

MINISTRY OF ENERGY

ENERGY CONSERVATION & EFFICIENCY (ECE)

POLICY

2008-2022

An Addendum to the Draft Energy Green Paper 2006 – 2020

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List of Abbreviations

BOE	Barrel of Oil Equivalent
BSJ	Bureau of Standards Jamaica
Btu	British Thermal Unit
CARICOM	Caribbean Community
CDM	Clean Development Mechanism
CEIS	Caribbean Energy Information System
CI	Commercial and Industrial
CO ₂	Carbon Dioxide
DSM	Demand Side Management
ECEP	Energy Conservation and Efficiency Policy
ECE	Energy Conservation and Efficiency
ECLAC	Economic Commission of Latin America and the Caribbean
EER	Energy Efficiency Ratio
EEU	Energy Efficiency Unit
GOJ	Government of Jamaica
GWh	Giga Watt-Hour
HEART	Human Employment and Resource Training
HOV	High Occupancy Vehicle
JIE	Jamaica Institution of Engineers
JPS	Jamaica Public Service Company
KWh	Kilo Watt-Hours
LED	Light Emitting Diode
MEn	Ministry of Energy
MVA	Mega Volt-Ampere
MW	Mega Watts
MWh	Mega Watt Hours
NCU	Northern Caribbean University
NECEC	National Energy Conservation and Efficiency Centre
NHT	National Housing Trust
NWC	National Water Commission
OLADE	Latin American Organization for Energy
OUR	Office of Utilities Regulation
PCJ	Petroleum Corporation of Jamaica
RET	Renewable Energy Technology
SIC	Standard Industrial Classification
SRC	Scientific Research Council
T12	Tubular fluorescent lamp 12 x 1/8"
T8	Tubular fluorescent lamp 8 x 1/8"
UCC	University College of the Caribbean
UWI	University of the West Indies

Units and Conversion Factors

Tonne	=	Metric tonne (=1000 Kg = 2,205 lbs)
1 MWh	=	1.19 tonne of CO ₂ emissions
1 MWh	=	0.667 BOE

Executive Summary

Despite the rapid increase in world oil prices over the past five years and the record levels attained, Jamaica's energy consumption continues to increase at a much faster pace than the expansion of the economy. Over the period 2000 - 2006 the average increase in non-bauxite oil imports was 5.5%. At half of this rate of growth, in fourteen years (2022) the country's oil import will be approximately 50% higher than it is today.

Energy Conservation and Efficiency (ECE) remains Jamaica's only short term response to significantly impact the adverse energy situation. The Government is in the process of finalizing the Energy Green Paper and recognizes that ECE needs to be given priority attention. The Government has mandated the development of an Energy Conservation and Efficiency Policy, the subject of this document, to engage all sectors of the economy and all persons in the society in a coordinated and aggressive drive towards significantly reducing national energy consumption.

Past efforts at energy conservation and improved efficiency of use have not been sustained. The proposed Energy Conservation and Efficiency Policy (ECEP) identifies strategies to overcome the barriers to the implementation of ECE initiatives. In this regard, the ECEP recommends that a targeted approach be taken with emphasis on public awareness, provision of financing and the establishment of an appropriate institutional framework. The Government intends to lead by example, ensuring that the public sector implements ECE initiatives as a matter of urgency. The private sector will be engaged and encouraged to participate in this national drive.

When imports for the bauxite sector are excluded, the oil imports for powering the electricity and transportation sectors averaged 74.0% of the total oil imports over the period 2000 - 2006 (being 38.0% and 36.0% respectively). These two sectors will therefore be the major focus for the ECEP.

If the national target is set at 1.4 - 2.0% (or 292,231 - 427,635 barrels of oil) reduction per year, at the present 2.8% growth in demand, savings of 23.0% can be achieved by 2022 relative to the business-as-usual scenario. A target of 1.4% yields 292,231 barrels of oil savings per year. This however, is based on plant/equipment efficiency upgrade only. A 2.0% reduction is therefore seen as a reasonable target when all the other initiatives are taken into account. In order to maintain the 2006 level of oil imports for the non-bauxite sector (21,233,779 barrels) or to reduce the volume over time, it will be necessary that ECE efforts attain more than 3.0% (637,000 barrels of oil) reduction every year. The target (in percentage terms) set for various sectors and industries will of necessity be significantly higher than the national target, given the unevenness in energy saving potential across sectors and other sector specific issues.

The areas of focus in the proposed ECE policy include: public sector, private sector (households, industrial, commercial, and tourism), electricity, transport, codes and standards, energy conservation and efficiency market, renewable energy technologies, environment, institutional framework and technical capacity development. The salient policy and strategy recommendations of the proposed ECEP are:

PUBLIC SECTOR:

- Advancing ECE efforts towards a 10 – 15% reduction in use. Energy budgeting is strongly recommended;
- Mandating that new buildings fulfill the requirements of the building code and have solar water heaters and solar lights installed where applicable;
- Focusing on National Water Commission as the single largest consumer in the public sector, with intensification of loss reduction, improvement in pumping efficiency and introduction of a distributed storage programme which will facilitate better management of pumping operations;
- Targeting street lighting for efficiency improvement;
- Expediting the implementation of energy efficiency measures in hospitals and other areas of the public sector, based on the findings of various earlier studies;
- Establishing ECE protocols for the operation of public sector facilities including appointment of an energy coordinator for each facility.

PRIVATE SECTOR:

- Expanding the financing facility for householders to access solar water heaters, photovoltaic home systems and other ECE devices at low interest rates;
- Replacing incandescent lamps with compact fluorescent lamps in homes and businesses. There is significant potential for energy savings from the replacement of incandescent light with compact fluorescent bulbs.
- Encouraging the National Housing Trust to introduce ECE initiatives as a condition of home improvement loans; Other financing agencies are also to be encouraged to include as a requirement ECE efforts (e.g. energy audit of facilities) for loans at preferential interest rates;
- Implementing a programme for the efficiency branding of facilities – Tourism, Commercial, and Industrial sectors
- Providing financial and technical support for ECE implementation for Commercial and Industrial (C&I) sectors;
- Establishing targets for energy use reduction for large C&I enterprises. Some facilities will be deemed energy management facilities and will be required to appoint an energy manager, have an updated energy audit, and implement a system of tracking and reporting.

ELECTRICITY SECTOR:

- Encouraging the Jamaica Public Service Company (JPS) to make significant contributions to the ECE effort by intensification of its loss reduction effort, heat rate improvement strategies, implementing a customer power factor improvement programme and reintroduction of a load research programme.
- Implementation of a full scale demand side management programme is contemplated, with a target peak reduction of 30 MW.

TRANSPORTATION SECTOR

- Advancing and significantly expanding efforts under the National Transport Policy towards ECE from better traffic management in urban centres by utilizing a range of strategies which include but are not limited to: park-and-ride and car pooling.

- Establishing and implementing minimum fuel efficiency standards for imported vehicles;
- Re-establishing the rail transportation system or conversion of the rail corridor into a mass transit road way;
- Exploring the use of water transportation for moving cargo and persons around the island.

ENERGY CONSERVATION AND EFFICIENCY MARKET

- Stimulating the energy conservation and efficiency market by encouraging the establishment of small energy services and products enterprises such as designers, installers and after-sales service providers;
- Increasing the availability of ECE technological solutions by removing duties on ECE type equipment and devices.

INSTITUTIONAL FRAMEWORK

- Establishing specialized units within the portfolio Ministry to:
 - develop key indicators to measure the impact of ECE
 - assess and monitor the effectiveness of approved ECE measures for periodic policy review
 - design and promote timely public awareness messages according to energy consumption trends
 - Undertake economic analysis, modeling and forecasting energy demand for the transport and electricity sectors
- Expanding 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.

CODES, STANDARDS AND LABELING

- Promulgating the energy efficiency component of the recently revised and updated national building code as mandatory standards in Jamaica;
- Implementing a system of mandatory efficiency labeling of selected appliances e.g. refrigerators, air-conditioners, washers;
- Establishing minimum standards for air-conditioners and end use devices.

ENVIRONMENT

- Apart from the energy cost savings to be derived from the implementation of ECE, there are the benefits to the environment of reduction of gaseous emissions;
- ECE implementation also poses an environmental challenge in terms of disposal of materials and equipment which may contain materials which could be harmful to health. Measures to ensure the safe disposal of used products will be devised in support of the ECE policy.

ORGANISATION OF THIS REPORT

This policy document is organised in four chapters with supporting statistical data presented in three appendices.

