DRAFT

SAINT LUCIA

ENERGY SECTOR POLICY AND STRATEGY

(A Green Paper for Discussion)

Ministry of Physical Development, Environment and Housing,
Castries, St. Lucia
May 2003

CURRENCY EQUIVALENT

Currency Unit	= Eastern Caribbean Dollar (EC$)
US$1.00	= EC$2.70

MEASURES AND EQUIVALENTS

1 kilometre	= 0.6214 miles (mi)
1 ton	= 1,000 kilogram (kg)=2,200 pounds (lbs)
1 kilovolts (kV)	= 1,000 volts (v)
1 megawatt (MW)	= 1,000 kilowatts (kW)
1 kilowatt hour (kWh)	= 1,000 watt-hours (Wh)
1 gigawatt hour (GWh)	= 1,000,000 kilowatt hours (kWh)
1 kilocalorie (Kcal)	= 3.97 British Thermal Units (BTU)

MULTIPLYING FACTORS FOR CONVERSION OF PETROLEUM UNITS

	US Gallons (gal)	**UK Gallons (gal)**	**Barrels (bbl)**	**Metric Tonnes (t)**	**Litres (l)**	**Cubic Meters (m^3)**
US gallons (gal)	1	0.8327	0.02381	0.00325	3.785	0.0038
UK gallons (gal)	1.201	1	0.02859	0.0039	4.546	0.0045
Barrels (bbl)	42.00	34.97	1	0.1366	159.00	0.159
Metric tonnes (t)	308.00	256.00	7.32	1	1164.00	1.164
Litres (l)	0.2642	0.220	0.0063	0.000859	1	0.001
Cubic meters (m^3)	264.20	220.00	6.289	0.8591	1000.00	1

Source: IEA, McGraw-Hill, Inc. 1984

MULTIPLYING FACTORS FOR CONVERSION OF ENERGY UNITS

	Terajoules (TJ)	**Gigacalories** (G cal)	**Million Tons Oil Equivalent** (Mtoe)	**Million Btu** (Mbtu)	**Gigawatt Hours** (GWh)
TJ	1	238.8	2.388 x 10-5	947.8	0.2778
Gcal	4.1868 x 10-3	1	10-7	3.968	1.163 x 10-3
Mtoe	4.1868 x 104	107	1	3.968 x 107	11630
Mbtu	1.0551 x 10-3	0.252	2.52 x 10-8	1	2.931 x 10-4
GWh	3.6	860	8.6 x 10-5	3412	1

Source: IEA, 2001

ABBREVIATIONS AND ACRONYMS

ANWAR	=	Arctic National Wildlife Refuge
BPD	=	Barrels per day
CARICOM	=	Caribbean Community
CIF	=	Cost, Insurance and Freight
CNG	=	Compressed Natural Gas
DSM	=	Demand Side Management
EEBC	=	Energy Efficiency Building Codes
EIA	=	Environment Impact Assessment
ESMAP	=	Energy Sector Management Assistance Program
FSA	=	Fuel Supply Agreement
GDP	=	Gross Domestic Product
GEF	=	Global Environmental Facility
GET	=	Global Environmental Trust Fund
GOSL	=	Government of Saint Lucia
IA	=	Implementation Agreement
ICB	=	International competitive Bidding
LUCELEC	=	St. Lucia Electricity Services Limited
LCEP	=	Least Cost Expansion Plan
LPG	=	Liquefied Petroleum Gas
LRMC	=	Long Run Marginal Cost
MMB	=	Million Barrels
MPDEH	=	Ministry of Physical Development, Environment and Housing
NAFTA	=	North American Free Trade Area
OECS	=	Organisation of Eastern Caribbean States
OIDC	=	Oil Importing Developing Country
OPEC	=	Organization of Petroleum Exporting Countries
OTEC	=	Ocean Thermal Energy Conversion
PPA	=	Power Purchase Agreement
PV	=	Photovoltaic
SLBS	=	Saint Lucia Bureau of Standards
SWHS	=	Solar Water Heating Systems
USAID	=	United States Aid Agency for International Development

St. Lucia: Energy Sector Policy and Strategy

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I. Executive Summary

Background

i. During recent years, Government has pursued several initiatives in the energy sector in an effort to ensure the sustainability of its development and to ensure that sector development impacts positively elsewhere in the economy and does not impede its overall growth and development. Most recently, Government has formulated a Sustainable Energy Plan. However, the policy framework which currently exists does not facilitate implementation of the Plan.

ii. The following has been agreed as the broad objectives for a comprehensive energy sector policy and strategy for St. Lucia:

(a) ensuring energy supplies to St. Lucia at the least economic cost through a combination of public and private sectors under a deregulated and liberalised environment;

(b) diversification of the energy base; optimal development of indigenous energy resources where economically feasible; and ensuring security of supplies;

(c) efficiency in energy production, conversion and use with the overall objective of reducing the 'energy intensity' of the economy;

(d) reduction of adverse environmental effects and pollution caused by the production, storage, transport and use of energy;

(e) implementation of appropriate and economic pricing policies to ensure that adequate energy supplies are delivered to all economic sectors efficiently and an improved energy supply network is sustained; and

(f) establishment of an appropriate regulatory framework to protect the consumers, investors and sector entities.

iii. To achieve these objectives the comprehensive policy and strategy should create an enabling environment for:

(a) attracting private sector participation and investments through deregulation, liberalisation and appropriate regulatory framework;

(b) development of indigenous energy supplies where appropriate;

(c) encouraging energy conservation and efficiency;

(d) fully protecting the environment while ensuring that adequate energy supplies are available to the country to sustain desired rate of economic growth; and

(e) sustaining appropriate institutional arrangements for the sector.

iv. The energy policy and strategy paper: (a) reviews the global and national developments and their relevance to St. Lucia's energy sector; (b) identifies and evaluates short to medium term energy sector policy options that are needed to consolidate the economic gains and policy initiatives of the past years; and (c) recommends strategies to sustain economic growth without encountering energy supply shortages.

Overview

v. Global Outlook Recent economic performance of the developing countries has been slow and the future prospects are not encouraging. Additional demands for limited concessional resources are now bearing pressure, while availability of such funds has become tighter from traditional sources. The developing countries must, therefore, expect to meet their future investment requirements largely from their own savings or non-traditional sources (such as the local and foreign private sector financing). The evolution of regional trading blocs in the world is expected to have unprecedented consequences for the economies of the developing countries. The events of September 11, 2001, have particular consequences for the world economy, even though the global economy weathered the uncertainty associated with the terrorist attacks much better than expected. The IMF expected global growth which slowed to about 2¼ per cent in 2000, to rebound to about 2¾ per cent in 2002 and to strengthen further in 2003. Although the global recovery is expected to continue, concerns have emerged about the strength and durability of the expansion, and projections for growth in the industrial countries in 2003, especially in the U.S. and in the euro area, have been revised downwards.

vi. Risks to the outlook and policy challenges: For the past several months, the global outlook has been clouded by uncertainties, many of these associated with the situation in Iraq. On the economic front, some of the more serious fears about the consequences of the war have not come to pass. Oil prices have moderated to pre-Iraq crisis levels. Equity markets, while volatile, have not been as weak as some feared. But as the IMF forecast notes, there is a climate of uncertainty today and the balance of risks is clearly on the downside. There continue to be risks associated with a winding down of the war in Iraq and the possibility of further terrorist activity. More fundamentally, however, many of the risks and uncertainties in the outlook that were present even before the build-up to the war remain.

vii. The world economy has for the last couple of years been driven to a large extent by consumer spending in the United States, but the strength of the household sector in the U.S. now seems to be waning. At the same time, we do not yet see strong evidence that business investment is strengthening to take up the slack. Given this, it is more important than ever for the world economy that there is stronger growth coming out of Europe and Japan. However, growth in both continues to disappoint.

viii. The current juncture therefore poses a considerable challenge for policy-makers. It is critical that macroeconomic policies in the industrial countries support economic expansion. Fiscal and monetary policies must be put on a sustainable track. And structural policies to improve the growth potential and flexibility of economies have to be a key element of our economic strategies going forward.

ix. Caribbean Region Considering the foregoing, the Caribbean faces serious challenges – with the region's economic outlook highly dependent on global economic activity and tourism, the war in Iraq could have a particularly destabilizing effect on the region. Against this background, Caribbean governments are working to improve competitiveness and strengthen public finances by redirecting expenditures and enhancing revenue collections. These efforts, combined with an early improvement in global economic activity and strength in the tourism sector, will allow the Caribbean to build on the economic growth experienced in the latter part of 2002.

x. A rapidly changing international environment makes it urgent to re-establish the Caribbean Region as a dynamic competitor and to forge strong links with the US, Europe and other emerging new trading blocks. To achieve this, the region will need a strong a new vision. Growth in the Caribbean remains subdued, as these open economies continue to grapple with a decline in travel and the slowdown in the global economy. Public finances have generally worsened as weak economic activity reduced revenue and strained social programs. In response, Caribbean governments are intensifying economic reforms and consolidating budgets to improve their international competitiveness and build the basis for renewed expansion. However, since these economies are inextricably linked to the global economy, they will likely face modest growth prospects if current global trends continue. The economies of the Caribbean Community (CARICOM) are in a most difficult and precarious situation. Small and highly open, they are extremely vulnerable to international economic developments such as WTO liberalisation programmes and the loss of preferential markets; reduced net in-flows of foreign capital, especially official development assistance; and unanticipated increases in expenditures for international security. Seven of our eleven most important commodity exports in 1995 experienced price declines and lost market share in 2000. Tourism, vitally important for foreign exchange and employment, declined dramatically as a result of September 11, 2001.

xi. Economic Prospects for St. Lucia Given the global and regional constraints, the short-term economic outlook will depend on successful implementation of the new stabilisation and adjustment programs and availability of sustained energy inputs. Barring major external shocks, growth in real Gross Domestic Product (GDP) is expected to return after the decline in recent years, be fairly broad-based, and the rate of is projected to average about 3% p.a in the mid-2000s[1/].

xii. Domestic Energy Resource Base Without unexpected and significant discoveries of oil and gas or unforeseen technological breakthroughs, the likelihood of finding adequate indigenous energy sources is limited. St. Lucia will continue to rely on imported oil to meet most of its energy requirements during the next fifteen to twenty years. The most readily available indigenous energy

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1/ IMF Country Report No. 03/137 May 2003 – *Staff Report for the 2002 Article IV Consultation, November 2002*

source appears to be fuel wood. Indiscriminate use of fuel wood is already having serious adverse environmental effects and St. Lucia's forestry resource would have to be properly managed. Solar water heaters have an economic potential, provided appropriate fiscal and pricing polices are introduced to encourage their use. As far as the development of other renewable energy options is concerned, geothermal energy and wind energy offer the greatest prospects for electricity generation and efforts to exploit the use of this form of renewable energy should be intensified. Other forms of renewable energy are either immature or require considerable investments and St. Lucia would be ill advised to pursue their development at this time. It should however continue to monitor international developments to determine when their exploitation can become competitive.

xiii. International Commodity and Energy Prices Crude oil prices increased about 3 percent in 2002 as a result of tight supplies and Middle East tensions. Non-oil prices increased about 5 percent, led by a 9 percent increase in agricultural commodities, which more than offset a 4 percent decline in metals and minerals. Uncertainty about the strength of the global economic recovery contributed to the decline in metals and mineral prices, but the effect of uncertainty on agricultural prices was offset by lower supplies of selected commodities, because of drought. Non-oil prices are in the early stages of price recovery which is expected to last about three years before nominal prices will begin to weaken. However, the recovery of agricultural prices will be more strongly influenced by supply increases and by recent weather disturbances and droughts. Oil prices slumped after September 11, 2001, because the economic recession, mild weather, and reduced air travel weakened demand. Also, the Organisation of Petroleum Exporting Countries (OPEC) made no attempts to prop up falling prices. Prices started to rebound at the end of 2001 on expectations that markets would tighten because of a recovery in world oil demand, OPEC output restraint, and declining stocks. In addition, perceived threats of a supply disruption from a United States-led invasion of Iraq also helped push prices higher, and those anxieties deepened as the year progressed. Barring un-expected political upheavals, however, energy prices would remain stable and favourable during next fifteen years. Once Middle East tensions ease, oil prices are expected to decline because non-OPEC oil supplies will increase and Iraqi oil will return to the market. The average price of crude oil is projected to decline from $25 per barrel in 2002 to $23 per barrel in 2003. By 2005, crude oil prices are projected to decline to $19 per barrel in today's prices.

xiv. Security of Supplies St. Lucia is situated within the highly competitive Caribbean petroleum supply region. Current petroleum requirements are about 1.1 million barrels a year. These are small relative to the total regional supply which for island refineries alone amounts to over 500 million barrels a year. In addition to international majors, a number of independent traders operate in the region. Being a marginal buyer, the security of supplies for St. Lucia is reasonably assured.

xv. Energy and the Economy About 98% of the population lives in dwellings with electricity. In comparison with countries at a similar stage of development, the level of energy consumption in St. Lucia is moderate. In the ten years from 1985 to 1995, the primary energy consumption per dollar of GDP in 1995 constant dollars, increased at an average of about 1.1% per annum. In 1997, for every one US dollar of GDP, about 5,024 Btu of primary energy was input. The income elasticity of demand for energy is estimated at about 1.6.

xvi. Energy Consumption and Costs In 2001 Total energy requirements stood at 567,000 barrel of oil equivalent (boe), with a per capita requirement at 3.6 boe. In 2001, energy imports cost US$[…] million and accounted for about […] % of foreign exchange earnings from merchandise exports.

