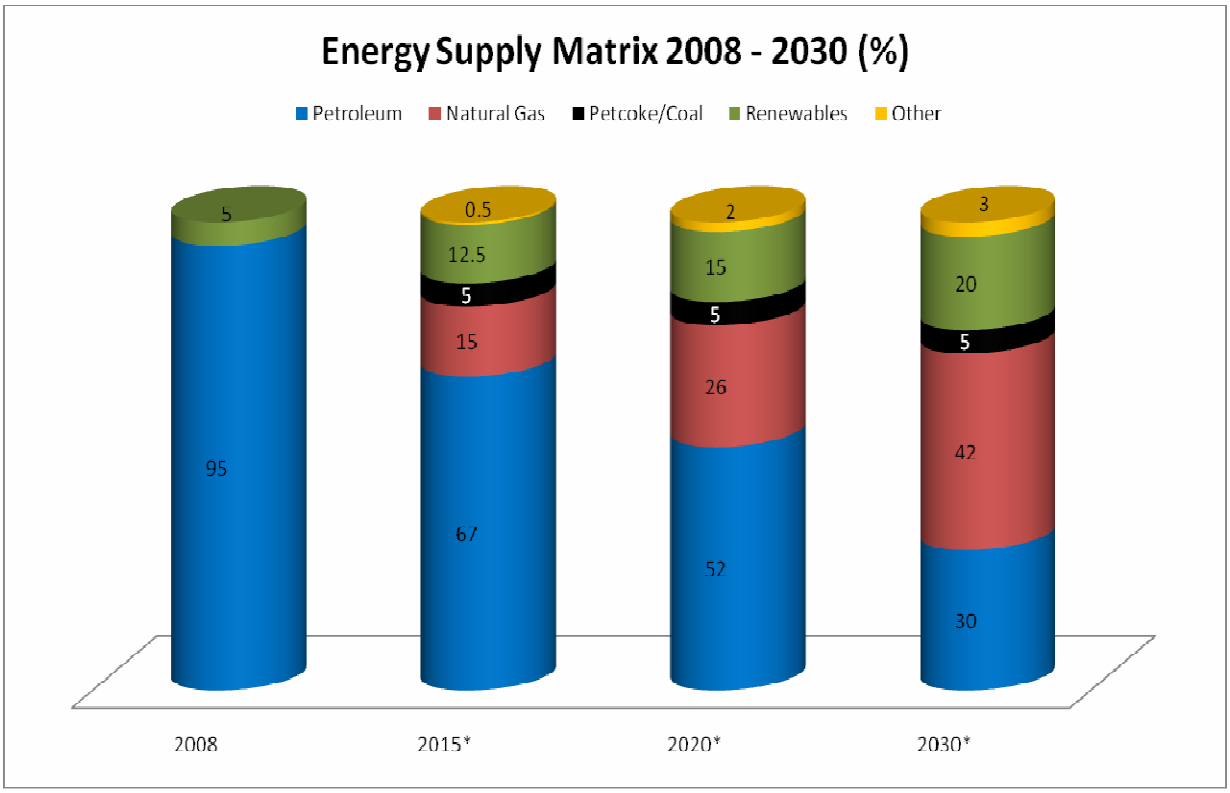
Source: Jamaica's National Energy Policy (Draft, July 8, 2009)

7.6 Appendix 6 – Jamaica's Energy Supply Matrix to 2030

The energy matrix below is taken from Jamaica's National Energy Policy (Draft, July 8, 2009), and presents projections for Jamaica's energy mix to 2030. It is noted that these percentages are subject to change based on the introduction of new and renewable energy sources.

> "The energy supply mix shows that in 2008 Jamaica's supply mix consisted of 95% petroleum and 5% renewables. The supply mix is expected to have marked changes by 2012 when petroleum is expected to represent 67% of the mix, natural gas 15%, petcoke/coal 5% and renewables 12.5%. By 2030, the share of petroleum in the supply mix is expected to be only 30%, with natural gas accounting for as much as 42% of the mix and renewables 20%. This information is present graphically in the figure below."
>
> Jamaica's National Energy Policy (Draft, July 8, 2009), p. 35.

Figure 1: Jamaica's Energy Supply Matrix 2008 – 2030



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