Chapter 1, by way of an introduction, provides the background, it places in context the concept of energy conservation and efficiency and the general philosophy underpinning the approach taken in developing the policy recommendations. Barriers to implementation of energy conservation and efficiency measures are highlighted and it provides a brief statement on the methodology and approach used for the development of the policy.

An analysis of the ECE elements of the Energy Green Paper is presented in **Chapter 2**. There is a graphic presentation of forecasted oil consumption for three different scenarios compared with “business-as-usual”; annual reduction of 1%, 2%, and 3% up to 2022.

The institutional framework to support implementation of the several ECE policy initiatives is discussed in *Chapter 3*. The specific policy issues and recommendations with associated targets are described for the electricity sector and the public and private sectors. Transportation, building code, utility service metering, ECE market, and the environment are among other areas similarly treated. Where presented, targets are quantified according to the impact of the policy in terms of energy or capacity savings.

Chapter 4 presents in a tabular format the expanded list of the ECE devices and equipment for tax exemption, which is now being finalized.

There are two appendices. Appendix 1 provides historical data on petroleum imports and consumption according to sectors and activities. In Appendix 2, projected reductions in energy consumption by 2.5% and 3.5% for the NWC are tabulated for the period 2008-2022 with the base year being 2006.

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

In 2006, Jamaica imported approximately 31 million barrels of oil with just over 21 million barrels going to the non-bauxite sectors. The total oil import for the non-bauxite sectors in 2006 being 33.0% higher than that of 2000 largely driven by an increase in the demand for bunkering fuel (Appendix 1). The resulting 5.5% average rate of growth is higher than the growth rate in GDP of 1.7% over the same period. Should this rate of growth in demand continue, then in 2022 oil imports to the non-bauxite sectors would be 50 million barrels or 137% higher than the 2006 import levels. Should the rate of growth in demand be reduced by half, in fourteen years (2022) the country's oil import could be approximately 50% higher than it is today.

A new draft energy policy has been developed. This draft policy, now at the 'Green Paper' stage, makes several references to the importance of energy conservation and efficiency as part of the energy management strategy. It has however become necessary to expand the energy conservation and efficiency elements and to present these in this Energy Conservation and Efficiency Policy (ECEP). The ECEP is consistent with the Energy Green Paper and will give energy conservation and efficiency (ECE) the requisite focus and delineate a path for expedited and targeted implementation of ECE measures in all sectors of the society.

It is appropriate that immediate focus be turned to the implementation of ECE at this time given that conservation and efficiency measures represent the only short term response to the growing energy crisis for oil dependent countries like Jamaica.

Harnessing energy from renewable sources is an important initiative and specific targets have been established in the Energy Green Paper. The Government is fully committed to the development of renewable energy resources as part of the energy diversification strategy. In keeping with this commitment the Government established a Centre of Excellence for Renewable Energy within the the Petroleum Corporation of Jamaica to conduct reviews of renewable energy technologies (RET), evaluate RE proposals and provide technical support for RE initiatives. This document therefore does not elaborate on RE policy initiatives.

1.2 ENERGY CONSERVATION AND EFFICIENCY

The terms energy efficiency and conservation have been used interchangeably and in some cases energy practitioners have sought to use both in order to ensure that they are comprehensive. In this document this approach will be taken.

Energy efficiency may be defined as a combined set of actions to take advantage of all benefits of improved utilization of energy without sacrificing comfort or economic production, but at the same time reducing the amount of energy supplied. Energy efficiency does not necessarily mean deprivation.

Energy conservation traditionally emphasizes reducing use or cutting back on energy input. In this regards many persons opt not to use this as it may connote deprivation. However, the term, in the broadest sense, covers the greater stewardship of utilization of energy. In order to be comprehensive, in this document, both terms are utilized in the expression *energy conservation and efficiency (ECE)*.

1.3 CONTEXT OF THE CURRENT ENERGY CONSERVATION AND EFFICIENCY POLICY

Over the years, progress has been made in the area of national ECE efforts, but in most cases these were short lived and not sustained.

- There is a need for strong and sustainable ECE efforts. An opportunity is presented for the government to lead by example, given the fact that the public sector uses a significant amount of energy resources.
- Given the many ECEP initiatives of the past and the elapsed time since the onset of this era of high oil prices, there is impatience for appropriate interventions to contain the growth in demand. It is necessary for the proposed ECEP to reflect an aggressive and expedited approach to communicate a clear message that the current effort will be meaningful.

1.4 BARRIERS TO THE IMPLEMENTATION OF ENERGY CONSERVATION AND EFFICIENCY

Many studies over the years have identified major barriers to the implementation of ECE initiatives in developing countries on a sustained basis. The generic barriers include: technical, informational, financial/economic, managerial/entrepreneurial and organizational, risk and/or uncertainties, and policy and legal/regulatory. All of these barriers are relevant to Jamaica. In addition, traditional attitudes and inertia influenced by cultural norms are among other factors that thwart the meaningful adoption of ECE measures.

1.5 WHAT MUST BE DIFFERENT THIS TIME?

The ECEP recommends measures to overcome the major barriers within the framework of macroeconomic objectives. In view of skepticism about ECE, the ECEP needs to be targeted, must address the matter of financing, place much emphasis on information dissemination, have an appropriate institutional framework and address the importance of timely and reliable energy information to inform the planning process for all sectors of the economy and monitor the impact of recommended interventions.

This proposed ECEP offers recommendations in support of each policy measure. Importantly, the strategies have realistic targets with corresponding implementation schedules. Monitoring and evaluation will be important to inform timely and appropriate adjustments in keeping with the ECEP objectives.

1.6 METHODOLOGY AND APPROACH

In keeping with the major objectives of the ECEP which are to improve efficiency in energy use and promote conservation, several policy measures are proposed.

To achieve the objectives, a review of the relevant sub-sectors/areas was undertaken to assess the energy efficiency status and the potential gains from ECE measures while taking into account the relevant issues and barriers to be addressed. There was extensive review of energy statistics and other relevant data, analysis of several studies and consultation with key stakeholders. The issues and barriers identified as well as the policy interventions proposed reflect the result of this approach. It is anticipated that the document will be strengthened following the Parliamentary debate.

CHAPTER 2:

A. OVERVIEW OF THE ECE PROVISIONS OF THE ENERGY POLICY GREEN PAPER (2006 – 2020)

ECE IN THE DRAFT ENERGY POLICY

The Energy Green Paper recommends energy conservation and efficiency measures in the areas of:

- Electricity – generation, transmission and distribution as well as consumption at the levels of commercial, industrial and residential users;
- Road transportation and vehicle fleet;
- Production and distribution of water.

Further the recommendations recognize:

- The importance of extensive and sustained public education programmes to encourage lifestyle changes;
- A need for firms and public sector entities to publish timely and accurate energy related information;
- The value of establishing efficiency standards for buildings and equipment.

Comments

The gravity of the energy situation means the ECE has to be treated as a matter of urgency. This dictates that immediate attention is placed on mitigating the negative impact of rising oil prices. Therefore the energy conservation and efficiency element of the Energy Green Paper was expanded to include specific targets and timelines for implementation which is represented in the ECEP, covering the period 2008 – 2022. **This document is an addendum to the Energy Green Paper.**

B. BRIEF ANALYSIS OF THE ECE POTENTIAL

ENERGY CONSERVATION AND EFFICIENCY POTENTIAL

Energy Consumption Forecast:

The energy consumed by the non-bauxite sectors amounted to 20 million barrels in 2006. The electricity and road transportation sectors combined accounted for 65% of total petroleum consumption for Jamaica. These two sectors offer tremendous potential for improved levels of efficiency in energy use. Figure 1.1 below summarizes Jamaica's total oil consumption (2000 – 2006) and forecasts consumption for up to 2022 (using regression analysis). The graph shows that in spite of rising fuel prices, oil consumption has not shown any major declines (except in 2004 the year of Hurricane Ivan).

The trend line, which results in a conservative 2.8% growth rate, indicates that oil consumption in 2022 will be significantly higher than present (approximately 50.0%). However, the implementation, monitoring and maintenance of adequate ECE initiatives can influence this unfavourable trend in the energy consumption forecasts

ECE Scenarios: After plotting the results of conducting business as usual, three scenarios are developed in Figure 1.1 illustrating the effect on consumption from implementing ECE initiatives. The scenarios include forecasted trends based on the application of ECE interventions that result in a 1%, 2% and 3% reduction in energy consumption per annum (see Appendix 1 for data showing Jamaica’s Oil Imports and Consumption).