Least Cost Energy Supply Options

xvii. Power Sector The Lucia Electricity Services Limited (LUCELEC) has a current installed capacity of 66.4 MW and a peak demand of nearly 43.4 MW. This permits a safe operating reserve of about 23 MW. Because of this healthy reserve margin, new base load generating capacity will not be needed to improve the system reliability until about 2004. In St. Lucia, no studies have so far been carried out to determine the cost of unserved energy[2/] to the economy. This cost is important in setting the reliability targets which should be achieved by LUCELEC and it will be urgent for the Government of Saint Lucia (GOSL) to commission a study to estimate this cost before power sector planning can proceed with confidence. The objective of the Least Economic Cost Power Expansion Plan (LCEP) is that all new capacity ensures that:

(i) a reliable and appropriate technology is adopted;

(ii) the unit sizes are compatible with the system size; and

(iii) the timing of new units neither creates overcapacity nor develops capacity shortages.

xviii. Sales of electricity grew from 163,300 MWh to 215,661 - a 32% increase over the period 1995 to 1999. The number of customers grew from 36,713 to 45,000 - an increase of 22.5%. The percentage of domestic customers remained almost constant at 86% of total customers. Based on an expected sales forecast of about 332,045 MWh during the year 2010, about 26 MW of new capacity will be needed by that time if we assume a load factor of about 41%, the current value. The investment requirements for the power sector are therefore estimated at: (i) about US$20 million[3/] for new power generation capacity in the next 10 years. Of this about US$6 million would be needed in local finances and the remainder in foreign capital. This means that during the next decade on the average about US$1 million would have to be invested every year in the power sector.

xix. Petroleum Sector The petroleum sector is only partially liberalised. The prevailing regime for petroleum supply is that there are only two marketing companies, Shell and Texaco and they have well established distribution chains. There is also a separate terminal facility owned by Hess Oil St. Lucia Limited (HOSL) which supplies diesel fuel to LUCELEC, but is also used by the

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[2/] The cost of unserved energy is the estimate of the value of lost economic production for every one kWh of electricity not supplied.

[3/] Constant 2002 prices

local marketing companies. HOSL has the right to enter the local marketing trade and distribute products in St. Lucia, but it has so far decided not to exercise this right.

xx. The pricing system is one which takes Mean Caribbean Posted Prices as the starting point and adds allowable margins for freight, insurances and marketers' profits. Variations in the cost of supply are balanced by variations in the consumption tax so as to keep the final selling price fixed. This method of pricing may be resulting in higher prices for petroleum products than necessary, as by using Caribbean postings and other forms of artificial built-up product prices instead of US Gulf Coast spot prices and notional transportation costs, it has the effect of shielding the marketers from competition by providing them with guaranteed margins, and also shielding consumers from the real costs of supply.

xxi. To achieve a least cost supply of petroleum products to the St. Lucian economy, GOSL will move in the direction of full deregulation of the petroleum industry, and will consider:

(a) either rationalising and establishing more realistic guidelines for the marketing companies to calculate import parity petroleum prices and removing the automatic adjustment of the excise tax component which keeps prices constant; or removing price controls altogether, charging a fixed tax, and relying on market forces instead of posted prices and notional transportation costs and a pricing formula to determine prices;

(b) encouraging the entry of more players into the market;

(c) enacting Fair Competition and Anti-Dumping legislation and legislation and regulations to force compliance with environmental standards for the transportation handling and storage of petroleum products; and,

(d) establishing petroleum quality standards and enforcing qualification and registration standards for marketers, haulage contractors and distributors.

Regulation

xxii. Even under a regime where there is substantial private participation in the energy/power sector, GOSL continues to have a vital role in the sector in that is has responsibility for regulating the entire sector. GOSL will analyse policy on an on-going basis and if necessary, effect policy change so as to benefit the economy of St. Lucia as a whole.

xxiii. GOSL will repeal The Electricity Supply Act No.10 of 1994 (ESA) and replace it by (a) new legislation which will govern the overall operations of the power sector; (b) a separate non-exclusive operating licence which will be negotiated with the utility which will, in the interest of maintaining investor confidence, guarantee as far as possible, substantially the same commercial arrangements which now obtain under the ESA; and, (c) legislation which will establish an independent regulatory body headed by a utility regulator ("the Regulator") to regulate the power sector in St. Lucia.

xxiv. The new ESA will unambiguously allow for self-generation without the possibility of disconnection by the utility; but a new tariff design will identify realistic fixed costs of supply, and separate them from the variable cost of supply so that hotels which desire to self-generate could do so, relying on the utility for their standby power. These arrangements will allow the utility to recover the capital and fixed operating costs of maintaining the capacity to supply the consumer.

xxv. Significant economies of scale, as well as a fillip to the important perception of independence and impartiality, would be brought to bear on the operation of the utility regulatory body if it were founded at a regional level, and regulated not only electric utilities, but other utilities as well. GOSL will move speedily to consider promoting the establishment of such a regional office of utility regulation

xxvi. The Regulator will be mandated to, inter alia: undertake the economic regulation of the sector; set and monitor quality of service standards; approve reliability criteria for the utility; review and approve the expansion plans of the utility; determine which renewable energy options should be exploited by the utility or IPPs; determine whether the utility should face competition from IPPs for the provision of incremental power plant additions; determine whether an IPP would be allowed to generate power for a specific end-user; determine the tolls to be charged by the utility for transmitting power and energy over its network; and, process licence applications from new players in the power market and make recommendations to the Minister responsible for energy/public utilities regarding the grant of licences.

Energy Pricing

xxvii. Energy prices in the country should reflect the economic cost of products. All indirect or cross subsidies should be phased out. If subsidies are to be provided, they will be on direct basis, e.g. subsidy on electricity through life line tariffs for poor consumers. Fuel prices and pricing margins need to provide correct signals to producers and consumers. Price distortions, such as subsidies and taxation, will be reviewed. Subsidies on household and transportation fuels, for example, have proved extremely costly to economies elsewhere. Consumers are better served by plentiful resources and several suppliers competing in a level market. Policies will therefore encourage substitution of modern fuels and favour direct subsidies. In addition, downstream taxation must not differentiate between local and foreign supplies or between fuels.

xxviii. The basic principles governing rate setting will be modified to reflect the following principles:

(a) rates should reflect full costs including duties and taxes that are applied to all other industries;

(b) overall revenue requirements to be established to meet rate of return and/or self financing tests with adjustments for inflation based on a retail price index minus an incentive factor for productivity improvement, as determined by the Regulator;

(c) indexing of fuel cost fluctuations;

(d) tariffs should be structured according to long run marginal cost (LRMC) principles according to peak and off peak cost, voltage level, capacity and energy costs, etc.; and

(e) pass through of purchased power charges and adjustments with initial contracts subject to regulatory board approval.

Energy Efficiency and Conservation Strategy

xxix. Efficiency improvements on the supply side should be programmed in systematically implemented system loss reduction programs. On the demand side a pilot project should be prepared for possible funding through the Global Environmental Facility (GEF) of the United Nations, UNEP and the World Bank. The main objectives of this project would be to: (a) develop institutional mechanism to assess end use efficiency potentials; (b) design and recommend specific programs to capture these potentials; (c) evaluate the effectiveness of the proposed programs; and (d) develop the necessary institutional capabilities for implementing these programs. Adequate resources should be allocated for the preparation and implementation of this project. This should be done jointly by Ministry of Physical Development, Environment and Housing (MPDEH) and LUCELEC. In addition GOSL should also consider promoting the use of low or zero energy appliances and transporting equipment (e.g. bi-cycles, mopeds, motor cycles and small engine cars) through the market mechanism by either eliminating or introducing low taxes and duties on such equipment.

Environmental Strategy

xxx. Some institution building is required to consolidate environmental strategy. The cost of environmental protection measures to international standards should be internalized as project costs and thus reflected in the price of petroleum products and electricity. Environmental Impact Assessments (EIA) of new energy related project are already mandatory under the new Physical Planning and Development Act but the following environmental action programs are recommended in connection with existing and proposed energy projects:

(a) cleaning up of existing sources of pollution such as LUCELEC's Union power station should be the highest priority;

(b) pollution abatement through conservation and energy efficiency improvements should be encouraged;

(c) establishing baseline data for air quality and forest resources;

(d) establishing standards for environmental zones such as the Pigeon Island National Park, tourist areas, etc.; and

(e) reducing the indiscriminate felling of trees by reducing or eliminating taxes on small gas stoves which are mainly used by the poor population.

Institutional Needs for Energy Sector Development at MPDEH

xxxi. The SDEU will play the key role in coordinating and ensuring the timely implementation of energy sector projects and policy decisions. The staffing and or portfolio responsibilities within SDEU will be reorganized/expanded to cater for the revised role contemplated. The core of the SDEU will be:

(a) Chief Sustainable Development Officer who will be the Unit manager/director and together with the other specialists, prepare cabinet submissions and liaise with the Legislative Committee in the drafting of legislation for the energy sector;

(b) Power Sector Analyst who will be responsible for power sector policy development, strategy and monitoring functions within the sector; reviewing the development of least cost supply and integrated resource planning options etc; project analysis and financing of studies within the sector;

(c) Energy Conservation/Renewables Specialist who will have overall responsibility for coordinating Demand-Side-Management (DSM) programmes, energy efficiency and conservation programmes, renewable energy development; and monitoring the energy efficiency programs of sector entities and for liaising with the St. Lucia Bureau of Standards (SLBS) in the preparation of energy efficiency standards for appliances; and,

(d) Energy Economist/Energy Planner who will have responsibility for ensuring consistency between energy sector development strategy/policy and the overall macro-economic policies; assist in the economic analysis for the various sub-sectors; preparing energy balances for St. Lucia; and, assist the Chief Sustainable Development Officer in coordinating the activities of the other specialists in the Division.

Inter-Ministerial Steering Committee

xxxii. Because of the significant inter-ministerial collaboration which will be required to implement the new arrangements, GOSL should establish an ad-hoc Inter-Ministerial Steering Committee to guide the efforts of the SDEU in implementing the policy and assist in the substantial coordination effort which will be required. This should be a high-level committee which should have representation from among the senior technocrats from, *inter alia*, the Ministry of Finance; the Ministry of Physical Development, Environment and Housing; the Ministry of Communications, Works and Public Utilities; the Ministry of Tourism; the Ministry of Agriculture; the Attorney General's Chambers; the St. Lucia Bureau of Standards; and, a Government-nominated representative on the Board of LUCELEC.

xxxiii. The senior Staff of the SDEU will act as the Secretariat for the Ministerial Steering Committee (MSC) and will be responsible for *inter alia*, the recruitment of consultants/advisors from among other GOSL agencies and the private sector, including the St Lucia Hotel and Tourism Association, and LUCELEC, preparing briefs for the MSC, summoning meetings of the MSC and keeping the record of decisions taken at meetings.

II. Background

2.01 The role of energy in St. Lucia's competitiveness drive to meet the rapid globalization of international markets and a national energy diversification strategy to meet the medium to long-term challenges posed by globalization cannot be overstated. Government policy, *inter alia*, aims at diversifying exports and facilitating market penetration. In the absence of a strategy to obtain long-term security of low cost inputs, including energy, St. Lucia will be unable to provide an enabling environment for sustainable growth. A key to the realization of this objective is the cost of inputs and the competitiveness of St. Lucian products in the international market. Government will therefore need to develop an appropriate medium to long-term energy supply strategy that will ensure sustainable development of the economy. It is therefore important for the Government of Saint Lucia (GOSL) to develop a strategy for the development of the energy sector which will be necessary to obtain an overall reduction in long-term energy input costs which will assist in making St. Lucia more internationally cost competitive. It will also be necessary to evaluate strategies for the diversification of energy sources to achieve an overall improvement in the security of energy supplies to St. Lucia.

2.02 **Global Challenges:** Following the "nine eleven" events, many developing countries are facing adverse repercussions of a downturn in the US and other developed economies. The immediate challenge for St. Lucia has been to prevent a reversal of the economic gains that have occurred during the 1990s. St. Lucia's immediate and longer-term development strategy is based on: (i) restoring economic growth; (ii) ensuring that growth is inclusive and that the poor are adequately protected; (iii) improving governance, efficiency and effectiveness in the public sector; and (iv) ensuring sustainable development. With the rapid pace of globalization, a prerequisite for sustainable development is the creation of an enabling environment that must facilitate an increase in domestic productive capacity and production of goods and services at the most competitive costs.

2.03 In St. Lucia, the tourism industry comprises the single largest earner of foreign exchange. In order to improve the competitiveness of this sector, it will be necessary to find ways to reduce the cost of inputs, especially energy input costs. The long-term competitiveness and expansion of St. Lucia's economy will therefore depend on the availability of sufficient energy supplies at prices that will sustain economic growth.

2.04 **Global Energy Supplies and Strategy:** While the world has abundant proven reserves of energy, oil is a limited resource and its demand for "noble uses" will continue to increase. Hence less and less of it will be available as an energy source. In a small oil importing developing countries (OIDCs) like St. Lucia, therefore, encouraging an economic and cost effective diversification of the energy base must focus on practical and market based approaches that would ensure the security and supply of energy at least economic cost for the national economy as a whole.

2.05 **Energy Policy Objectives:** Given the foregoing circumstances, the key objectives of energy policy should be:

- Ensuring stable and adequate energy supplies at the least economic cost in a deregulated and liberalised environment;

- Diversifying the energy base and encouraging the development of indigenous energy resources where economically viable and technically feasible; and ensuring the security of energy supplies;

- Recognizing the importance of energy as a critical input to industrial growth and stability; and,

- Minimizing the adverse environmental effects and pollution caused by the production, storage, transport and use of energy.

2.06 The broad objectives for a comprehensive energy policy for St. Lucia will therefore include, *inter alia*, measures aimed at:

(a) establishing an appropriate regulatory framework to protect the consumers, investors and sector entities;

(b) ensuring energy supplies to St. Lucia at the least economic cost through a combination of public and private sector initiatives under a deregulated and liberalised environment;

(c) diversifying St. Lucia's energy base – optimal development of indigenous energy resources where economically feasible – and ensuring security of supplies;

(d) increasing the efficiency in energy production, conversion and use with the overall objective of reducing the 'energy intensity' of the economy;

(e) implementing appropriate and economic pricing policies to ensure that adequate energy supplies are delivered to all economic sectors efficiently;

(f) improving the institutional capabilities within GOSL and other sector entities to carry out such tasks as energy end-use analysis, estimating the cost of power outages to the St. Lucian economy and modelling the effect of demand side management, environmental effects and pricing policies; and,

(g) reducing the adverse environmental effects and pollution caused by the production, storage, transportation and use of energy.

Privatisation and Competition

2.07 The key energy policy initiative pursued most widely by Caribbean governments in recent years has been the privatisation of a number of formerly state-owned electric utilities. Privatisation is motivated, amongst other reasons, by budgetary pressures, a need to improve efficiency, and a desire to attract private capital. Usually, through privatisation, restructuring and cost reductions have taken place, government subsidies to the energy sector have been reduced, and competition has increased.

2.08 However, liberalisation has raised several questions, particularly with respect to its ability to address security of supply in the most economical manner, extend accessibility to energy services, and to promote sustainable development. Issues also arise as to whether governments have sufficient, or any, control over the activities of the utility, once privatised. Many privately owned utilities believe that they should service their clients by focusing on efficiency, including cost-effective technologies; and that making electricity available to the poor and rural areas is mainly an issue for social policy. In addition, several have established non-optimal planning criteria for the retirement and expansion of generation capacity, and the absence of heat rate targets in tariffs means that inefficiencies in the use of fuel are simply passed on to the consumer.

2.09 The answer to the above questions, generally, is that there is a need for policymakers to introduce effective, strong and transparent regulatory frameworks while avoiding detailed interventions by Government in the sector. This regulatory framework should set clear guidelines as to what utilities are supposed to do, and what incentives they will be allowed for the pursuit of social objectives.

Creating the Conditions for Competition

2.10 It takes time – depending on the location of the country, the size of its market, and the overall macroeconomic program – to create the minimal conditions for competition. It also takes time for a market to react to new competitive conditions, and during the initial phases, governments should remain sensitive to developments in the marketplace and be able to respond quickly. During the transition, the following features are important:

- a regulatory entity must be established to monitor the market and to react rapidly to any deterioration of product quality or non-competitive behaviour.

- a certain number of players must be willing and ready to operate in the market (the number depends on the size of the market) ; and,

- qualified operators should prove their financial and technical capacity, and be liable for environmental and safety regulations.

Sector Review and Main Issues

Energy Supply and Demand Structure

2.11 St. Lucia imports about 95,000 Tons of oil equivalent (TOE), at a cost of some US$25 million or 20% of the island's total export earnings. About 30% of this is used for electricity generation. Except for wind and geothermal energy, indigenous energy sources (hydropower, fuel wood and charcoal) are limited, have a low potential, and are not yet fully developed. However, solar energy also promises some economic potential in the form of domestic water heating and crop drying. Imported petroleum accounts for about 98% of the gross commercial energy supplies.

2.12 The energy sector in Saint Lucia is dominated by the electricity and transportation sub-sectors which are the largest users of imported energy. The total dependence on imported fossil fuels makes St. Lucia very vulnerable to price increases and supply shortages, particularly because of the on-going instability in many oil-producing countries, both within the region and outside. Saint Lucia has signalled its intention to become a "Sustainable Energy Demonstration Country" by 2008-2012 – this commitment requires that a minimum of 20% of energy be contributed from renewable resources by that time. The commitment was given to the international community at a press conference held jointly with the Climate Institute at the Fifth Meeting of the Conference of Parties of the United Nations Framework Convention on Climate Change held in Bonn, Germany in November 1999.

2.13 In November 2000, at the Sixth Conference of the Parties on Climate Change (COP6) in The Hague, St. Lucia again highlighted its commitment to reducing its dependence on fossil fuel imports for energy generation; and this commitment was again reiterated at the World Summit on Sustainable Development in Johannesburg in September, 2002 when the international community was advised that St. Lucia had adopted a Sustainable Energy Plan (SEP) which aims for a contribution of 20% from renewable energy by 2010. Details of the SEP are at Attachment I.

Petroleum Sector

St. Lucia depends exclusively on imported energy for its electricity and transportation needs and relies entirely on a single privately owned terminal for the off-loading, storage and supply of its fuel requirements. In 2001, St. Lucia imported about 140,000 thousand litres of petroleum and petroleum products. At the present time, refined petroleum products are imported into the island by the petroleum marketing companies, Shell and Texaco and Hess Oil St. Lucia Company Limited (HOSL). The breakdown of imported petroleum by product for the year 2001 is shown in Table 1

Hess Oil Terminal

2.23 Pursuant to the Oil Refinery Act, 1977 Hess Oil St. Lucia Company Limited (HOSL) was provided with an exclusive licence by GOSL to build and operate an oil terminal at Cul-de-Sac. In the Act, GOSL has agreed that for the duration of the right and licence referred to in clause III of the licence or any extension or extension thereof, GOSL shall not permit the establishment of another crude oil, petroleum products, petrochemical products, petrochemical and/or chemical

trans-shipment terminal and/or refinery in the Cul-de-Sac area [4/]. This means that HOSL is the only marine facility that can handle imported liquid fuel to St. Lucia.

Other Oil Companies

2.24 Other marketers (Shell and Texaco) are assured of products meeting their volume and quality requirements at competitive prices (import parity based on average prices of Caribbean refineries). Transport fuels, gasoline and diesel are sold through a network of some ….. retail outlets which are either owned or operated by affiliates of these international marketing companies. The outlets are supplied by road tankers from the loading racks at Cul de Sac.

Table 1: Importation of Petroleum Products – 2001

Fuel	Quantity			
	IG	BBL	TOE	BOE
Leaded Gasoline			NA	NA
Unleaded Gasoline	10,344,434	295,808	36,680	264,318
Gas Oil (Non Elec Generation)	3,015,339	86,226	11,985	86,367
Kerosene			NA	NA
LPG	13,390,120	70,548	6,558	47,260
Lubricants	101,760	2,909	404	2,914
Lubricants (lb)	10,226		4.50	32
Bitumen	NA	NA	NA	NA
Fuel Oil				
Spraytex	420,798	12,033	1,672	12,052
Av-jet	6,286,128	179,757	23,907	172,279
Av-gas				
Gas Oil (For Electricity Generation)	14,893,580	425,895	59199	426,591
Total			**140,413**	**1,011,816**

Source: MPDEH – Caribbean Energy Information System Database

N.B.

1. For the year 2001 there are significant discrepancies in the data available form the Central Statistical Office of St. Lucia and that available from the CEIS as contributed from the MPDEH which cannot be explained by opening and closing stock positions and losses.
2. Fractions are omitted

Liquefied Petroleum Gas

2.25 Liquefied Petroleum Gas (LPG) is the most popular fuel used for cooking in St. Lucia. LPG is imported into St. Lucia by Shell and Texaco, and during 2001, a total of 13,390,120 Imperial Gallons (IG) or 6,558 Tons of Oil Equivalent (TOE) of LPG was imported into St. Lucia.

[4/] Oil Refinery Act. 1977. Para. 17

Fuel Supplies to LUCELEC

2.26 HOSL supplies all of the fuel requirements of LUCELEC. LUCELEC entered into contract with HOSL for all its fuel requirements, overwhelmingly, No. 2 Diesel Oil but including transportation fuel for its vehicles. The initial period of the contract between the two companies extends from January 1, 1996 through December 31, 2000. However there is provision for one-year annual extensions, so that at all times, subject to appropriate termination, the term of the agreement shall be five years. The contract was entered into after open tender.

Table 2: LUCELEC: Fuel Cost Structure – (EC cents per IG)

		1995	1996	1997	1998	1999
1	Av Caribbean Postings	152.458	189.965	174.785	122.322	150.895
2	1973 Base Cost	29.770	29.770	29.770	29.770	29.770
3	Fuel Adjustment (1-2)	122.688	160.195	145.015	92.602	121.125
4	Government Excise	20.000	20.000	20.00	20.000	20.000
5	Hess Service Charge	54.883	54.883	54.883	54.883	54.883
6	Fuel Surcharge (3+4+5)	197.571	235.078	219.898	167.485	196.008
7	Cost to Lucelec (2+6)	227.34	264.84	249.66	197.25	225.77
8	5 as a percentage of 6	24	21	22	28	24

2.27 The LUCELEC Report claims that over the last 25 years, Caribbean posted prices have tended to reflect international oil prices. In this regard, movements in fuel prices paid by HOSLL and LUCELEC over the past 27 years (1973-1999), though not strictly proportional, virtually mirror international crude oil prices. This claim is however, disputed by the World Bank in its 1991 Caribbean Least Cost Petroleum Supply Study [5/].

Pricing Formula

2.28 The pricing system in use is one in which Mean Caribbean Posted Prices is used as a starting point to which are added allowable margins for freight, insurance and marketers' profit. The final selling price is fixed, and variations in the cost of supply are mat by variations in the consumption tax charged by GOSL on petroleum products. Proposals have been made[6/] for an alternative strategy to be used which would abandon the use of Caribbean postings and other forms of artificial built-up prices and for acquisition of refined products to be carried out on the basis of US Gulf Coast spot market prices. It would also abandon the use of controlled fleets of the traditional suppliers for transportation and instead place reliance on vessels suitable for the trade transporting products from a variety of supply points on a stand-alone basis at free market conditions. Terminal fees would be targeted to recover costs based on a defined period to amortise, rather than allow excess profits and restricted access by the traditional suppliers. The alternative strategy would aim to reduce the cost of internal distribution by allowing and promoting competition between independent distributors who would have access to the terminal under equal conditions set out under *"common carrier"* arrangements.

[5/] Steigerwald, Thomas G. and Peet, John R. 1991 Caribbean Least Cost Petroleum Supply Study – World Bank, 1992

[6/] Energy Policies fro Caribbean States, The Case of St. Lucia – W.R. Ashby 1996

2.29 During the twelve months between February 1998 and 1999, crude oil prices increased from less than US$10.00 per barrel to almost US$30.00 per barrel, an increase of almost US$20.00 in one year. During this period, the posted price per imperial gallon of Diesel #2 showed an increase from EC¢ 85.5 to EC$2.09, a movement of some 184%. Included in the cost over the base costs, i.e. the fuel surcharge is an amount estimated at approximately 55 cents EC/IG added by HOSLL to the posted formula price to cover its transportation cost, freight and insurance and mark-up.

Price Volatility

2.30 Crude oil price movements have been particularly volatile over the last twenty-five years. This volatility is shown in numerical detail in Table 3.

Table 3: Spot Crude Oil Prices – US $ per Barrel

Year	Dubai	Brent	Nigerian Forcados	West Texas Intermediate
1972	1.90	-	-	-
1973	2.83	-	-	-
1974	10.41	-	-	-
1975	10.70	-	-	-
1976	11.63	12.80	12.87	12.23
1977	12.38	13.92	14.21	14.22
1978	13.03	14.02	13.65	14.55
1979	29.75	31.61	29.25	25.08
1980	35.69	36.83	36.98	37.96
1981	34.32	35.93	36.18	36.08
1982	31.80	32.97	33.29	33.65
1983	28.78	29.55	29.54	30.30
1984	28.07	28.66	28.88	29.39
1985	27.53	27.51	27.80	27.99
1986	12.95	14.38	14.39	15.04
1987	16.92	18.42	18.40	19.19
1988	13.19	14.96	14.99	15.97
1989	15.68	18.20	18.30	19.68
1990	20.50	23.81	23.85	24.52
1991	16.56	20.05	20.11	21.54
1992	17.21	19.37	19.61	20.57
1993	14.90	17.07	17.41	18.45
1994	14.76	15.98	16.25	17.21
1995	16.09	17.18	17.26	18.42
1996	18.56	20.81	21.16	22.16
1997	18.13	19.30	19.33	20.61
1998	12.16	13.11	12.62	14.39

Source: LUCELEC Commission Report / Platt's Oilgram

Regional Supply Cost Issues

2.31 In 1991, a Caribbean Least Cost Petroleum Supply Study carried out for the World Bank showed inter alia, that:

(i) the supply costs in the Caribbean Region are significantly higher than the current market condition should dictate. A preliminary estimate indicates that the Region could reduce petroleum supply significantly costs by adopting least cost supply options;

(ii) the supply costs can be reduced without compromising the reliability or the security of supply;

(iii) the conditions which lead to the higher supply costs are complex, have existed for a number of years and are often the result of not appreciating the interrelationship between the barriers to lower supply costs. Removing these barriers will require a concerted effort on the part of each country to promote a higher, achievable level of competition between the petroleum suppliers. Vested interests of the traditional suppliers, lack of buyer knowledge and skills in supply acquisition and transport, and fear that change may be equated with unreliability are expected to lead to resistance to the changes required to lower the barriers to increased competition and lower supply costs;

(iv) although a form of competition exists in many locations, it is typically limited to a group of traditional suppliers who, between them, control access to the marine and terminal facilities necessary to import products. It is naive to assume that other companies will compete if they are forced to construct high cost, often duplicate facilities. Creation of enabling legislation and rules to model the use of these key infrastructure after the rules in place in the USA for *"Common Carriers"* is a very practical option to reduce the cost to the national economy;

(v) terminal cost could be reduced significantly; and

(vi) internal distribution costs justify an independent competitive distribution system which could produce significant savings.

2.32 The report estimated that savings of about US$2.3 million per year would accrue to St. Lucia as a result of implementing the above strategy, but very little has been done to address any of the above findings of more than ten (10) years ago and so many of the above positions still probably exist to a large extent.

Power Sector

Installed Capacity and Peak Demand

2.14 The current installed capacity in St. Lucia is 68.8 MW supplied by 3 diesel-generating stations. Peak demand is currently about 43.3 MW; and it is reported that the national electric utility is anticipating the need to add 33.3 MW of new generating capacity over the next 10 years to meet the projected peak demand at the end of the period. To date, there is no renewable energy in the energy supply mix for electricity generation in St. Lucia but GOSL has been reviewing a 13.5 MW Canadian-sponsored wind energy development project and has requested that the electric utility LUCELEC considers signing a power purchase agreement which would facilitate the financing and further development and implementation of the project.