Summary of Scenarios and ECE Intervention Savings

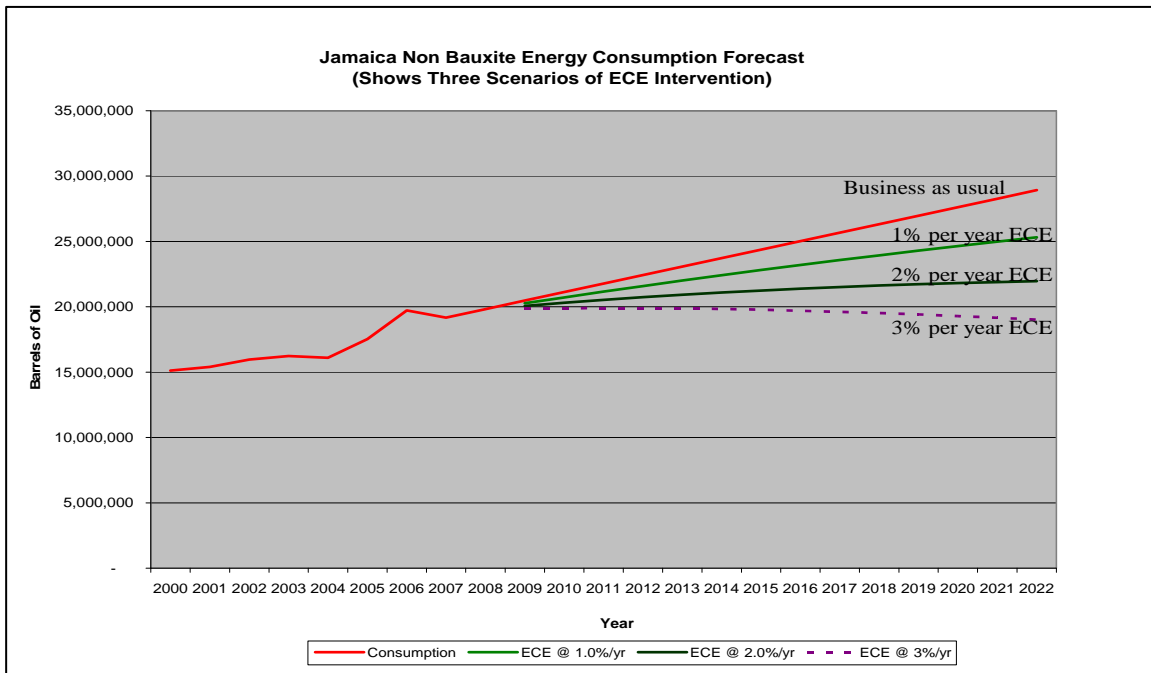
	Scenario 1 (1% reduction)	Scenario 2 (2% reduction)	Scenario 3 (3% reduction)
Decrease in consumption in 2022	12%	24%	34%
Average savings p.a.	> 200,000 barrels of oil	> 400,000 barrels of oil	> 700,000 barrels of oil

Scenario 1: ECE intervention which results in 1% p.a. reduction in petroleum consumption and a decline in energy usage of 12% in 2022, relative to the business as usual case. This represents an average savings of 200,000 barrels of oil per year over the period of the study.

Scenario 2: ECE intervention which results in 2% p.a. reduction in petroleum consumption and a decline in energy usage of 24% in 2022, relative to the business as usual case. This represents an average savings of 400,000 barrels of oil per year over the period of the study.

Scenario 3: An ECE intervention which results in 3% p.a. reduction in consumption every year over the previous year starting in 2009 will allow the energy usage in 2022 to remain essentially flat at the 2006 - 2007 consumption (a natural growth rate of 2.8% is assumed based on historical trending).

Figure 1.1: Jamaica’s Non-Bauxite Sector Oil Consumption: 2000-2022



Energy Savings Target for National Energy Conservation & Efficiency Policy

The Government is committed to significantly reducing Jamaica’s fossil fuel dependence by diversifying the energy base to include renewable energy and by promoting ECE initiatives. The scenarios indicate that a moderately aggressive and sustained national ECE effort will achieve considerable benefits for the next fourteen years. The forecast and analysis from current consumption trends indicate that a minimum average of 2% reduction per annum should be set in this policy as the national target.¹ A target of 1.4% savings per year (savings in excess of 200,000 barrels per year) can be achieved through fervent ECE efforts aimed at upgrading the efficiency of plant, equipment and end-use devices. Further, in order to reduce energy consumption below current levels, ECE interventions which result in annual savings in excess of 3% pa is necessary.

ADDITIONAL BENEFITS OF ENERGY CONSERVATION AND EFFICIENCY IN JAMAICA:

There are numerous benefits to be derived from implementing ECE in Jamaica. ECE reduces oil dependence and the demand for foreign currency to make oil payments. It generates savings which can be utilized for urgent social programmes and developmental activities. In very tangible terms energy conservation and efficiency can provide immediate cost savings. A mere 1% reduction in the country’s energy bill will mean that approximately US\$20 million (\$J1.4 billion) would be made available every year for spending on necessary social programmes.

¹ The 2.0% reduction per year may prove more achievable in the short term against the background of challenges to the implementation of ECE interventions.

With the establishment of the Clean Development Mechanism (CDM) under the Kyoto Protocol ECE can provide further benefits to the economy by the trading of carbon credits derived from the implementation of energy efficiency projects.

CHAPTER 3: DISCUSSION OF POLICY ISSUES & RECOMMENDATIONS

INSTITUTIONAL FRAMEWORK

3.1 POLICY ISSUE: NEED FOR INSTITUTIONAL ARRANGEMENT TO SUPPORT ECE IMPLEMENTATION

3.1.1 Discussion:

Considering the critical importance of energy conservation and efficiency there needs to be an appropriate institutional arrangement to support the various initiatives as well as to measure the impact of the initiatives on the energy sector. Of necessity, several agencies will be involved. These include the portfolio agencies of the energy Ministry, other Ministries and agencies of the Government as well as local, regional and international organizations. The roles and responsibilities of the participating agencies must be well defined to minimize duplication of efforts and areas of omission. Importantly the roles and responsibilities must be complementary and in accord with the overall objectives of the ECEP.

3.1.2 Policy Recommendation:

The Ministry of Energy has general responsibility for policy formulation and review, energy planning, monitoring and research among other things. With the emphasis on ECE the role of the Ministry will be expanded to:

- develop key indicators to measure the impact of ECE initiatives
- assess and monitor the effectiveness of approved ECE measures for periodic policy review
- design and promote timely public awareness messages according to energy consumption trends, and
- undertake economic analysis, modeling and forecasting energy demand for the transport and electricity sectors.

Government will expand the roles and functions of the present EEU within the PCJ to establish a National Energy Conservation and Efficiency Centre (NECEC) which will provide technical assistance at the national level. The Ministry of Energy will provide policy directives to guide the work of the NECEC.

The NECEC will be the coordination centre and will:

- Undertake pre-feasibility studies;
- Offer consulting services
- Design programmes/projects for the public sector;
- Provide guidance to manage retrofit projects for the public sector;
- Implement a sustained Public Awareness Programme;
- Manage and disseminate ECE information;
- Monitoring of ECE-standards
- Monitor and track performance of programmes and activities.

3.1.3 Target/Schedule:

A complete review of the technical capacity and levels at which the staff of the Ministry is positioned is to be undertaken and appropriate action taken to ensure adequacy, with immediate effect.

The NECEC is to be established by April 1, 2009 in order to facilitate the implementation of ECEP recommendations.

3.2 POLICY ISSUE: **THERE IS NEED FOR GREATER EMPHASIS ON GOOD DATA COLLECTION TO GUIDE ANALYSIS, POLICY DEVELOPMENT AND PLANNING.**

3.2.1 Discussion:

The economic growth and development of the country will require greater utilization of energy. As a result, improvement in energy productivity and overall efficiency are paramount and should not be viewed against the background of simply reducing the national energy consumption or of keeping this constant but rather that ECE interventions are sustained over time.

Timely and accurate information for various aspects of the energy system are a hallmark of countries which have successfully implemented ECE policies, programmes and strategies. It is important that disaggregated energy data be readily available in a user-friendly manner in order to support policy formulation and planning, economic analyses and feasibility studies. In this regard, data capture systems should be standardized to allow for meaningful comparison and analyses. The systems will be reviewed periodically to ensure relevance.

In order to enhance the stock of good quality data, it is necessary for timely and on-going research to be done in order to understand various trends and behaviours in sub-sectors or market segments impacting overall energy consumption patterns. Many entities in the energy sector are uniquely positioned to provide good data. The electric utility should be able to provide usage profiles for customers in various categories and sub-categories in manner that allows for clear interpretation. The customs department should capture Manufacturers' stated performance and other data on motor vehicles and end-use devices.