2.15 The movements in peak demand, installed capacity and reserve margin over the period 1994 to 2002 are shown in Table 4.

Table 4 – Historical Capacity and Peak Demand

Year	Peak Demand	Installed Capacity	Reserve Margin	%
1994	30.7	40.2	9.5	30.94
1995	31.8	44.5	12.7	39.94
1996	32.5	44.5	12.0	36.92
1997	34.65	44.5	9.85	28.43
1998	37.2	59.9	22.7	61.02
1999	41.0	59.9	18.9	46.10
2000	43.3	66.4	23.1	53.35
2001	43.3	66.4	23.1	53.35
2002	43.4	66.4	23.0	53.0

Source: Adapted from LUCELEC Commission Report and LUCELEC Annual Report 2002

2.16 At the present time, renewable energy makes no contribution to the energy supply mix in St. Lucia. Even though it appears that wind and geothermal energy could make a significant contribution to the energy supply mix, existing energy sector policies do not encourage the rapid development of these renewable energy resources. Therefore, if the targets which have been announced to the international community are to have a reasonable chance of being met, new policies will have to be put in place immediately to facilitate the speedy introduction of renewable energy production in the national energy mix.

Forecast of Sales and Peak Demand

2.17 The latest sales forecast suggests that the base demand for electricity, during next several years, will increase at an average 5.2% per annum. This reflects the position if no demand-side measures (DSM) are applied. If it is assumed that between the present time and 2010 the capacity factor improves somewhat because of improved dispatch methods and the availability improves from about 90% to 97% over the period to 2010, these sales would indicate a peak demand of about 56 MW at the end of 2010, again, if no DSM is implemented.

2.18 Table 5 provides data on the historical consumption of electricity by each category of consumer and the percentages of total output consumed by each.

Table 5 – Historical Consumption of Electricity in Saint Lucia by Sector

YEAR	2000		1999		1998		1997		1996		1995	
	MWh	%	MWh	%	MWh	%	MWh	%	MWh	%	MWh	%
Domestic	85,075	36.34	79,491	36.86	75,639	38.04	69,617	38.51	65,653	39.74	62,668	38.37
Commercial & Hotel	131,863	56.33	120,628	55.93	10,8618	54.63	97,248	53.80	86,518	52.37	85,683	52.46
Industrial	13,250	5.66	12,271	5.69	11,640	5.85	11,287	6.24	10,860	6.57	12,697	7.77
Street Lighting	3,893	1.66	3,271	1.52	2,931	1.47	2,605	1.44	2,185	1.32	2,282	1.40
TOTAL SALES	234,081	100	215,661	100	198,828	100	180,757	100	165,216	100	163,330	100

Sources: Adapted from LUCELEC Annual Report 2001

2.19 Overall sales data for the years 2000 to 2002 and projections for electricity sales and annual percentage increases to the year 2010 are provided at Table 6.

Table 6 – Historical Sales and Forecast 2000 – 2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Sales (kWh x1000)	234,081	243,416	239,387	267,700	278,890	290,030	300,910	312,100	323,660	335,140	346,720
Growth Rate (%)	8.5	4.0	-1.7	11.8	4.2	4.6	4.7	6.3	5.0	5.2	5.3

Source: LUCELEC Review Commission Report

Heat Rates

2.20 Currently heat rates, computed on both monthly and annual bases, are being maintained below 9,500 BTU/kWh, often approaching 8,500 BTU/kWh. On an annual basis, the heat rate moved from over 10,000 BTU/kWh in 1990 to 8,875 BTU/kWh in 1999. Use of highly efficient diesel engines and the high quality of the fuel have contributed to this excellent Heat Rate, and it is not expected that a major improvement in heat rates can be expected in the near future. Improvements in overall cost can therefore be only expected from the use of cheaper fuels.

2.21 In order to ensure that economic load dispatch techniques can be effectively introduced at LUCELEC, it will be necessary for heat rate figures to be computed on an hourly, monthly and yearly basis. This will become an important data collection activity in the future and it is necessary that the LUCELEC ensures that these rates are accurately measured and kept updated.

Generation Operating costs per kWh

2.22 The LUCELEC Report suggests that the wide monthly variation in fuel costs does not allow a meaningful evaluation of the total generation operating cost. However, the subtraction of the fuel surcharge provides a figure which represents the O&M costs, including the fixed fuel cost component. Using this approach, the O&M generation cost per kWh, excluding the fuel surcharge costs are shown in Table 7. These figures reflect better heat rates and a reduction in other operating costs, excluding fuel.

Table 7: Generation Operating Costs [7/]

	1999	1998	1997	1996	1995	1994
EC cents per kWh.	4.9	7.0	9.3	7.6	7.2	7.32

Source: LUCELEC Review Commission Report

2.33 The Commission has assumed that, having achieved a figure of 4.9 cents generation cost per kWh in 1999, that a target of less than 4.9 cents is achievable.

System Losses

2.34 System losses are calculated as the difference between the system energy demand and total energy sales. A high level of losses has a serious impact on the tariff rates and LUCELEC's operations and performance. LUCELEC calculates losses expressed as moving annual totals on an annual basis, but there is no disaggregating of these calculated amounts into technical and non-technical losses[8/]. Losses expressed as a percentage of gross generation dropped from a high of 13.2 % (average) in 1994 to a low of 11.0 % in April 1999 but at the end of that year had increased to 12.0% taken over the entire year. These losses have since then declined steadily to 10.7% in 2001, but have again risen to 12.5% in 2002, the last year for which published data is available. Losses over the period 1994-2002 are shown at Table 8. Figures computed on a net generation basis are shown for comparison.

Table 8 – System Losses

	1994	1995	1996	1997	1998	1999	2000	2001	2002
Units Generated (kWh x 1000)	180,679	196,574	198,033	213,147	235,881	256,195	276,745	286,539	287,511
Company Use (kWh x 1000)	6,691	8,073	8,189	8,455	8,817	10,800	12,069	12,522	12,132
Net Generation (kWh x 1000)	173,988	188,501	189,844	204,692	227,064	245,395	264,676	274,017	275,379
Losses (kWh x 1000)	23,880	25,171	24,628	23,935	28,236	29,734	30,595	30,601	35,992
Sales (kWh x 1000)	150,108	163,330	165,216	180,757	198,828	215,660	234,081	243,416	239,387
Losses as (%) of Gross Generation	13.2	12.8	12.4	11.1	12.0	11.6	11.1	10.7	12.5
Losses as % of Net Generation	13.7	13.4	13.0	11.7	12.4	12.1	11.6	11.2	13.1

Source: LUCELEC Commission Report & LUCELEC Annual Reports

2.35 There have been no systematic formal programmes to reduce system losses over the years although loss reduction studies were carried out under the United States Agency for International Development (USAID) Alternative Energy Systems project in 1982. Several of the recommendations of the study were accepted but were never implemented as a complete programme Over the years, however, LUCELEC has made several ad-hoc efforts to reduce technical losses which have included: (a) capacitor installation to achieve a system power factor of 0.95; (b) voltage standardization programme to operate all primary distribution circuits at 11kV; (c) distribution trunk reinforcement for

[7/] Figures exclude Fuel Surcharge amounts

[8/] LUCELEC reportedly proposes to introduce a system for computer-calculated real time losses and when this is completed, it will be in a better position to assess both its technical and non-technical losses.

the primary distribution system to improve reliability; (d) re-conductoring the primary distribution; (e) installation of low-loss high efficiency transformers; and, (f) balancing the distribution phases. While these steps have tended to restrain the increase in losses, for proper planning and efficient investment allocation, it is important to institute steps to disaggregate losses into their separate components and to reduce them to an even lower level.

2.36 Until now, most discussions have been oriented to technical losses in all the components of a power system. Besides technical losses, however, there are also non-technical losses associated with the system. These non-technical losses refer to the energy that is consumed and which is consumption not billed by the utility. The main sources of these losses are: billing errors, metering errors, unregistered customers and outright theft. Non-technical losses are primarily financial losses to the utility. Their main impact is evident on the financial position of the utility itself. The revenues that are lost when electricity is consumed but not paid for by the consumers impose a heavy burden on the financial viability of utilities both directly and indirectly. Non-technical losses also distort the optimal pattern of electricity consumption, which represents an additional cost to the economy. In utilities where tariffs reflect costs (operating and investment), non-fraudulent consumers are charged relatively more for the service than they should and as a consequence, they tend to consume less because the higher cost of those who do not pay for electricity is passed to them through higher tariffs. Conversely, those who do not pay for electricity, tend to consume more than if they had to pay for it. This feature creates a distortion in the economically optimal electricity consumption pattern.

Fuel Usage

2.37 LUCELEC is the second largest user of imported petroleum products in St. Lucia behind the transport sector. Table 9 shows LUCELEC's fuel usage between 1992 and 2001.

Table 9 – LUCELEC Fuel Usage (1992 – 2001)

Fuel Consumed	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993
(Imperial Gallons)	14,736,896	14,860,580	14,388,680	13,276,298	12,599,190	11,826,009	10,890,044	10,776,772	9,901,546	9,413,399

Source: LUCELEC Annual Report 2001

2.38 The percentage contribution of the electricity bill assigned to recovery of fuel costs varies between 26 % and 31%is and is shown in Table 10.

Table 10 – LUCELEC Fuel Cost as percentage of LUCELEC Electricity Sales (1994 – 1999)

	1994	1995	1996	1997	1998	1999
Fuel Costs (EC$'000)	21,432	24,601	29,051	32,520	27,903	29,591
Sales of Electricity (EC$'000)	68,678	77,996	86,129	98,631	102,062	112,801
Fuel Cost as % of Sales	31	32	34	33	27	26

Source: LUCELEC Commission Report

Least Cost Supply Options

2.39 LUCELEC has a total installed capacity of about 59.9 MW of diesel generation which is spread between 13 units, varying in size from 1.25 MW to 9.30 MW and in ages from 2 years to 30 years.

2.40 The generating capacity of the company is determined neither by company policy nor modern least cost planning techniques but by legislation. The ESA of 1994 requires LUCELEC to use reasonable efforts to ensure that sufficient generating capacity is maintained at all its power stations in order that peak demand may be met, assuming that the two largest generating units are unavailable for generating electricity. The Act therefore sets out specific guidelines for the reserve capacity of the generating units eschewing modern approaches to determining reliability of the generating system and as a consequence makes it possible that LUCELEC may well be over-investing in plant to ensure a level of reliability which the economy of St. Lucia can ill afford.

2.41 In accordance with the guidelines set out in the legislation, LUCELEC's required capacity is set out in Table 11.

Table 11: LUCELEC – Required and Actual Generation Capacity

Year	Peak Demand	Two Largest Units	Required Capacity	Required Reserve Margin	%	Actual Capacity	Actual Reserve Margin	%
1994	30.7	7.00 + 6.30	44	13.3	43.32	40.2	9.5	30.94
1995	31.8	7.00 + 6.30	45.1	13.3	41.82	44.5	12.7	39.94
1996	32.5	7.00 + 6.30	45.8	13.3	40.92	44.5	12.0	36.92
1997	34.65	7.00 + 6.30	47.95	13.3	38.38	44.5	9.85	28.43
1998	37.2	9.30 + 9.30	55.8	18.6	50.00	59.9	22.7	61.02
1999	41.0	9.30 + 9.30	59.6	18.6	45.37	59.9	18.9	46.10

Source: Adapted from LUCELEC Commission Report

2.42 The actual reserve margin of 61.02% in 1998 appears to be excessive. Analysis of the above table suggests that:

(i) the requirements mandated by the ESA result in reserve margins that are probably too large and results in capacity charge components of the tariff which are higher than necessary;

(ii) the increment of 9.3 MW for the last addition was probably too large in that is caused LUCELEC to exceed the mandated reserve margin requirement in 1998; and,

(iii) it would probably be cheaper overall for slightly smaller plant sizes to be installed on a more frequent basis

Reliability and Generation Expansion Planning

2.43 Outages are not only an inconvenience to LUCELEC's customers, but also result in economic losses to St. Lucia. This will usually be far greater than the value of revenue lost to LUCELEC. No reliable estimates exist for the cost of unserved energy in St. Lucia but it would be in the range of about US$0.75 US$1.25/kWh for unplanned outages given the energy intensity of the economy and what is typical for other countries at the same level of development as St. Lucia. Having an accurate estimate of the cost of unserved energy is critical in the fixing of target reliability criteria for the utility and it is urgent that GOSL/LUCELEC undertakes studies to make an estimate of this variable. It is important because reliability is costly, and so is the lack of it. If St. Lucia has more electricity generating plant installed than is necessary to ensure optimum reliability, this eventually will result in consumers paying higher tariffs than would otherwise be the case. If on the other hand, there are outages resulting from insufficient generating capacity, there is lost production. The optimum point is arrived at when the system reliability is set at a level where the long run marginal cost of improving it further is equal to the cost of unserved energy.

2.44 The LUCELEC Commission has noted in its report that LUCELEC uses a method to determine the reliability of its generation which is inappropriate for continued use in the planning for a utility at LUCELEC's stage of development. In its proposals, Generation Expansion 1999-2000, the LUCELEC Planning Department has utilized the simplest of analyses in arriving at its recommendations. While making references to the loss of load probability (LOLP) in their reports, this factor did not appear not to have been taken into account in the planning exercise. Furthermore, the method used to determine system availability was cited by the Commission as not providing an adequate picture of the performance of station and individual units. The Commission also reported that for transmission and distribution outages, the Average Customer Minutes Lost/month per 100 customers in 1998 was 30.2 minutes and in 1999, it was 31.5 minutes. The Commission concluded that there is substantial room for improvement in the reduction of distribution outages. To this end, the Commission recommended that a comprehensive analysis be carried out of the causes of those distribution outages. Government supports this recommendation as it will be a requirement that the new regulatory authority will have the authority to monitor these and other quality of service parameters and direct the utility to effect improvements.

2.45 Modern practice requires more data to calculate factors such as Equivalent Availability (EA) and Equivalent Forced Outage Factor (EFOF) which require data on:

- planned outage hours;
- maintenance outage hours;
- forced outage hours;
- planned de-rating hours;
- unplanned de-rating hours; and,

- service hours.