3.2.2 Policy Recommendations:

- The portfolio Ministry will strengthen its capacity to collect and manage energy data while being cognizant of the need to preserve the data and respecting confidentiality. It will periodically make available energy information in a manner that is sensitive to commercial and competitive issues.
- Critical stakeholders in the energy sector will be required to submit on a timely basis accurate energy related data
- Government will require that all its agencies periodically review data capture systems to ensure consistency and relevance for policy formulation and planning.

3.2.3. Proposed Target:

This initiative will begin immediately with a review of the energy data needs in order to fill the gaps in the existing data capture system.

3.3 POLICY ISSUE: ENERGY CONSERVATION AND EFFICIENCY INFORMATION CLEARING HOUSE

3.3.1 Discussion:

One major barrier to ECE is the unavailability of reliable and relevant information from a central location to inform decisions. Stakeholders should have easy access to information such as: list of ECE tax-exempt items, appliance energy performance data, technological options, list of ECE options for various applications, contact information for certified ECE technology installers, general self help tools, case studies, performance standards and best-practices, expert advice, and interactive energy analysis tools. The provision of this kind of information is critical to transforming all sectors of the economy towards greater implementation of ECE measures.

At present, energy information is available from various sources: the portfolio Ministry, several agencies of government, educational institutions and via the internet. The existing energy information resources need to be rationalized and expanded to fulfill the objective of an **energy information clearing-house**. Importantly, the quality of the information needs to meet established standards and the relevance of ECE options to the local environment needs to be verified.

Access to this energy information clearing house will empower the various stakeholders to effect relevant measures to achieve sector/industry ECE targets towards the national goal for ECE reduction of an average of 2% in national energy use.

3.3.2 Policy Recommendation:

- The government will establish a focal point in the portfolio Ministry for ECE related information. This information will be easily accessible and available in a user-friendly format.
- Information and communication technologies will be utilized to manage, evaluate and publish energy related information.
- Subscribers to the database will be given access at different levels.

3.3.3 Proposed Target:

Work to establish the Energy Information Focal Point will begin in 2008.

3.4 POLICY ISSUE: NEED FOR ECE PUBLIC EDUCATION

3.4.1 Discussion: A relevant and sustained public energy information programme will be important in communicating the message of the importance of ECE. Well placed public information can be an effective tool for changing lifestyle and culture toward being more energy efficient.

There are efforts being made by various players in the sector to provide public ECE information and this must be encouraged. Although ECE sensitization occurs, there is need for a strategic, coordinated and systematic approach. There will be greater value from synergy among individual players such as the Ministry, JPS, other government and non-governmental organizations

All persons, including householders, business persons, professionals, informal traders, farmers, drivers, public transport operators and students need to be sensitized so that better choices and more efficient behavioral changes can be implemented. A special opportunity exists for integrating ECE efforts in the educational system.

All available media should be utilized in communicating the relevant information to the various target groups in this thrust to significantly change energy use patterns in Jamaica. In order to minimize costs, alliances must be forged with the media.

3.4.2 Policy Recommendations:

- An ECE Public Education Taskforce with membership drawn from critical sectors of the society will be established. Government will encourage cooperation among the governmental and non-governmental sectors to promote consistent energy awareness messages, targeting specific sectors to influence lifestyle/cultural shifts.
- ECE and renewable energy material will, through a collaborative process, be developed and made available for introduction in the school system beginning at the secondary level using the infrastructure being established for the e-Learning project.

3.4.3 Proposed Target:

The Minister of Energy will commission a Public Education Taskforce within six months of the establishment of the NECEC.

The portfolio Ministry will, through the NECEC, provide appropriate material in electronic format for introduction at the secondary school level in September 2009.

HUMAN RESOURCE DEVELOPMENT - EDUCATION & TRAINING

3.5 POLICY ISSUE: NEED FOR THE PROVISION OF EDUCATION, TRAINING & HUMAN RESOURCE DEVELOPMENT IN SUPPORT OF ECE

3.5.1 Discussion:

Implementation of recommendations to improve energy efficiency from building designs, electrical installations and energy consumption by end use devices will of necessity require capital investments. These recommendations must therefore be sound.

There is a general shortage of well trained and certified ECE practitioners in Jamaica to undertake studies and audits aimed at determining the efficiency of energy use, as well as to design, install and maintain energy efficiency systems and programmes and calculating payback for capital investments. It will be important to provide appropriate training and apprenticeship experience to build a cadre of professionals at different levels to support a sustained national ECE programme. Local professional bodies should be encouraged to participate.

3.5.2 Policy Recommendation:

- Vocational and tertiary level institutions will be encouraged to introduce ECE related course options, which should include strong practical elements and with appropriate certification.
- Public and private sector institutions and professional bodies will be invited to participate in the apprenticeship programme
- A database of the certified professionals should be maintained by portfolio Ministry.

3.5.3 Proposed Target:

To have active and readily accessible training programmes at HEART NTA, NCTVET and at tertiary institutions such as UWI, UTECH, NCU, UCC and teachers colleges.

ELECTRIC UTILITY

3.6 POLICY ISSUE: NEED FOR CONTRIBUTION TO THE ECE EFFORT BY ELECTRIC UTILITY - JPS

3.6.1 Discussion:

The National Energy Policy Green Paper: 2006 – 2020 makes specific reference to the importance of energy efficiency measures in power generation and in transmission and distribution. Section 4.4.3 deals with the “*Need for Heat Rate to be Consistent with International Standards*”. The “*Need to Optimize Efficiency of Transmission and Distribution of Electricity*” is discussed in section 4.4.5. Related policy recommendations are offered in the respective sections.

The major electric utility company implemented a pilot demand side management (DSM) programme which was terminated in 2000.

3.6.2 Policy Recommendation:

- The Government will encourage the electric utility company to implement supply side efficiency improvement programmes (see Sections 4.4.3 and 4.4.5 of the National Energy Policy Green Paper), a load research programme, an improved system of classifying customers and a power factor improvement programme. The Government will further encourage the company to intensify the programme to reduce technical and non-technical system losses.
- The Government will also encourage the company to develop integrated resource capacity planning especially in relation to the technology options and citing of power plants.
- Lessons from the pilot DSM programme should be used to design a new programme for full scale implementation.

3.6.3 Target /Schedule:

All large commercial and industrial customers are to have power factor improvement resulting in a system demand savings of 50MVA over five years.

A one percent per annum improvement in plant efficiency in the electric utility company is proposed over the next ten years to 2018.

An approximate 2 - 4% reduction in system peak demand or 15-30 MW over a five year period is targeted.

PUBLIC SECTOR

3.7 POLICY ISSUE: NEED TO IMPROVE ENERGY EFFICIENCY IN THE GOVERNMENT SECTOR

3.7.1 Discussion:

The government has determined that energy consumption is to be reduced by 15% in the short to medium term. This will require significant expenditure for energy audits and for implementation of retrofits in order to reduce the recurrent spend for energy. In this regard, there has to be a paradigm shift to focus on making timely investments designed to achieve energy savings across the government. Conservation and efficiency in the transport sector is treated separately in this document.

To realize the benefits of ECE measures in the public sector, staff will have to be fully engaged in the process. To this end, relevant ECE management protocols will be important and mechanisms developed for accountability and reward.

The total public sector electricity bill for 2006 was approximately J\$6.3 billion for 410 million kilowatt hours (kWh). In kWh terms, the National Water Commission consumed 47%, street lighting about 19% and public buildings including hospitals 28%. Another 6% is attributable to other areas including public parks and stadia.

Electricity for Water

In order to meet the increasing demands for potable water, the energy demand by the NWC will increase. The challenges related to insufficient water storage capacity must be addressed; the Company is unable to take advantage of load management techniques which utilize off peak pumping and pumps now operate for much longer periods than would be otherwise necessary. In addition, the NWC experiences a high percentage of non-revenue water (68% in 2006). Importantly, the average unit cost of electricity used by NWC in 2006 was \$13/kWh which is lower than the JPS system average of \$16/kWh. This means that the NWC system operates at a fairly high electrical load factor (i.e. long average operating hours).

Electricity for Street Lighting

During the period 2000 – 2006, the energy consumption for street lighting increased by an average of 2% per annum. With new housing developments, the fear factor aggravated by crime levels and the expansion of electricity to more remote communities, this growth trend is expected to continue.

JPS standard requires that high pressure sodium lights are installed on roadways. This type of high pressure discharge lighting is the most efficient of the high intensity discharge lights. Wattages range from 70 - 400W on highways. Two concerns are frequently expressed; defective lights are not replaced in a timely manner and, high incidents of defective photocells which allow lights to be left on through the day.