2.46 The Commission has also expressed the view that LUCELEC has reached a stage of development when Least Cost Generation Expansion studies must be undertaken. GOSL supports this recommendation for the use of more sophisticated planning techniques but will advances this recommendation further by ensuring that LUCELEC begins to use Integrated Resource Planning methodologies which will incorporate least cost planning techniques but also make use of estimates of the LOLP, DSM and the cost of unserved energy in the St. Lucian economy to determine the requirement for new plant.

Retirement of existing plants

2.47 Timing for the retirement of old units depends on their technical performance and availability; whether or not rehabilitation and life extension would be worthwhile; and whether there is an economic case for retirement. It is estimated that about 13.6 MW [9/] of old and less efficient existing plant capacity would be retired during the next five years.

Competition

2.48 It is well known that employing competition to procure goods and services usually results in the most economical prices. The LUCELEC Report has, however, suggested that there is no scope for competition in generation in St. Lucia. It opines that *inter alia*, in order to avoid collusion and price fixing effective competition is predicated on a sufficient number of firms and even a two or three generator industry may be conducive to collusion and that a larger number of companies is required to induce truly competitive behaviour. It suggests that in small island systems, the market is too small to support enough firms to achieve real competitive conditions.

2.49 Broadly speaking, the type of competition which a utility may engage in for the supply of power can be divided into two types: operational competition in accordance with models which operate in Chile and the United Kingdom and the type assumed by the LUCELEC Commission in their comments above; and, competition at the capacity acquisition level[10/], whereby competition for incremental capacity is by way of build-own-operate (BOO) solicitations for incremental plant. This latter type of competition is more popular in the United States.

2.50 It seems to be clear that a model incorporating operational competition will be inappropriate for St. Lucia in the foreseeable future, as the possibility of such competition would only exist when the system was oversupplied with plant of similar type which would allow for generators with fairly close unit generation costs competing with each other to supply capacity and energy to the system by virtue of more efficient management. This oversupply position is very unlikely in St. Lucia because investors would be unwilling to build new plant without the benefit of a power purchase contract which would at least set capacity payments at a level which would guarantee that the investor had sufficient funds to pay his debt service and fixed operating costs.

[9/] Source: LUCELEC Commission Report

[10/] (i) Competition at the capacity acquisition level refers to the bidding for the rights to develop the project and to enter the power market by way of the Power Purchase Contract.

(ii) Operational Competition refers to competition within the power market which would take place on an on-going basis in the dispatch of generating plant to meet the system demand and would be based on the variable operating cost of the generating equipment.

2.51 The likely situation is that, in the short run at least, the system dispatcher would not have much choice in dispatching the load between individual generators because:

(i) there is very little variation in unit incremental variable costs among the generating units which are available to satisfy the daily demand; and,

(ii) there is almost no likelihood of an oversupply of generating plant owned by IPPs, competition among which would force prices down.

2.52 Competition is nevertheless possible at the level of market entry, and this can happen in two ways. In the first, when utilities construct their own capacity, competition can be carried out by the utility to secure the best prices for equipment and services used to produce the power, and in the second, competition can be more direct by entertaining competitive bids to secure the lowest prices for the energy and capacity from an Independent Power Producer (IPP). The competition which a utility would employ to purchase and install equipment is only an intermediate step and a proxy for competition in the procurement of the capacity and energy, and is therefore likely to be less efficient than the direct competition for the power and energy which would capture all the factors, including any inefficiencies in managing construction contracts into account.

2.53 Because of this, a utility which is engaged in the construction of its own capacity requirements is clearly not going to be subject to the same competitive forces as IPPs competing to supply the same capacity, and the real cost of power produced by an integrated utility installing its own capacity is likely to be more than that from an IPP, given the same cost of debt financing and return on equity expectations.

United States and Regional Experience

2.54 The Public Utility Regulatory Policy Act (PURPA) legislation which came into effect in the United States during the 1970s mandates that all utilities must subject themselves to competition in generation from IPPs. More recently, the passage of the National Energy Policy Act of 1992 and recent rulings by the Federal Electricity Regulatory Commission (FERC) has opened the gates to increased competition among utilities and IPPs and created uncertainty about the future of the industry as the new thrust to encourage competition is changing the face of the industry.

2.55 The experience over the last twenty or so years has shown that monolithic utilities are facing fierce competition in generation from the IPPs who have demonstrated that they are able to sell power to the utilities more cheaply than the utilities can produce it themselves because IPPs usually run more efficient operations. In addition, utilities are not as heavily leveraged as IPPs typically having a 60:40 debt to equity ratio, whereas IPPs typically operate at debt to equity ratios as high as a 90:10. Because of this, utilities have to charge more for their power to achieve the same return on equity as an IPP because the equity return expectations of investors are higher than the interest charged on debt. These are some of the main reasons why several utilities are now looking to diversify their operations by, inter alia, investing off-shore, and are themselves investing in subsidiaries which are entering the IPP business.

2.56 In the Caribbean region, the Jamaica Public Service Company Limited (JPS) signed an agreement on September 30, 1994 with Kenetech Energy Systems, LP for the provision of 43 MW of gas turbine generating capacity, on a build, own and operate (BOO) basis, by December 14, 1994. Twelve days later, on October 12, 1994, JPS signed a second agreement with Jamaica Private Company Limited (JPPC) for the supply of 60 MW of low speed diesel power on a similar basis by July, 1996. By October 21, 1994, the also company signed a third agreement with Jamaica Energy Partners Limited (JEP) for the provision of 72 MW of medium speed diesel capacity, also on a BOO basis, by September 1995. Thus, within less than a month JPS had signed agreements with the private sector for supply of 175 MW of additional generating capacity, an increment of 30% on its existing generating capability costing approximately US$266 million in investments.

2.57 The implementation of the above projects were all the subject of open procurement following an international competitive bidding process, and demonstrate that if appropriate conditions are put in place, competition can be successfully implemented for the entry of independent power producers into the market.

Power Sector Issues

2.58 So far, not enough has been done to represent national economic perspectives in the arrangements which govern the operations of the electric utility. The current arrangements do not reflect the fact that the objectives of national economic policy are often wider than the interests of the power sector; and do not stop at ensuring the viability of electricity generation and distribution in a country. The licence under which LUCELEC currently operates clearly appears to be designed to ensure its viability; but a viable utility is only important to St. Lucia in so far as:

- that viability contributes to sustainable economic growth in the country, and an improvement in the welfare of its citizens; and,

- the financial viability is not at the expense of the viability of other areas in the economy.

2.59 A private investor-owned utility such as exists in St. Lucia does not necessarily have the national interest in view – the only mandate of management is to increase shareholder value; it is not necessarily concerned about what is in the best interest of St. Lucia as a whole. However, the representation of national economic interests is, without any doubt, the responsibility of Government; and because so much of St. Lucia's continued economic growth is dependent upon continued growth in the tourism sector which is heavily dependent on energy, such economic expansion requires that energy be provided at the lowest possible prices. It also demands that there is as little volatility as possible in these prices, and this makes the case for increasing the proportion of energy supplied from renewable sources. However, it should be noted that although the development of renewable resources will result in reduced price volatility and improve the security of supply, it will not necessarily result in overall lower energy prices to the consumer.

2.60 The inclusion of renewable energy in the supply mix will present the utility with several challenges and issues requiring resolution. These comprise:

(a) Operational issues which include the effect of intermittent power output on operating reserve requirements, unit commitment and economic dispatch;

(b) Interface issues which include suppression of harmonics, reactive power supply and voltage regulation, frequency control; and,

(c) Planning issues which include appropriate modelling and valuation of intermittent wind resources compared to conventional resources.

2.61 Based on the wind plant operating experience in the USA and Europe, integration of wind resources will not be a problem in terms of interface and operational issues. Any issues that have developed, such as intermittency and voltage regulation, have been adequately addressed by accepted power system procedures and practices. However, planning issues associated with the integration of wind power plants into utility systems is an area that is still being evaluated.

2.62 The capacity factor of renewable energy sources such as wind energy is significantly less than that of fossil fuelled generators. Depending on the wind regime at the selected site for a wind turbine, it is likely that the machine will only be able to produce its rated capacity for probably only about 25-30% of the time. In order for the overall system reliability to be maintained, the utility will have to maintain sufficient spinning reserve and cold standby capacity on hand. But the cost of carrying this extra capacity will have to be traded off against the gains provided by an overall reduction in fuel costs and passed on to the consumer in the tariff. Making use of geothermal resources, however, will probably reduce the system reliability problem by an order of magnitude, as the capacity factor of geothermal plant is likely to be only slightly less than conventional steam plant.

Regulatory Issues

2.63 As it is generally understood, the difficulties associated with the operation of the Public Utilities Commission (PUC) [11/] which ultimately led to its disbandment and the repeal of the legislation which governed it stemmed largely from that body's misunderstanding of its role as an arbitrator of consumer and investor interests. Instead, it assumed a role which was largely one of a perceived protector of consumer interests and in addition, there was a lack of timeliness in deliberating on rate applications and issuing awards. This unfortunately led to significant underinvestment in the sector and a deterioration of service standards. Unfortunately, however, although achieving better efficiencies as far as timeliness is concerned, the new regulatory regime which has resulted does not provide sufficient incentives for LUCELEC to improve its efficiencies and maintain such improvements.

2.64 Appropriate rate setting criteria and tariff design are essential to the encouragement of investments in the power sector. The allowable rate of return is a critical aspect of the rate setting process. This is because the electric utility industry requires substantial financing for investment in plant and equipment to meet customer requirements. Investors and lending institutions have considerable interest in rates of return on investment because this is one of the important measures

[11/] The body previously charged with regulating utilities prior to 1994.

they use to determine whether or not to invest or lend. Electric utilities cannot attract capital for investment unless their costs can be recovered and unless there is adequate return on investment.

2.65 The tariff should be adequate to cover operating expenses, depreciation and taxes, and also allow a fair return on the fair value of the capital invested in the business. The elements of value refer to the assets of a utility which comprise the rate base and may generally be listed as:

(i) fixed assets, defined as used and useful land, buildings, plant and equipment;

(ii) working capital and property held for future use; and,

(iii) construction work in progress.

2.66 There are several issues which arise:

- Electricity Supply Act: The Electricity Supply Act No.10 of 1994 (ESA) sets out the arrangements under which LUCELEC generates and supplies electricity in St. Lucia and effectively enshrines the utility's operating licence within the legislation. However, it is more usual nowadays to have legislation governing the sector separated from the utility's operating licence as that arrangement allows governments more flexibility to deal with the sector as a whole, without changing the commercial arrangements with the utility.

- The Act at Section 21 (1) is unclear, as it appears to allow the generation of electricity for "*a person's*" own use, but then seems to take away that right in the proviso which indicates that the right is only exercisable after the grant of a sub-licence; which is at the sole discretion of LUCELEC: or at sub-section (2) by Government in the case of generation from the fumaroles at Soufriere. This is a serious obstacle to the development of renewable sources of energy and this area of the legislation should be clarified to make it certain that self-generation is allowed [12/].

- Under the ESA, the tariff charged by LUCELEC allows the company to recover its costs and achieve a return on its ratebase. The ESA specifies that the allowable rate – the so called return on ratebase (ROR) – shall be not less than the average twelve-month deposit rate paid by commercial banks in St. Lucia plus an additional ten per cent, provided that such return on equity shall be at a rate not less than fifteen percent per annum. A significant issue, therefore, is the fact that the above arrangements do not place a cap on the rate of return earned by LUCELEC, even though a floor of 15% per annum has been established. Even though in recent years LUCELEC has not exercised its right to increase its tariff to recover at the 15% floor, this provision is inequitable and unfair to consumers. If, for example, the average twelve-month deposit rate paid by commercial banks in St. Lucia were to increase to 10%[13/], LUCELEC would then be entitled to a tariff which would earn it a return of 20% per annum on equity even though there would have been no increase in operational risk caused by the higher deposit rate.

[12/] LUCELEC should, however, be entitled to payment in the form of a fixed charge for maintaining the capacity to supply the customer.

[13/] It is not inconceivable that in order to protect the value of the EC$, monetary policy of the Eastern Caribbean Central Bank could determine a deposit rate which was close to this value.

- There are no target heat rates in LUCELEC's fuel surcharge – under the present arrangements, the extra costs resulting from poor fuel efficiency are simply passed on to the consumer [14/]. While LUCELEC has performed reasonably well in maintaining the fuel efficiency of its engines to date, it would nonetheless be wise to include these targets in a redesigned tariff as a disincentive to poorer performance.

- At the present time, in accordance with the ESA, customers' contributions and tax deferrals are included in LUCELEC's rate base [15/]. This is unusual since these items do not represent investor-supplied capital and has the effect of inflating the rate base thereby inflating the absolute amount of the target rate of return.

- Reliability Targets – The generating capacity of LUCELEC is determined by legislation. The ESA requires that LUCELEC should use reasonable efforts to ensure that sufficient generating capacity is maintained at all its power stations in order that peak demand may be met, assuming that the two largest generating units are unavailable for generating electricity. This is an onerous requirement which may well result in LUCELEC having too much capacity to ensure an economic level of generation reliability for the system and means that the consumer may well be carrying the cost of any overcapacity in the form of higher than necessary tariffs.

Other Sector Issues

2.67 There are several other issues which arise that will need to be taken into account in the development of a comprehensive sector policy:

- Government has little or no influence in planning for expansion in the power sub-sector, and as a result, its objectives for the use of renewable energy may not be fully accommodated. Energy policy in St. Lucia has come to be unduly influenced by the electric utility, even though the power sub-sector is but one part of the energy sector. As there is no regulatory oversight, planning for the power sub-sector expansion is left entirely to the utility which may not necessarily act in the interest of the economy. As a result, there is no obligation for the utility to ensure, for instance, that planning for the sub-sector considers fuel supply contingencies, or that expansion is via the least cost route.