The compact fluorescent technology has matured significantly and high-output compact fluorescent lamps (CFLs) with power rating ranging from 65 - 100W are being used increasingly to replace high intensity discharge lights for outside security lights. The 65W and 85W fixtures are used to replace 300W and 400W incandescent equivalent respectively. While the use of CFL replacements is recommended for all types of road ways especially highways (owing to the height of the fixtures above ground and the characteristics of the fixtures), these can also find useful applications for secondary roadways and community street lighting which comprise the largest percentage of the street lighting installations in Jamaica.

There are approximately 100,000 street lights consuming about 66,000 MWh per year. The average power rating per lamp is approximately 100W.

Solar street lighting has significant potential for cost savings, however experience has shown that securing the installations will be an issue; solar lights installed in Ocho Rios by the PCJ some years ago road were pilfered. Light Emitting Diodes (**LED**) lighting for roadways is now being explored in many first world countries but is not yet being used in any significant way commercially.

The total energy consumption by traffic lights is relatively small, accounting for only 0.4% energy consumed by the public sector and the Ministry of Transport has been installing LED technology for street lights. There is however, an opportunity to install solar photovoltaic (PV) powered traffic lights to minimize traffic congestions at major intersections, with the attendant waste of fuel, during periods of an interruption of the electricity supply.

Electricity for Public Buildings

The electricity use for government facilities including offices for the Ministries and Agencies, Schools, Police Stations and Correctional Institutions represent approximately 19% of total electricity consumption in the public sector while consumption by hospitals account for an additional 9%. An ECE project for hospitals has been initiated and this will be completed.

Energy audits have been completed for several government buildings and, excluding that for office spaces, the data indicates that the potential for energy savings ranges between 25 - 40%. In cases where the facilities are owned by government then effective ECE measures may be implemented without much difficulty. There are however, some special challenges to implementing ECE measures in locations where there is a high degree of interface with the public, where the space occupied is rented/leased and electricity charges are prorated among several unrelated entities and for facilities that are used for public events.

Even without the benefit of energy audits, there are some “low hanging” opportunities to immediately reduce energy consumption in government facilities: as matter of course, as electric end use devices are replaced, energy efficient ones should be installed; and, unplugging of electric equipment when not in use. A heightened awareness of other energy conservation practices such as using natural lighting and ventilation should produce measurable results as well.

When the audit was undertaken for the Hospitals, it was determined that ECE measures could reduce consumption in some facilities by up to 40%. The measures identified include, generally improved operations and maintenance, retrofitting of lighting and air-conditioning systems, power factor improvement, motor replacements, insulation of boiler systems and sensitization of staff for more efficient practices. The opportunity for ECE improvement from *low cost or no-cost* measures in the Hospitals is determined to be in the range of 7 – 15% with average simple payback of two years.

3.7.2 Recommendations

- Each public sector entity will be required to appoint an energy manager/coordinator who will be trained in energy management techniques to allow for tracking, analysis and reporting of energy use information on a periodic basis
- Publish, within three months of the end of the fiscal year, annual reports on the energy consumption profile of the government
- Develop and implement procurement policy guidelines and efficiency standards for equipment
- Prepare protocols for the efficient management of energy consumption for all government facilities, taking account of the peculiarities associated with rented/leased spaces, public parks and stadia, schools, hospitals and correctional facilities among others
- All facilities will be required to operate in compliance with the protocol and members of staff will abide by guidelines;
- On a phased basis, undertake energy audits and prepare projects/programmes for improvement on a short, medium and long term basis, for all government occupied facilities
- Based on the recommendations of the energy audits, each entity will make budgetary provision to install retrofits as necessary
- Design and mount ECE awareness campaign within the government.
- The provisions of the building code and other relevant ECE standards will be enforced in the public sector;
- Government will rationalize the institutional framework for procurement in hospitals to ensure that ECE is a major focus in the areas of:
 - operations & maintenance support, and
 - equipment and technical services
- NWC, being the single largest energy consumer in the public sector, is to implement an aggressive programme of water and energy efficiency including but not limited to:
 - water loss reduction
 - distributed water storage
 - high efficiency motor replacement
 - Demand Side Management Programme for customers.
- Government will actively pursue discussions with the electric utility company to institute a systematic programme for the upgrade of **street lights** with more efficient technologies.
- Government will continue to pursue strategies for improving the efficiency of traffic lights by using LED technology complemented with photovoltaic power supply as appropriate.

3.7.3 Targets/Schedule:

The potential for conservation and efficiency in the different areas of the public service and the associated costs to achieve reductions in energy consumption is varied. Importantly, the timelines to achieve the targets will depend on the level of budgetary support.

Demand growth for water supplied by the NWC is estimated to be 2.5% and efficiency improvements should reduce consumption by 3.5 % to result in a net reduction of energy consumption of 1% on an annual basis. The efficiency improvements (million litres/kWh) translate to savings of 7,600 MWh per annum over the next fifteen years.

With implementation of ECE projects in government facilities, a target of 10% reduction is proposed. The savings could translate to 6,000 MWh/year. The related initiatives will begin in 2008.

Replacement on an annual basis of approximately 5% of the bulbs in street lights with energy saving bulbs will translate to savings of 1,700 MWh per year annum.

Studies carried out in hospitals showed that it is possible to reduce energy use in public hospitals by approximately 40% or 14,000 MWh/year. The programme which is already underway will be continued.

PRIVATE SECTOR:- Commercial & Industrial (C&I) and Tourism Sectors

3.8 POLICY ISSUE: THE NEED TO IMPROVE EFFICIENCY IN COMMERCIAL & INDUSTRIAL AND IN TOURISM SECTORS

3.8.1 Discussion:

In general, up to 15% energy savings could be achieved by implementing low/no cost operations and maintenance type measures. Where ECE interventions had previously been implemented, the savings would be at the lower end. Wide experience in the C&I Sector in Jamaica suggests that 5-10% reduction in energy consumption could be attained with modest effort.

Generally, commercial and industrial facilities do not have a coordinated and systematic approach to energy management at their facility and many of these facilities have never conducted an energy audit and so do not know the potential for savings.

The table below summarizes the 2006 electricity sales to the various categories of customers and presents two scenarios for savings/reduction.

Electrical Energy Use -2006 and Potential Energy Savings

Category - JPS Customers	Energy Usage 2006 (MWh)	Percentage Share of Total (%)	Energy Savings Scenarios	
			5% Scenario (MWh)	10% Scenario (MWh)
Small Commercial - General Service	650,412.70	20.84	32,520.60	65,041.30
Power Service - Commercial	765,226.70	24.52	38,261.30	76,522.70
Large Power - Industrials & Commercials	505,542.90	16.20	25,277.10	50,554.30
Residential	1,108,206.30	35.51	55,410.30	110,820.60
Street and Traffic Lights	91,280.40	2.93		
Total Energy (MWh)	3,120,669.00		151,469.30	302,938.90

Source: Derived from Energy Economics, Ministry of Energy Tables

The main barriers to implementation of efficiency measures in the commercial and industrial sectors are lack of financing, limited knowledge about the technological solutions available and, how to quantify the savings from recommended interventions. Access to low cost financing will facilitate energy audits, development of appropriate strategies to address ECE opportunities and funding for the measures that have been identified.

The small commercial customers, which include supermarkets, retail shops, gas stations, restaurants, and light manufacturing constitute the largest segment of the C&I market numbering approximately 58,000 accounts and 21% of the energy consumed by JPS customers. This category must be targeted for ECE improvements since energy cost translates directly into the pricing of goods and services.

The large commercial segment of the market consists of approximately 1,500 JPS accounts and accounts for 25% of energy sales. There are also 101 'very large customers' who accounted for 16.7% of the energy sales in 2006.

3.8.2 Policy Recommendation:

- The Government will pursue a range of creative measures including consultations, competitions and energy efficiency branding to encourage commercial and industrial facilities to achieve reduction in energy use by installation of ECE measures.

Branding will consider the extent to which entities implement measures to improve efficiency in basic operations, improved maintenance and staff sensitization. It will further consider retrofits as recommended from energy audits.

- Commercial and Industrial facilities over a certain size and annual budget, will be deemed to be energy management facilities and will be encouraged to implement measures such as:
 - Appoint an energy manager;

- Conduct a comprehensive energy audit and implement recommendations from these;
- Submit relevant energy consumption reports on a periodic basis;
- Conduct ECE sensitization of all levels of staff;
- Participate in facility energy performance competitions which will rate the facilities according to measures implemented.