- The electricity tariff in St. Lucia does not appear to have been designed with national economic objectives in mind, because the design methodology eschews long run long run marginal costs in favour of accounting costs to determine the cost of service. From an economic point of view, accounting costs are not the most efficient basis on which to allocate costs; and tariffs could result for each class of consumer that do not reflect the true economic cost of providing them with power and energy, and consequently promote wastage. If tariffs for a given consumer class are set at less than their long run marginal cost, among other things, over-consumption of electricity will result, driving an earlier requirement for the installation of the next increment of plant – and for the foreign exchange to purchase and install it. On the other hand, if set at higher than the long run

[14/] This problem will of course be lessened to the extent that renewable energy technology contributes to the energy supply mix.
[15/] LUCELEC Report, Section 11.4

marginal cost, those classes of consumers will be penalised with costs that will impede their growth[16/].

- National economic benefits aside, the long run marginal cost approach to tariff setting will probably result in higher tariffs for residential consumers. Implementation will therefore present significant political challenges. But it will also yield benefits in energy conservation and energy efficiency, and more effective demand side management. In countries at St. Lucia's stage of development, it is the residential consumer that usually drives the requirement for the utility to increase its peak load generating capacity – hence the popularity of demand side management programmes (targeted mainly at residential consumers) among developing country utilities in an effort to delay new plant additions [17/].

- Appropriate rate setting criteria and tariff design are essential to the encouragement of investments in renewable energy and encouraging energy efficiency and conservation. The return on ratebase (ROR) criteria for fixing the utility's tariff is essentially cost-plus, and even if benchmarks are used for best practice performance, because the financial incentive is missing, ROR criteria do not usually provide sufficient motivation for the utility (particularly a private investor-owned utility) to make significant and sustained efforts to save the foreign exchange earned by other sectors.

- Furthermore, ROR criteria do not encourage investments in renewable energy because, compared to fossil fuelled generating projects, the investment costs for renewable energy projects are loaded up front and usually pay dividends much later in the project life cycle – a fact which although tolerable to utilities owned by governments, is less attractive to private investor-owned utilities, which are usually anxious to recover their investments in as short a time as possible.

- The Ministry responsible for energy does not have a sufficiently comprehensive energy planning capability. Before meaningful interventions in the energy sector can take place, such as the undertaking of a comprehensive energy end-use analysis, it will be necessary to improve the institutional capabilities within the Ministry to carry out such tasks and to review recommendations for the grant of licences to IPPs from the Regulator and making recommendations to the Minister.

2.68 The above analysis of the issues makes it clear that a new regulatory regime should be given serious consideration by GOSL. However, the new regulatory regime/process should not, and need not, be burdensome, and there should not be a return to PUC style regulation. Under any proposed new arrangements, annual changes in the tariff could be arrived at automatically by using an [RPI-x] formula in which the retail price index (RPI) would be used as the basis of granting annual increases, the x-factor being set by the regulatory body and designed to provide an

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16/ Owing to the practical difficulties of metering and billing, however, the degree of sophistication of the tariff and the metering utilised (e.g., by time of day) will usually depend on the net benefit of such metering; and the ideal tariff structure may have to be simplified as a result. Thus, the number of customer categories, rating periods, consumption blocks, voltage levels, and so on, will have to be limited in practice. Further, some developing countries (although perhaps not St. Lucia) may lack technically skilled labour for installation and maintenance of sophisticated meters, or even reliable meter readers. Therefore, in practice, the choice of a tariff design and an appropriate metering scheme is likely to involve many practical considerations and trade-offs.

17/ Demand side management programmes also help to reduce green house gas production.

incentive for the utility to improve its efficiency. The entire arrangement, including returns to the company, could then be reviewed in detail every five or so years by a utility regulator, and the x-factor adjusted in the succeeding period to compensate for over recovery or under recovery in the period just completed.

2.69 The type of regulation recommended above would, however, be more complicated to administer than the ROR method currently used and would require the establishment of a regulatory authority (an office of utilities regulation). To reduce costs, such a body could be multi-sectoral in scope, and it could also be regional in scope. It is important that the body should be endowed with the maximum degree of independence from direct governmental influence and it should not mirror the regulatory philosophy of the PUC.

2.70 The new regulatory body should be one whereby the philosophy of regulation would be to act as an independent arbitrator, balancing consumer interests against investor interests and the interests of Government, and avoid “capture” by any of the above groups.

Transport Sector

2.71 Energy for transport poses severe policy and planning problems for governments of developing countries. In the modern part of the transport economy of developing countries petroleum products provide the only primary energy source because the internal combustion engine still remains the most efficient form of prime mover. Alternative fuels such as alcohol are not readily available in the sizeable volumes required to substitute for petroleum products in transport, nor do they appear to be economically competitive even at present-day crude oil prices.

2.72 The transport sector is the largest energy consumer in St. Lucia. Transportation services in St. Lucia are provided by road, air, and marine systems. The overwhelming majority of personal travel and almost all goods transported within the country moves on the roads. International travel predominates in air passenger services, but there is some internal traffic utilising the two international airports. The number of privately owned aircraft is of no great significance in the overall transportation sector. Commercial marine traffic is almost exclusively international, cargo, especially containerized, and cruise ships.

Table 12: Transport Sector Share of Petroleum Import Bill (EC$ Million)

	1998	1997	1996	1995	1994
Transport Sector Cost (CIF)	43.7	40.5	34.9	32.8	27.3
LUCELEC Fuel Cost (CIF)	23.9	28.5	28.0	23.2	20.2
Total Petroleum Imports (CIF)	67.6	69.0	62.9	56.0	47.5
Transport Sector Share	65	59	56	59	57
UCELEC's Share (%)	35	41	44	41	43

Source: Adapted from LUCELEC Report - transport sector costs assumed to include bunkering and aircraft uplift.

Vehicular Transportation

2.73 St. Lucia has a road network which comprises a total of about 1,210 km, of which about 63 km of highways are paved and 1,147 km are unpaved or partially surfaced secondary roads[18/]. GOSL through the Ministry of Communications Works and Public Utilities is responsible for the maintenance of roads. Generally the highways are in good condition, although the capacities are limited as there are only a few limited-access, divided highways. Traffic conditions in and around the major towns are often congested, but average speeds between major towns are reasonable except during peak hours where the increased congestion results in higher than normal fuel costs per passenger mile and other operating and maintenance costs.

2.74 In 2001 the total number of motor vehicles registered in St. Lucia was approximately 39,416, comprising 22,453 private motor cars, 1,894 taxis and hired vehicles, 3,387 passenger vans, 3,387 buses, trucks, tractors and others, and 757 motorcycles. Liberalisation of the motor vehicle import policy in the 1990s resulted in rapid increase in the number of motor vehicles (cars in particular) in the country. The average rate of increase in the motor vehicle population was about 7.9% per annum over the period 1997-2000.

[18/] 1996 Estimate

2.75 A large percentage of the cars were imported used from Japan at very attractive prices and as a result the average operating condition of the cars on St. Lucia's roads has been significantly upgraded over the past several years. However, the increase in numbers has placed great pressure on the road network, creating problems of congestion, especially in the urban centres. The increase in vehicular traffic has also exacerbated pollution, and was a factor in the government's decision in 2000 to restrict gasoline sales to unleaded petrol only.

Table 13: Vehicles Registered in St. Lucia – 1997 - 2001

VEHICLE TYPE	1997	1998	1999	2000	2001
GOODS VEHICLES	7,881	8,198	8,545	8,789	8,972
TAXIS/HIRED VEHICLES	1,230	1,522	1,718	1,824	1,894
MOTORCYCLES	642	674	720	750	757
PRIVATE VEHICLES	15,330	17,475	19,245	20,752	22,453
PASSENGER VANS	2,708	2,903	3,107	3,257	3,387
TRACTOR TRAILERS	34	34	34	34	39
EARTH MOVING EQUIPMENT	172	178	178	178	178
TRACTORS	40	40	40	40	40
OTHER/ NOT STATED	1,070	1,231	1,382	1,550	1,696
TOTAL	29,107	32,255	34,969	37,174	39,416

SOURCE: Road Transport Division; Ministry of Communications Works, Transport and Public Utilities

Public Transportation

2.76 All public passenger transportation services in St. Lucia are privately owned and the island's population centres are regularly serviced by mini-buses of varied passenger capacity and standards of comfort, providing connections to the cities and larger towns. At the end of 2001 there were 3,387 licensed passenger vans providing their services to a specified geographic area and the so called Route Taxis are required to operate along a specified route. The objective of the Route Taxi classification is to offer quality service at relatively low economic costs on low-density routes as an alternative to private cars. Route Taxis are normally un-metered single owner-operator cars, but there is a small group of companies which operate more than one vehicle. There is also a licensed hackney carriage taxi service which provides transportation services mainly to visitors to the island.

Transport Sector Fuel Pricing

2.77 Fuel prices and pricing margins need to provide correct signals to producers and consumers. Price distortions, such as subsidies and taxation, need to be reviewed. Subsidies on fuels have proved extremely costly to economies elsewhere. Consumers are better served by plentiful resources and several suppliers competing in a level market. In addition, downstream taxation must not differentiate between fuels, or between local and foreign suppliers. Policies should therefore discourage inter-fuel substitution.

2.78 Minimal regulations need to be put in place which should require that:

- policy formulation responsibilities and regulatory functions are assigned to different agencies;
- barriers to enter the local market are abolished (in particular, unnecessary legal and administrative procedures to build and operate new facilities);
- open access is introduced to monopolistic facilities (such as marine terminals, storage facilities, and pipelines) through non-discriminatory tariffs; and,
- quality standards are set for products that take into account the market characteristics and maximize the number of supply sources.

Table 14: Retail Price Computation for Unleaded Motor Gasoline 1999

	Category	**Value (**EC$)
A	Mean Caribbean Posting (AG)	1.05[19/]
B	I.G. equivalent of A	3.43
C	Freight and Insurance	0.25
D	Sub-total	3.68
E	Consumption Tax (variable)	1.15
F	Service Charge (4% of D)	0.15
G	Landed Cost (D+E+F)	4.98
H	Company Margin	0.80
I	Wholesale Margin (F+G)	5.78
J	Retail Margin	0.64
K	Final Retail Price (I+J)	6.42

Source: Report of LUCELEC Review Commission – 2000

Table 15: Retail Petroleum Price Movements 1990 – 1998 ($EC)

	1990		**1991**		**1992**		**1993**		**1994**		**1995**		**1996**		**1997**		**1998**	
	Jun	**Dec**	**Jun**	**Dec**	**Jun**	**Dec**	**Jun**	**Dec**	**Jun**	**Dec**	**Jun**	**Dec**	**Jun**	**Dec**	**Jun**	**Dec**	**Jun**	**Dec**
Gasoline	5	6	6	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.3
Kerosene	4.49	5.7	5.65	5.7	5	5	5	5	5	5	5	5	5	5	5	5	5	4.7

SOURCE: Central Statistical Office of St. Lucia

Air Transport

2.79 Air transport is of critical importance to the St. Lucian economy, being an important contributor to the tourism industry, the major economic activity in the island. Saint Lucia has two (2) airports. Hewanorra International Airport situated in the south of the island, caters for jumbo and other wide-bodied aircraft mainly out of Europe and North America and George F. L. Charles Airport, (formerly known as Vigie Airport) accommodates a number of general aviation and commuter airlines linking Saint Lucia to the other territories of the Eastern Caribbean. George F.L

[19/] Price in US$

Charles Airport attracts a greater volume of air traffic than Hewanorra International Airport. The average annual passenger throughput for George F.L Charles Airport is 394,000 while the average annual aircraft movement is 32,000. The average annual passenger throughput at the Hewanorra International Airport is 351,600. However, the average annual aircraft movements are only 10,104. There has been a decline in these movements since 2000, generally attributed to the terrorist attacks in the United States on 11th September 2001. However, these events are not likely to have affected cargo movements to the same extent as passenger travel.

Aircraft Uplift

2.80 Refuelling facilities exist at both airports and during 2001, approximately 5.2 million gallons of Av-jet aviation fuel was uplifted by aircraft flying out of St. Lucia.

Sea Ports

2.81 The Saint Lucia Air and Sea Ports Authority Act No. 10 of 1983 defines five (5) sea ports of entry into St. Lucia. They are at Castries, Vieux - Fort, Rodney Bay, Marigot Bay and Soufrière. All of the island's general cargo and cruise ships are handled exclusively at Castries. An indication of marine activity can be obtained by reviewing the number of vessels calling at the ports, the volume of cargo handled and the number of cruise ship calls and visitors. The number of cruise ship calls increased steadily from 301 in 1996 to 679 in 2000 but has since declined to 506 in 2002, probably reflecting the decline in world tourism resulting from the events of September 11, 2001. The number of passengers increased from to 181,555 to 530,680 in 2001 but declined to 424,474 in 2002, again probably because of the September 2001 terrorist events. The total number of vessel calls was 2,244 in 1998 and landed a total tonnage of 547,092. Total tonnage loaded in 1998 was 137,776.

Bunkering

2.82 Bunkering facilities for diesel fuel are available at ports of entry and in the case of the Rodney Bay Marina and various fishing boat terminals, both diesel and gasoline are sold at duty free prices to facilitate the fishing and yachting industry. No fuel oil bunkering is available in St. Lucia. During 2001, 177,719 imperial gallons or 706.4 toe of diesel fuel were supplied for marine bunkers.

Transport Sector Issues

Petroleum Supply and Pricing Issues

2.83 A comparison between the price computations for diesel supplied to the retail trade and that supplied to LUCELEC is shown in Table 16. The price differential which is charged for freight and insurance from Trinidad compared with those rates form the greater distance from St. Croix is a significant issue for GOSL to contemplate, as the price differences need to be resolved. This issue is explored elsewhere in this document and relates to the need for GOSL to revisit the recommendations of the 1991 Caribbean Least Cost Petroleum Supply Study carried out for the World Bank.

Table 16: Comparison of LUCELEC & Retail Diesel Price Build-up Feb 2000 (EC cents/IG)

	Category	Retail	LUCELEC
a	Ex. Refinery Price 1	268.63	243.94
b	Freight and Insurance 2	25.22	10.49
c	CIF Cost (a+b)	293.85	254.43
d	Service Charge (4% of c)	11.75	nil
e	Consumption Tax (variable) 3	162.9	20.0
f	Sub-Total	468.50	274.43
g	Wholesale Margin (f+g) 4	77.50	44.39
h	Wholesale Price	546.00	329.31
i	Retail Margin	52	nil
j	Final Retail Price (h+i)	598.00	318.82

Notes:

1. The ex-refinery rice for the retailer is the mean of Caribbean Posted Prices, whereas for LUCELEC it is the mean of "Platts Low Caribbean Cargo Posting" for No. 2 oil and the low plats "US Gulf Coast Posting" for No. 2 Oil.
2. Assuming that the product is taken from Trinidad, for the retail price build-up freight and insurance is a fixed rate from Pointe-a-Pierre Trinidad to St. Lucia. Other industry sources indicate equivalent rates ex-Trinidad of EC15.37 cents/IG lower. For LUCELEC's supplies the freight and insurance rate is from St. Croix to St. Lucia and is included in the US17.0 cents/AG add on.
3. LUCELEC is subject to neither consumption taxes nor Customs services charges. However, retail consumers pay an excise tax of EC20 cents/ IG in addition to a consumption tax. The latter is computed as a balancing item, moving with ex-refinery prices to retain the fixed wholesale and retail pump prices and margins established by Government. Accordingly the consumption tax varies inversely with ex-refinery price.
4. The wholesale margin to HOSL on sales to LUCELEC is the difference between the US17 cents/AG service charge, and the imputed freight St. Croix to St. Lucia (i.e.) EC 54.88 cents/IG–EC 10.49 cents/IG.

2.84 Whether the differences in fuel requirements are sufficiently important to determine the choice of transport modes can only be decided on a case-by-case, country-by-country basis. The relative cost differences between different transport modes in a given developing country may be so large that even substantial shifts in relative fuel prices are insufficient to alter the attractiveness of one compared with another. This issue is further complicated by the fact that taxes and distribution margins make up the major part of the end-user price of motor fuels, especially gasoline, in most oil importing developing countries. The foregoing highlights the fact that in

transport, energy policy issues are more complex than those encountered in the other sectors of energy demand. Two important transport energy policy issues arise – pricing and physical limitation of demand.

2.85 Fuel prices in the transport sector should reflect the following factors:

- the desire to reduce consumption and improve the efficiency of use;
- true foreign exchange and opportunity costs of fuels; and,
- the fact that fuel costs are a relatively minor proportion of total transport costs.

2.86 Demand for gasoline among motorists appears to be relatively price-inelastic in the short term, which means that substantial and massive price increases are necessary to have any marked effect on demand. Even in those developing countries where such price increases have occurred, there is no clear evidence that consumption has declined although consumption growth rates may have been reduced. There is also evidence of inelastic demand for the services of road haulage industries, which means that diesel oil price increases are usually passed through to the consumer without a noticeable decline in fuel demand. Leaving aside the effect on public opinion, doubling of fuel costs usually leads to a relatively much smaller increase in overall transport costs, which implies that transport fuel costs could be kept at a relatively high level in order to restrain wasteful consumption, and as a revenue raising device[20/].

Duties and Taxes

2.87 In the transport sector, duties and licences are set and collected in accordance with administrative convenience rather than economic principles. For example, the licensing fee for light vehicles such as cars and pick-ups is incorporated in the price of petrol, thereby shifting the burden of administering vehicle licences from GOSL to the fuel suppliers[21/] and ultimately the purchasers of fuel. This may very well be an administrative convenience, but sends the wrong price signal by penalising high mileage users with a higher than necessary fuel prices relative to low mileage users.

2.88 Further, from an energy perspective, the duty structure for vehicles does not appear to be developed on a rational basis. Import duty on motor vehicles is currently based on engine capacity and not the level of efficiency. It appears that engine capacity is used as a proxy for fuel consumption and this is not necessarily the case. Very often, engines with larger capacities are more efficient users of fuel per passenger mile in the road conditions encountered in St. Lucia. For example, a highly tuned (for performance) 1600cc vehicle is likely to be more fuel inefficient and

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[20/] The World Bank reports that fuel costs in the UK in 1975 accounted for about 17 percent of the total cost of professional road haulage operations (based on diesel oil) and about 25 percent of private motoring costs (based on gasoline). Substantial diesel oil and gasoline price increases would, therefore, lead to smaller but nevertheless significant increases in road haulage and motoring costs. It was estimated then that doubling fuel costs would cause only about 20 percent increase in total vehicle operating costs. In the case of road haulage these increases will be passed on to customers. Despite the relatively minor effect of fuel price increases on transport costs, such increases are used by transport operators to justify disproportionate demands for tariff increases, and so are popularly regarded as being highly inflationary, despite evidence to the contrary.

[21/] All vehicles with tares (weight of vehicles without fuel or load) equal to and greater than 3 tons pay an annual licensing fee of EC$300 in addition to the regular price of petrol.

produce more greenhouse gases than a moderately tuned low performance 2,000cc or 2,500cc car when operated on hilly terrain in congested traffic conditions. Studies would need to be carried out to determine the overall efficiency of transportation per passenger mile of various classes of vehicles in use in St. Lucia to use the results as a basis for allocating relative import duties between different classes of vehicles.

Traffic Management

2.89 The are significant traffic management problems in St. Lucia which result in large economic losses and during peak hours, it is not unusual for a trip from Gros Islet in the north of the island to Castries to achieve average speeds of only about 7 miles per hour. This results in significant wastage fuel and also the production of large incremental amounts of greenhouse gases. It is urgent that GOSL conduct surveys and studies and undertake the necessary upgrading and traffic management measures to increase the average speed on this thoroughfare as there is a potential for significant time savings to be achieved.

2.90 Several projects to be funded during Financial Year 2003/2004 include the ongoing Road Development Programme, the Tertiary Roads Rehabilitation Project, which is to be funded by the French Government, and the Castries Gros Islet Highway Improvement, which is to be funded by the Kuwait Fund for Arab Economic Development. This latter project is expected to impact positively on the traffic management problems in the Gros Islet Castries corridor. In addition, GOSL, with the assistance of the Agence Français de Development (AFD) is in the process of conducting a study aimed at upgrading the transportation network within Castries. The "Castries Basin Transportation Study" is aimed at developing an integrated multidisciplinary approach for dealing with the several transportation issues which plague the Castries basin.

Current Energy Sector Policy Initiatives

2.91 To date, most energy sector initiatives and policy directives in Saint Lucia have been founded on *ad hoc* reaction to current issues as and when they arise. Consequently, the development of the energy sector in general and the power sector in particular has not had the benefit of a coherent strategy.

2.92 In recognition of the strategic importance of the energy sector to the economic performance, and to ensure that the further development of the energy sector proceeds in an orderly manner, Government has therefore commission a review of the energy sector and the development of a comprehensive strategy for the sector. The review will provide background analysis for the development of the comprehensive energy sector policy, strategy and investment programme, consistent with macro-economic strategy and objectives.

2.93 Significantly, Government has already embarked on a number of sector initiatives and in May 1999, adopted a policy to eliminate all import duties and consumption taxes on renewable energy equipment and materials, and in April 2001 decided to allow the purchase of solar water heaters as an allowance against taxable income. However, there remain significant impediments to the widespread use of these technologies. Recognizing the need to address and ensure the long-term sustainability of its energy sector, the Cabinet of Ministers, in March 2000, approved the development of the SEP. The SEP provides the basis for the development of renewable energy

resources in St. Lucia and was the important first step to encourage renewable-energy development in St. Lucia.

Sustainable Energy Plan

2.94 The SEP sets out a strategy for the maintenance and growth of the energy sector by pursuing the following objectives:

- Ensure the existence of adequate energy supplies to sustain economic development, while meeting current and projected power demand.
- Provide for stable and reliable electricity supplies for all customers.
- Enhance the security of energy supply and use for all sectors of the economy.
- Allow reasonable incomes for businesses engaged in the local energy sector, while attracting international investment where appropriate.
- Promote energy efficiency and conservation at all levels of the economy in order to achieve optimum economic use of renewable and non-renewable sources of energy.
- Protect the local and global environment by maximizing the use of renewable-energy and energy-efficiency alternatives where viable, thereby enabling Saint Lucia to become a *"Sustainable Energy Demonstration Country"* by 2008-2012 in accordance with its announcement made at the Fifth Meeting of the Conference of Parties of the United Nations Framework Convention on Climate Change.

Energy Sector Baseline [22/]

2.95 The following baseline has been established by the SEP for purpose of comparison and is consistent with the goal of ensuring that sufficient, cost-effective, and reliable electrical power will be available to all customers in keeping with an expected annual economic growth rate of 3.1%.

- Current installed capacity is 66.4MW. The peak demand is 43 MW, and the average base load is 26.6 MW. All installed capacity is derived from diesel powered generators.
- Installed capacity in 2005 will be 79MW (21.3 MW additional diesel-powered generating capacity); peak demand in 2005 will be 53.6 MW.
- Installed capacity in 2010 will be 91 MW (33.3 MW additional diesel-powered generating capacity); peak demand in 2010 will be 65.6 MW.
- Universal electricity coverage of the residential sector will be achieved by the year 2002. Electricity is currently available to approximately 98% of commercial and residential properties in the country.

[22/] The baseline and projections for the energy sector through 2010 are based on analyses prepared by the Government of Saint Lucia, LUCELEC, and other organizations

- Current greenhouse gas emissions (GHG) from the electricity sector are 156,530 tons of Carbon.

- The projected GHG emissions from the sector in 2005 are 188,860 tons of carbon.

- The projected GHG emissions from the electricity sector in 2010 are 230,060 tons of carbon.

- In 1999, 82,214 barrels of diesel and 338,454 barrels of gasoline were consumed in the transport sector by a fleet of 33,563 vehicles. In 2010, 128 916.7 barrels of diesel and 643 130.7 barrels gasoline will be consumed by a fleet of 60,575 vehicles (no alternative-fuelled vehicles are assumed for this baseline figure).

Sector Targets [23/]

2.96 The SEP establishes the following targets for the energy sector which are to be achieved by the years 2005 and 2010 (See also table 2).

- Reduce projected electricity demand by 5% in 2005, resulting in a peak demand in 2005 of 51 MW, which will require an installed capacity of 75MW.

- Reduce projected electricity demand by 15% in 2010, resulting in a peak demand in 2010 of 55.7 MW, which will require an installed capacity of 77.4 MW.

- Deliver 5MW, or 7% of installed capacity, via renewable energy technologies in 2005.

- Deliver 17MW, or 20% of installed capacity, via renewable energy technologies in 2010.

- As a result of reductions in demand and increased use of renewable energy resources, reduce the annual consumption of diesel fuel for electricity generation to 436 579 barrels in 2005 (12% reduction from the baseline) and 392 823 barrels in 2010 (35 % reduction from the baseline.

- Reduce the annual GHG emissions from the electricity sector to 166 197 tons of carbon/year in 2005 and 149 539 tons of carbon/year in 2010.

- Reduce the consumption of gasoline and diesel fuel in the transportation sector to 122 471 barrels of diesel and 610 974 barrels of gasoline in 2005 (5% reduction) and 109 579 barrels of diesel and 546 661 barrels of gasoline (15% reduction) in 2010. These reductions will be achieved by a combination of measures, including the increased use of public transportation, the introduction of high-efficiency vehicles, the deployment of a limited number of vehicles powered by alternative fuels, driver education and awareness to reduce fuel consumption, and improvements in road and traffic management.

[23/] Proposed alternatives to the baseline and scenarios described above, including reductions in demand and additions to capacity via renewable energy systems, are based on the best available information regarding project feasibility and commercial interest.

2.97 Table 17 summarises targets which have been established in the SEP for the reduction in electricity demand and energy production from conventional sources of energy, energy production from renewable energy sources, and the reduction in greenhouse gas (GHG) emissions.

Table 17: Electricity Sub-sector SEP Targets

Year	Target Peak Demand	Reduction from Baseline	Target Installed Capacity	Reduction from Baseline	Target Renewable Energy Installed	Proportion of total Installed Capacity	Diesel Fuel Consumption	Reduction from Baseline	CHG Emissions	Reduction from Baseline
	(MW)	(%)	(MW)	(%)	(MW)	(%)	(bbls)	(%)	(toce)	(%)
2005	51	5	75	5	5	7	436, 579	12	166, 197	12
2010	55.7	15	77.4	15%	17	20	392, 823	35	149, 539	35

Note: 1. (toce) – tons of carbon equivalent
2. (bbls) – barrels

Policy Objectives

2.98 The objectives of this policy paper are to: (a) review the global and national developments and their relevance to St. Lucia's energy sector; (b) identify and develop short to medium term energy sector policy options that are needed to consolidate the economic gains and policy initiatives of the past years; and (c) enable St. Lucia to achieve sustainable growth without encountering energy supply shortages and bottlenecks. While developing and reviewing the policy recommendations, the policy makers must recognize the resource and adjustment constraints that Saint Lucia currently faces. The effort should be aimed at identifying pragmatic least economic cost energy supply options which could be employed with minimum public sector reliance or exposure.

2.99 The broad objectives for a comprehensive energy policy for St. Lucia will, inter alia, include measures aimed at:

(a) establishing an appropriate regulatory framework to protect consumers, investors and sector entities.

(b) ensuring energy supplies to St. Lucia at the least economic cost through a combination of public and private sectors under a deregulated and liberalised environment;

(c) diversifying St. Lucia's energy base – optimal development of indigenous energy resources where economically feasible – and ensuring security of supplies;

(d) increasing the efficiency in energy production, conversion and use with the overall objective of reducing the 'energy intensity' of the economy;

(e) implementing appropriate and economic pricing policies to ensure that adequate energy supplies are delivered to all economic sectors efficiently;

(f) improving the institutional capabilities within GOSL to carry out such tasks as energy end-use analysis, estimating the cost of power outages to the St. Lucian economy and modelling the effect of demand side management, environmental effects and pricing policies; and,

(g) reducing the adverse environmental effects and pollution caused by the production, storage, transportation and use of energy.