3.8.3 Targets/Schedule

A 5 – 7% savings per annum is targeted for various segments of the electric consumption sector. The table below summarizes the energy savings target for the various categories of customers of JPS.

Projected energy saving to be derived from Strategies in the Electric Sector

Category - JPSCo Customers	Energy Usage	Target Annual	Target Annual
	2006 (MWh)	Savings (%)	Savings (MWh)
Small Commercial - General Service	650,412.70	5.00	32,521.00
Power Service - Commercial	765,226.70	7.50	57,392.00
Large Power - Industrials & Commercials	505,542.90	7.50	37,916.00
Residential	1,108,206.30	7.50	83,115.00
Total Energy (MWh)	3,029,388.60		210,944.00

Source: Derived from Energy Economics, Ministry of Energy Tables

The total energy savings for the commercial sector is 128,000 MWh/year. Low level implementation is to begin in 2008.

3.9 Tourism Sector

3.9.1 Discussion:

It was not possible to disaggregate electricity consumption by the hotel sector from published reports. It is however a reasonable assumption that there are significant opportunities for ECE within this sector. The total room stock in the tourism sector now number approximately 28,000. This industry is a high user of electricity for air-conditioning, lighting, refrigeration, for heating water, for treating swimming pools and for laundry services. Electricity to provide treated water from the public water system would be included in the statistics presented for the NWC.

As new properties are developed and existing ones are upgraded and refurbished, technologies geared to reducing electricity consumption should be deployed. In addition, there should be a systematic programme for all tourist facilities to convert from electric water heating systems to solar.

Hoteliers are familiar with the concept of having their facilities involved in competition and subject to scrutiny and inspection. It is therefore believed that hotels would be particularly amenable to participating in efficiency branding and energy efficiency competitions.

Larger hotels would also fall into the category to be classified as 'energy management facilities' and would therefore be required to comply with the recommended measures.

3.9.2 Policy Recommendation:

- Hotels should be required to satisfy certain basic ECE requirements to be eligible for any special Government incentives.
- Properties should install solar thermal systems for water heating.
- The entities need to conduct energy audits.
- Hotel properties should be subject to periodic inspections by a regulatory authority to assess energy efficiency standards.
- Designs for upgrade and new properties should be assessed for utilization of energy efficiency devices and compliance with ECE provisions of the building code.

3.9.3 Target/ Schedule:

Properties in the tourism sector should reduce electricity consumption by 10% in the first year and thereafter targets established for each property based on the outcomes of the energy audits.

PRIVATE SECTOR:- Residential

3.10 POLICY ISSUE: NEED TO IMPROVE RESIDENTIAL ENERGY EFFICIENCY

3.10.1 Discussions:

The attitude of householders towards ECE varies depending on factors such as awareness, affordability and the extent to which standards are maintained in the ECE market. These factors present real barriers to the implementation of ECE measures in the residential sector. Analysis of household buying patterns in Jamaica indicates that most householders still purchase the major appliances such as lamps, air-conditioners, refrigerators and stoves on the basis of cost rather than the life span of the appliance or the efficiency of operation. In view of this trend, a combination of specific policy initiatives should be pursued to address the challenges facing this sector. Initiatives such as a sustained ECE awareness campaign, mandatory energy efficiency labeling for electrical equipment and a tax regime that favours efficiency, programmes to facilitate equipment testing and low cost loans for ECE initiatives will prompt householders to be more responsible.

Installation of Compact Fluorescent Lamps

There is significant potential for energy savings from the replacement of incandescent light with compact fluorescent bulbs at the household level; a 15 watt CFL provides lighting equivalent to that of a 60 watt incandescent bulb.

National Housing Trust Solar Water Heating Loan Facility

The government has implemented a low cost loan facility through the National Housing Trust to allow householders to purchase solar water heaters. Present estimates suggest that the stock of electric water heaters number 12,000. Over time these should be replaced with solar systems and new installations should be solar based.

In April 2008, the NHT loan programme was improved to facilitate the installation of systems that would convert solar energy into electric energy for householder use. Under this programme and based on certain conditions, single applicants can access up to \$1.2 million while co-applicants can access up to \$2.4 million.

3.10.2 Policy Recommendations:

- The Ministry of Energy, through the NECEC, will establish standards for equipment to encourage energy efficiency.
- The Government will design appropriate fiscal policies to favour importation/manufacture of energy efficient end-use devices.
- The Government will intensify efforts to encourage lending agencies such as credit unions, and building societies to provide funding for solar energy systems.
- The Government will seek to create a competitive market for renewable energy systems.

3.10.3 Proposed Target:

Increase the existing number of solar water heating systems by 50% over five years beginning in 2008 which should increase the stock to 30,000 systems and save approximately 83,000 MWh/year.

BUILDING CODE, EFFICIENCY STANDARDS AND LABELLING

3.11 POLICY ISSUE: NEED FOR BUILDING CODE - ECE

3.11.1 Discussions:

It has been demonstrated that it is highly cost effective to insert ECE features at the design stage of a system or a facility rather than to attempt to improve the efficiency status after construction. The building code provides the opportunity for ECE measures and features to be designed into buildings.

An updated building code is now ready for promulgation and when applied to the design and construction of buildings and taking account of improved efficiencies in lighting and air-conditioning should result in a 40% improvement in energy efficiency compared to standard practice.

3.11.2 Policy Recommendation:

Government will promote sections of the building code related to ECE in building design and construction.

3.11.3 Proposed Target:

The ECE elements of the building code will be made mandatory once the code has been promulgated. This is estimated to result in a savings of 20,000 MWh per annum.

3.12 POLICY ISSUE: NEED FOR IMPLEMENTATION OF ENERGY EFFICIENCY STANDARDS AND APPLIANCE LABELING

3.12.1 Discussions:

Significant technological advances have occurred over the years to improve performance of lighting, air conditioning and refrigeration systems. Application of energy efficiency standards for equipment has proven to be an effective method of locking out inefficient equipment from markets.

There has been a proliferation of inefficient air-conditioning equipment in the local market from several countries; recent developments include the use of environmentally friendly refrigerants that improve efficiency.

Lighting represents another significant area of energy consumption in all sectors. The “T12” 40W fluorescent lamps have been long banned from use in many developed countries and should also be banned from Jamaica. CFLs and LED lighting should be encouraged.

Appliance labeling should be mandatory and the national standards organization and Customs Department should collaborate to enforce standards.

3.12.2 Policy Recommendation:

- A minimum Energy Efficiency Ratio (EER) will be set for all mini-split and unitary air-conditioners imported in Jamaica. The EER will be reviewed on a periodic basis.
- Importation of T12 fluorescent lamps will be banned in fiscal year 2009/2010.
- Energy efficiency standards for equipment will be enforced at the ports of entry.

3.12.3 Proposed Target:

Effective fiscal year 2009/2010 equipment standards will be established and labeling made mandatory. Appliances imported must satisfy the standards and the gains are estimated to result in energy savings of 3,300 MWh.

DAYLIGHT SAVINGS TIME

3.13 POLICY ISSUE: DAYLIGHT SAVING TIME AS AN ENERGY SAVING STRATEGY

3.13.1 Discussion:

Discussions remain topical as to the value of “daylight savings time” as an ECE strategy. Earlier efforts have not yielded the desired result and in many countries where this is practised there is still doubt as it relates to its effectiveness.

3.13.2 Policy Recommendation:

Daylight saving time is not a recommended ECE policy strategy at this time.

3.13.3 Proposed Target:

Not Applicable

UTILITY SERVICE METERING

3.14 POLICY ISSUE: PRE-PAID ELECTRICITY METER ARRANGEMENTS

3.14.1 Discussion:

It is considered that a pre-paid service for electricity supply hold significant potential for target groups in the Jamaican market. Information from installations already done by JPS on a pilot basis will be used for fine-tuning the approach for wider implementation.

3.14.2 Policy Recommendation:

The government will encourage the use of prepaid meters for niche areas or for customers on request.

3.14.3 Proposed Target:

Targets to be established after market survey.

TRANSPORTATION

3.15 POLICY ISSUE: NEED FOR EFFICIENCY IMPROVEMENT - ROAD TRANSPORTATION SYSTEM

3.15.1 Discussion

In 2006, the road transportation consumed 6.4 million barrels of oil, a marginal increase over the 6.2 million barrels for 2005. On the other hand, in 2005 shipping and aviation used 3.2 million barrels and 5.3 million barrels in 2006. Measures to reduce petroleum consumption in the transport sector are restricted to road transportation,

The stock of motor vehicles which were certified fit to operate on the road grew from 220,153 in 2000 to 319,621 in 2006 reflecting a growth rate of 7% per annum. The stock of public passenger mass transit vehicles grew by 63% over the same period; this at a growth rate of approximately 10% per annum. Importantly, these statistics provide insights on areas of the transportation system that require direct ECE interventions.

Fuel consumption by road transportation sector increased by 12% over the period 2000 – 2006 (Appendix 1). The marginal increase is due, in part, to the vehicle stock having on average better fuel efficiency. Analysis indicates that the average consumption in 2000 was 4,110 litres/vehicle/year while in 2006 average consumption amounted to 3,170 litres/vehicle/year, The 2006 fuel consumption translates to 13.2 litres per vehicle per work day if the assumption of 250 workdays in the year is used.

A 5% reduction in use per vehicle translates to 0.37 litres per day per vehicle or 1.5 to 2.5 miles per day. In other words if every vehicle in Jamaica were to use 0.37 litres per day less than it currently uses then nationally the savings would be 191,000 barrels per year of oil used for transportation. This can be achieved by simple practices such as correct tyre pressure, avoiding over loading, tuning vehicle, aligning vehicle and avoiding traffic congestion. Expressed in another way, if every vehicle were to travel 1.5 - 2.5 miles less than it does now on an average day the country could reduce its transportation fuel use by 3%. This could be done by optimizing routes through planning and eliminate unnecessary trips.

Several options are available to the government for controlling the flow of traffic on public thoroughfares as well as improving the overall efficiency of road transportation. These options include

- *Park and Ride*:- Park and ride facilities can involve public transport, shuttle buses, or carpools; dedicated park-and-ride car parks encourages ride sharing. There is at least one park and ride scheme that presently operates in Jamaica as a private enterprise.
- *Priority Lanes*:- The relative rarity of high-occupancy vehicles (HOV) compared to single occupancy vehicles - estimated at 7% of the traffic in the United States and Canada - makes HOV lanes work for the drivers who can use them. The high-occupancy vehicle lanes which presently

exist in Jamaica are intended for bus use only. This is useful in the metropolitan areas, and is currently enhancing traffic flow.

- *Car Pooling*:- In some countries, there are special facilities intended to encourage carpooling such as designated pick-up points and high-occupancy vehicle lanes which only allow cars with multiple riders at certain times of the day. Due to the limited capacity of the existing road network dedicated lanes for car pooling may not be feasible.
- *No Traffic Zones*:- This traffic management strategy is event-driven and employed for example for Cricket World Cup 2007. This strategy should be evaluated and implemented in areas suited.
- *Rail Service*:- Government is currently exploring the privatization of the rail service with a view to restoring the service. This will allow for another means of mass movement of persons and cargo and lessen the need for the use of the road.
- *Flexi-work arrangements*:- There is the need to reduce the waste of fuel while idling in traffic. Flexi-work arrangements should result in a more even distribution of traffic over the course of an extended work day. This measure also has potential for electricity savings and improvements in productivity.
- *Office Day Care Facility*:- Typically staff members go out in the days to pick up children from school between the hours of 12 noon and 3 pm and then return to work which causes traffic congestion. It is felt that this congestion could be significantly reduced if many businesses were to provide a facility for the accommodation of school children in a supervised environment and which allows for mass transit pick up and drop off.

3.15.2 Policy Recommendations:

- Government will maintain a lower level of import duty on vehicles with smaller engines than on vehicles with larger engines.
- Government will continue to pursue all the options involving traffic flow improvement including: Park-and-ride, Priority Lanes, Car Pooling, No Traffic Zoning, Rail service, Flexi-work arrangements and Office Day Care Facility.
- Government will focus on implementation of good data collection at all stages and aspects of the transportation system and intensify research to better understand the patterns of behaviours which impact fuel use.
- Government will, by way of public education, encourage the use of appropriate fuel grades for motor vehicles.

3.15.3 Proposed Target:

- Flexi-work arrangements will be introduced in the Ministry of Energy in September 2008.
- Implementation of other proposed initiatives to begin in 2009. A target of 5% is set for the first year and 3-5% for subsequent years (minimum of 190,000 barrels of oil per year).

ENERGY CONSERVATION AND EFFICIENCY MARKET

3.16 POLICY ISSUE: DEVELOPING AN ENERGY CONSERVATION AND EFFICIENCY MARKET

3.16.1 Discussion:

In order to develop an ECE market there needs to be sufficient market players (buyers and sellers) and readily available products and services with adequate demand to support sustainability. Additionally, the energy services business is considered a risky venture by financial institutions and collaborative efforts between the public and private sectors should encourage capital investment for entrepreneurs to secure financing. This stimulation of the small business sector is congruent with the government's stated position to grow small businesses so as to achieve the country's economic objectives related to growth and increase employment.

3.16.2 Policy Recommendations:

Government will support and encourage ECE market activities by:

- Making low interest funds available;
- Offering tax credits on ECE technologies;
- Encourage the financial sector to consider concessions to first time and incumbent small business enterprises that provide ECE services and supply renewable energy technologies.

3.16.3 Proposed Target:

Attracting professionals, skilled persons and entrepreneurs to the ECE market will contribute to achieving the national target of a minimum 2% per annum reduction in energy use. Efforts are expected to begin in 2008.

ECE & ENVIRONMENT

3.17 POLICY ISSUE: ECE & ENVIRONMENT

3.17.1 Policy Recommendations:

ECE efforts must be pursued, in a manner which allows for proper quantification and documentation of savings in carbon dioxide emissions to meet requirements of clean development mechanism.

The government will promulgate a policy that balances the future development needs of the country with near term benefits to be derived from trading in carbon credits.

Government will seek to implement an awareness programme in relation to the safe handling and disposal of hazardous materials and will seek to implement facilities to support the disposal of displaced materials and equipment as a result of ECE efforts.

3.17.2 Proposed Target:

Broad based consultations (local and international partners) will begin before the end of this financial year, to inform a comprehensive Carbon Credit Policy.

Messages specific to the environmental impact of ECE initiatives will be included in the public awareness programme to be developed under the supervision of the Public Education Taskforce.

CHAPTER 4: ENERGY CONSERVATION AND EFFICIENCY AND RENEWABLE ENERGY DEVICES AND EQUIPMENT

The following is a list of devices proposed for inclusion in the list of items to be duty exempt.

Product Category	Product Description*
Solar Energy Systems	
	Polyisocyanurate Foam Insulation for roofs
	Perlite roof insulation
	Polystyrene roof insulation
	KOOL KAT Heat Shield Coating
	Roof Skylights
	Solar water pumping systems and accessories
	Flat plate solar collectors.
	<i>Solar air heating systems.</i>
	<i>Solar power generating systems</i>
	Solar low pressure steam systems
	Solar cookers.
	Solar Driers and Accessories
	Solar water heaters
	Solar water Heating Systems
	Solar Water Heating Mounting Accessories
	Photovoltaic devices and accessories
	Concentrating and pipe type solar collectors.
	<i>Solar pumps based on solar thermal and solar photovoltaic conversion</i>
	Solar stills and desalination systems
Refrigeration	
	Air Conditioning Chillers with Rotary Screw Compressors
	Absorption Refrigeration Equipment and materials utilizing Solar Energy, waste heat, LPG, LNG, or Kerosene Oil
	Vapour absorption refrigeration systems
	Screw Compressors
	Thermal Storage Air Conditioning Systems
	Hydrocarbon Refrigerants
Cars/Vehicles	
	Air Conditioning Chillers with Rotary Screw Compressors
	Absorption Refrigeration Equipment and materials utilizing Solar Energy, waste heat, LPG, LNG, or Kerosene Oil
Fuel Cells	

Product Category	Product Description*
	Hydrogen Uninterrupted Power Supply systems
	Commercial stationary hydrogen fuel cells
	Hydrogen turbines and generators and accessories
	Hydrogen – powered vehicles
	Materials incorporated into hydrogen powered vehicles
	Hydrogen – fueling stations
	Electrically operated vehicles including battery powered or fuel-cell powered vehicles (Hybrid vehicles)
Appliances	
	Household appliances and office equipment with <i>energy star</i> labeling
	PL tubes
	T8 Fluorescent Tubes
	DC Fluorescent Bulbs
Wind Energy Systems	
	Windmills, parts of wind mills and any specially designed devices which run on windmills
	Wind turbines, support Accessories and Equipment
	Tower Propellers
Biogas Systems	
	Bio-gas plants and bio-gas engines
	Biogas generators
	Biogas equipment, appliances and accessories
Bio-diesel	
	Materials used in the distribution of bio-diesel, including fueling infrastructure, transportation, and storage
	Ethanol Fuel imports
	Gasoline fueling station pump retrofits for ethanol distribution
	Materials used in distribution of ethanol, including fueling infrastructure, transportation, and storage
	Bio-diesel and diesel vehicles
	Back pressure pass out, controlled extraction, extraction-cum- condensing turbines for co-generation along with pressure boilers.
	Waste Recycling Investments
	Waste Recycling Equipment and Accessories
Research and Development	
General	
	Mounting accessories
	DC water pumps
	Inverters
	Resistors, LED, capacitors, Integrated circuits, diodes
	Inverter/Chargers – transformers
	Fuses, resistors, LED, capacitors, Integrated circuits, diodes
	Charge controllers
	Deep Cycle Batteries
	Lighting control Units
	Coils, Resistors, LED, Capacitors, Integrated circuits, diodes
	Black continuously plated solar selective coating sheets (in cut lengths or in coils and fins and tubes).
	Mounting Stands, DC duct fans, glass sheeting for windows, plastic sheeting for windows, reflective panels
	Programmable thermostats
	Expanded metal sheeting
	Flat tempered glass
	Welded Water heater Panels
	Flat Tempered Glass
	Aluminum Angle with Glove
	Any special devices including electric generators and pumps running on wind energy

Product Category	Product Description*
R&D General Cont'd	
	Data loggers, miscellaneous cabling, grounding equipment, wind vanes and anemometer
	Metmast computer equipment
	Power Loggers
	Ground rods, magnetic cards for blades, shield wires for substation, and transmission cables, permanent magnet alternator
	Inverters, battery meters and charge controllers, smart inverters, DC auto transformers/ battery equalizers
	AC/DC disconnects, Ac circuit breakers, DC circuit breakers, fuse-blocks, ground Fault Protection, Lightning Arrestors
	Hot stick, High voltage gloves, Voltage detector, multimeters, Short and ground Sets, Harnesses, Lanyards, and cable glides
	Wind Turbine aligning tools, Mega Ohm testing equipment, hydraulic torque wrenches and pumps
	Deep Cycle batteries
	Pre-assembled AC/Dc Power panels
	Agricultural, forestry, agro-industrial, industrial, municipal and urban waste conversion devices producing energy.
	Equipment for utilizing ocean waves energy.
	Ocean thermal energy conversion systems. (Hydropower systems)
	Impellers/blades, shaft, bearings
	Rotor Coils, bearings and armature
	Variable Speed Drives
	Organic rankine cycle power systems.
	Low inlet pressure small steam turbines
	Time Clocks and timed switches
	Tinted or reflective glass or shading films
	Variable Air Volume (VAV) Systems
	Caulking Material
	Energy Management and Control Systems (EMCS) for lighting, heating and cooling
	Materials used in EMCS for lighting, heating and cooling
	Process heating or cooling systems (waste heat recovery)
	Materials used in Process heating or cooling
	Energy Efficient Motors
	Net Metering Equipment and Accessories
	Boilers that meet standards of efficiency of 85.0% or greater

Note: *Tariff code to be applied to each item

APPENDICES

APPENDIX I: JAMAICA'S FUEL IMPORT AND CONSUMPTION 2000-2006

Total Petroleum Imports – Volume in Barrels: 2000 - 2006

Segment	2000	2001	2002	2003	2004	2005	2006
Refinery	12,806,756	13,350,651	13,523,503	15,040,000	14,505,865	16,003,731	17,474,572
Bauxite Company	8,543,050	8,174,834	8,468,634	9,023,530	9,125,836	9,309,365	9,626,419
Marketing Company	3,123,429	3,259,118	3,238,232	3,033,449	2,638,853	2,503,319	3,759,207
Grand Total	24,473,235	24,784,603	25,230,369	27,096,979	26,270,554	27,816,415	30,860,198

Non-Bauxite Petroleum Imports – Volume in Barrels: 2000 - 2006

Segment	2000	2001	2002	2003	2004	2005	2006
Refinery	12,806,756	13,350,651	13,523,503	15,040,000	14,505,865	16,003,731	17,474,572
Bauxite Company							
Marketing Company	3,123,429	3,259,118	3,238,232	3,033,449	2,638,853	2,503,319	3,759,207
Grand Total	15,930,185	16,609,769	16,761,735	18,073,449	17,144,718	18,507,050	21,233,779

Non-Bauxite Petroleum Consumption Activity – Volume in Barrels: 2000 – 2006

Activity	2000	2001	2002	2003	2004	2005	2006
Road & Rail Transportation	5,691,514	5,714,767	5,822,606	6,037,168	6,075,623	6,247,835	6,373,380
Shipping	156,024	356,187	381,844	412,424	368,356	1,636,028	3,353,470
Aviation	1,640,492	1,452,198	1,616,873	1,620,143	1,792,975	1,577,438	1,983,596
Cement Manufacture	183,190	132,759	60,128	51,124	104,791	37,066	14,338
Electricity Generation	5,889,825	6,031,323	6,136,061	6,471,480	6,225,912	6,555,261	6,390,163
Bauxite/Alumina Processing							
Sugar Manufacturing	186,159	144,500	222,702	112,154	75,993	40,283	50,055
Cooking & Lighting	889,818	873,776	904,165	905,626	902,939	924,730	963,531
Other Manufacturing	81,450	55,516	73,177	142,290	135,991	163,261	181,695
Other	112,141	364,349	434,427	226,325	186,022	180,749	83,935
TOTAL	14,830,613	15,125,375	15,651,983	15,978,734	15,868,602	17,362,651	19,394,163
Petroleum Refinery	288,555	285,787	319,721	259,405	223,266	164,247	331,788
GRAND TOTAL	15,119,168	15,411,162	15,971,704	16,238,139	16,091,868	17,526,898	19,725,951
Storage	(14,528,474)	(14,633,149)	(15,870,882)	(14,924,959)	(15,357,235)	(17,036,503)	(18,143,496)

APPENDIX 1 CONT'D

Non-Bauxite Petroleum Consumption by Activity – Percentage: 2000 – 2006

Activity	2000	2001	2002	2003	2004	2005	2006
Road & Rail Transportation	37.60%	37.10%	36.50%	37.20%	37.80%	35.60%	32.30%
Shipping	1.00%	2.30%	2.40%	2.50%	2.30%	9.30%	17.00%
Aviation	10.90%	9.40%	10.10%	10.00%	11.10%	9.00%	10.10%
Cement Manufacture	1.20%	0.90%	0.40%	0.30%	0.70%	0.20%	0.10%
Electricity Generation	39.00%	39.10%	38.40%	39.90%	38.70%	37.40%	32.40%
Bauxite/Alumina Processing	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sugar Manufacturing	1.20%	0.90%	1.40%	0.70%	0.50%	0.20%	0.30%
Cooking & Lighting	5.90%	5.70%	5.70%	5.60%	5.60%	5.30%	4.90%
Other Manufacturing	0.50%	0.40%	0.50%	0.90%	0.80%	0.90%	0.90%
Other	0.70%	2.40%	2.70%	1.40%	1.20%	1.00%	0.40%
TOTAL	98.10%	98.10%	98.00%	98.40%	98.60%	99.10%	98.30%
Petroleum Refinery	<u>1.90%</u>	<u>1.90%</u>	<u>2.00%</u>	<u>1.60%</u>	<u>1.40%</u>	<u>0.90%</u>	<u>1.70%</u>
GRAND TOTAL	100%	100%	100%	100%	100%	100%	100%
Growth in Use		1.90%	3.64%	1.67%	-0.90%	8.92%	12.55%
Storage	-1	-1	-1	-1	-1	-1	-1

APPENDIX 2:

National Water Commission Energy Use Projections 2006-2022

Base year 2006 Usage 192,320,507 kWh

Year	NWC Electricity	Annual Reduction
	Usage (Grow @ 2.5%) kWh/Year	(3.5%) kWh
2006	192,320,507	
2007	197,128,520	6,899,498
2008	202,056,733	7,071,986
2009	207,108,151	7,248,785
2010	212,285,855	7,430,005
2011	217,593,001	7,615,755
2012	223,032,826	7,806,149
2013	228,608,647	8,001,303
2014	234,323,863	8,201,335
2015	240,181,960	8,406,369
2016	246,186,509	8,616,528
2017	252,341,171	8,831,941
2018	258,649,701	9,052,740
2019	265,115,943	9,279,058
2020	271,743,842	9,511,034
2021	278,537,438	9,748,810
2022	285,500,874	9,992,531
Total		133,713,826
Average Annual		9,550,988