III. Global Framework

Global Developments and Prospects

3.01 Between 2000 to 2001, growth in trade underwent one of the most severe decelerations in modern times - from over 13 percent in 2000 to 1 percent in 2001. Developing countries are confronting a 10 percentage point drop in the growth of demand for their exports. Although the weight of evidence pointed to a probable recovery in mid-2002, the risks posed to recovery are the gravest in a decade. The terrorist attacks in the United States, although it is still too early to evaluate them fully, have unleashed new and unpredictable forces that have substantially raised the risk of a global downturn.

3.02 Against this uncertain backdrop, world leaders launched an intense discussion about whether to begin a new round of global trade negotiations at the ministerial meeting of the World Trade Organization (WTO) in November 2001. A round would offer an opportunity to renew progress on multilateral rules that open markets and expand trade. A reduction in world barriers to trade could accelerate growth, provide stimulus to new forms of productivity-enhancing specialization, and lead to a more rapid pace of job creation and poverty reduction around the world.

3.03 The international community faces a clear choice: whether now is the time to continue down the path toward greater openness that has led to greater integration and prosperity for more than five decades, or whether to allow the hiatus in the wake of the WTO meetings in Seattle (1999) to endure. If trade talks are to succeed in underpinning a new wave of global prosperity, and at the same time contribute to raising the incomes of the poorest in the global community, they will have to ensure that the world's poorest countries and poorest people will benefit.

Prospects for the Developing Countries 2003

3.04 Though global GDP is expected to rise by 2.5 percent in 2003 [24/] as a result of improved business health and policy stimulus in the U.S. and Europe, the chances of the world economy sliding toward recession are real[25/]. Regional variations in growth in developing countries are striking: 6.1 percent in East Asia compared to 1.8 percent in Latin America. The poverty targets are likely to be achieved by most regions, except for Africa which lags behind.

3.05 The sluggishness in the world economy is also seen in a reduction in private capital flows to developing countries – both net commercial lending and foreign direct investment (FDI). FDI flows to developing countries peaked at $180 billion in 1999, and have fallen back to the $160 billion range. Rising global risk premiums have led to a reversal in debt capital flows. The precarious market conditions have also reduced infrastructure investment sharply. Besides the fall in investment in absolute terms, investors are becoming more selective in choosing their

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[24/] *Global Economic Prospects and the Developing Countries 2003* – World Bank

[25/] In its most recent forecast (April 2003) the IMF has established a baseline for subnormal growth of 3.2 percent (1.1 trillion dollars) in 2003, rising to 4.1 percent in 2004. This baseline assumes a tepid global recovery with normal growth only resuming sometime during the first half of 2004

investment destinations. As a result, investment is flowing to countries with better domestic investment climates: good governance, sound institutions and a system of property rights.

3.06 The historical GDP growth trends and projected growth prospects for various regions of the world are:

Table 18: GDP Growth and Prospects (%)

	1960-69	1970-79	1980-89	1990-99	2000	2001	2002 [26/]	2003 [27/]
East Asia & Pacific	4.0	7.1	7.6	7.6	7	6	..	..
Latin America & Caribbean	5.2	5.8	1.8	2.8	4	0	..	1.8
Lower middle income	5.8	5.4	4.0	3.0	6	4	..	..
Middle income	5.6	5.8	2.9	2.9	5	3	..	..
South Asia	4.2	2.8	5.8	5.5	4	5	..	..
Sub-Saharan Africa	4.8	4.0	2.3	2.0	3	3	..	..
World	5.6	4.0	3.2	2.4	4	1	1.6	2.5

Source: World Bank – *World Development Indicators database*

Financing Constraints

3.07 Traditional sources of external finances for developing countries during the decade of the 1990s were scarce, and the indications are that this situation will continue into the decade of the 2000s. Additional demands for concessional resources from new recipients will therefore face serious pressure, while supplies of such funds are likely to become even tighter from traditional donor nations. The developing countries must, therefore, expect to finance their investment requirements largely from their own savings or non-traditional sources, including the private sector.

Latin America and the Caribbean Region

Recent developments

3.08 In reviewing the performance of the economies of Latin America and the Caribbean, the World Bank Report Global Economic Prospects and the Developing Countries 2003 concludes that unlike most other developing regions where economic growth strengthened in 2002, GDP contracted 1.1 percent in Latin America, about 1.6 percentage points lower than anticipated in the early part of the year. This growth deceleration from 0.4 percent in 2001, however, was the result of enormous economic contraction in a handful of countries, fuelled in large part by the external environment and aggravated by domestic factors. The external environment for most of Latin America was more adverse than expected at this stage of the global economic recovery. Despite low interest rates in industrial countries, capital flows to developing countries fell, and the decline was especially pronounced in the Latin America and the Caribbean (LAC) region, partly because of the crisis in Argentina and its small neighbours. Few countries were able to attract the necessary

[26]/ *Global Economic Prospects and the Developing Countries 2002* – World Bank
[27]/ *Global Economic Prospects and the Developing Countries 2003* – World Bank

capital flows to sustain a strong growth recovery in the absence of rising domestic savings. U.S. growth, after a strong start in the first quarter of 2002, weakened significantly thereafter, while European growth was anaemic, resulting in lower growth expectations for LAC principal markets in the short term. The region's export market growth rate was a disappointing 1.2 percent in 2002 and was not helped by the price fall in key commodities exported by the region (for example, sugar fell by 26.5 percent, Arabica coffee by 8.8 percent, bananas by 7.4 percent, aluminium by 6.5 percent, and copper by 0.2 percent). Moreover, tourism revenues were weak because of reduced air travel from North America (affecting the Caribbean countries), and the collapse of income in Argentina significantly affected tourism in Paraguay and Uruguay as well as workers' remittances to Bolivia and Paraguay. Domestic factors are important in explaining the weak economic performance in a small set of countries, and these countries contributed most to the region's dismal growth performance in 2002.

Economic Prospects

Near-term Outlook

3.09 Provided there is a turnaround in the current uncertain political and financial market outlook the Global Economic Prospects and the Developing Countries 2003 [28]/expects that the region's growth prospects will improve in 2003, supported by strengthening of the global economy, particularly in trade volumes, commodity prices, and capital flows and the region's GDP is now expected to grow by 1.8 percent in 2003 – still almost 2 percentage points lower than earlier forecasts, however, but in line with the downgrading of world growth. Greater fiscal adjustment in a number of countries with high debt and relatively large financing requirements is a necessity for reducing economic vulnerabilities. This, along with reforms currently on the agendas of many countries, is needed to restore investor confidence (which will lower interest costs), attract more equity external financing, and reinvigorate growth.

OECS Region

3.10 After growing at an average annual rate of 3½ per cent in the 1990s, real GDP in the region grew by 2½ per cent in 2000 but fell by 1½ per cent in 2001, in an unprecedented decline since 1976. The combined central government deficit also widened from 5½ per cent of GDP in 2000 to around seven per cent of GDP in 2001, and is estimated to have remained broadly unchanged in 2002. The combined stock of public sector debt also increased to about 80 per cent of GDP in 2001 and grew further in 2002 while the debt stock of the countries in the region ranged between 40-135 per cent of GDP at end-2001. Based on this performance, the IMF has called for priority to be given to correcting the deepening fiscal imbalances, with a view to safeguarding the stability of the currency board arrangement and of the financial system in general. It also wants to see structural reforms aimed at strengthening the region's competitiveness and growth potential.

3.11 The economies of the Organisation of Eastern Caribbean States (OECS) face an unpropitious future. Individually, the island economies are small, highly dependent on foreign commodity markets for a reduced number of products. Although in the past progress towards the

[28]/ World Bank publication - 2003

regional single market economy by CARICOM has been halting, in recent times leaders have come to the conclusion that they have no alternative but to forge a much closer economic relationship with the states of Latin America, including Cuba.

3.12 Growth remains subdued, as these open economies continue to grapple with a decline in travel and the slowdown in the global economy. Public finances have generally worsened as weak economic activity reduced revenue and strained social programs. In response, Caribbean governments are intensifying economic reforms and consolidating budgets to improve their international competitiveness and build the basis for renewed expansion. However, since these economies are inextricably linked to the global economy, they will likely face modest growth prospects if current global trends continue. The economies of CARICOM are in a most difficult and precarious situation. Small and highly open, they are extremely vulnerable to international economic developments such as WTO liberalisation programmes and the loss of preferential markets; reduced net in-flows of foreign capital, especially official development assistance; and unanticipated increases in expenditures for international security. Seven of our eleven most important commodity exports in 1995 experienced price declines and lost market share in 2000. Tourism, vitally important for foreign exchange and employment, declined dramatically as a result of September 11, 2001.

Commodity and Energy Prices [29/]

Primary Commodity Prices

3.13 Crude oil prices increased about 3 percent in 2002 as a result of tight supplies and Middle East tensions. Non-oil prices increased about 5 percent, led by a 9 percent increase in agricultural commodities, which more than offset a 4 percent decline in metals and minerals. Uncertainty about the strength of the global economic recovery contributed to the decline in metals and mineral prices, but the effect of uncertainty on agricultural prices was offset by lower supplies of selected commodities, such as grains and oilseeds, because of drought. The weakness in the U.S. dollar supported commodity prices. Non-oil prices are in the early stages of price recovery. That recovery is expected to last about three years before nominal prices will begin to weaken. The strength of the global economic recovery will strongly influence the timing and strength of the recovery in metals and mineral prices. However, the recovery of agricultural prices will be more strongly influenced by supply increases and by recent weather disturbances such as El Niño and droughts. The index of nominal non-oil commodity prices is projected to increase by 5.8 percent in 2003 and by nearly 8 percent by 2005 in real terms.

Review of Oil Prices and Prospects

3.14 Oil prices slumped after September 11, 2001, because the economic recession, mild weather, and reduced air travel weakened demand. Also, OPEC made no attempts to prop up falling prices. However, as OPEC prices fell well below the organization's target range of $22 to $28 per barrel (OPEC basket $17.53 per barrel in December 2001), ten (10) OPEC countries, excluding Iraq, agreed to reduce production quotas 6.5 percent at the start of 2002. This reduction was the fourth cut in quotas in less than a year, totalling 5 million barrels per day or 19 percent.

[29/] Analysis in this section is based on projections prepared by the World Bank and published in *Global Economic Prospects and the Developing Countries 2003*

Prices started to rebound at the end of 2001 on expectations that markets would tighten because of a recovery in world oil demand, OPEC output restraint, and declining stocks. In addition, perceived threats of a supply disruption from a United States-led invasion of Iraq also helped push prices higher, and those anxieties deepened as the year progressed.

3.15 During the 1990 war in the Persian Gulf, more than 4 mb/d of oil from Kuwait and Iraq were removed from international markets, and prices exceeded $40/bbl. There was substantial surplus production within OPEC, and the organization raised output – but not immediately. Importantly, prices did not fall until the war commenced (and its success was quickly assured) and the strategic stocks were released. Since Iraq is exporting only around 1 mb/d, much less oil is at risk.

Table 19: Global Balance for Petroleum

(million barrels per day)

	1970	1980	1990	2001	2002	2003	Annual growth rates (%)		
							1970-80	1980-90	1990-2001
Consumption									
OECD	34.0	41.5	41.5	47.7	47.6	48.0	2.0	0.0	1.3
Former Soviet Union	5.0	8.9	8.4	3.7	3.8	3.9	6.0	- 0.6	- 7.2
Other non-OECD Countries	6.8	12.3	16.1	25.1	25.3	25.7	6.1	2.7	4.1
Total	**45.7**	**62.6**	**66.0**	**76.5**	**76.6**	**77.5**	**3.2**	**0.5**	**1.3**
Production									
OPEC	23.5	27.2	24.5	30.2	28.5	28.7	1.5	- 1.0	1.9
Former Soviet Union	7.1	12.1	11.5	8.6	9.3	9.9	5.4	- 0.5	- 2.6
Other non-OPEC countries	17.4	24.6	30.9	38.2	38.6	39.1	3.5	2.3	1.9
Total	**48**	**63.9**	**66.9**	**76.9**	**76.4**	**77.7**	**2.9**	**0.5**	**1.3**
Stock Change, miscellaneous	2.3	1.3	0.9	0.4	-0.2	0.3			
Memo Item: Iraq	1.6	2.7	2.0	2.4	1.9	2.0	5.5	- 2.7	1.5

Sources: BP, International Energy Agency and World Bank

3.16 There is more surplus capacity within OPEC than in 1990, and sufficient spare capacity within Saudi Arabia alone could easily replace lost oil from Iraq. However, OPEC desires prices of at least $25/bbl, and it is not clear how quickly its members will raise production to prevent a surge in prices. In such an environment, crude prices could be bid up sharply because of higher demand, speculation, and hoarding. Buyers might have to pay a substantial premium for prompt supplies, and prices could rise to 1990 levels. Once war ends, however, prices could fall precipitously as a result of a higher OPEC production, a draw from strategic stocks, and the return of Iraqi exports. Disputes within OPEC over market share could take prices well below $20/bbl. Crude oil prices are expected to remain firm in early 2003 because of the potential for military action against Iraq and tight supply conditions resulting from production restraint on the part of OPEC.

3.17 Once Middle East tensions ease, however, oil prices are expected to decline because non-OPEC oil supplies will increase and Iraqi oil will return to the market. The average price of crude oil is projected to decline from $25 per barrel in 2002 to $23 per barrel in 2003. By 2005, crude oil prices are projected to decline to $19 per barrel.

Table 20: Energy Prices and Price Projections in current dollars

Energy Source	Units	Actual					Projections				
		1970	1980	1990	2000	2001	2002	2003	2005	2010	2015
Coal, Australia	$/mt	n.a.	n.a.	39.67	26.25	32.31	26.5	26.00	27.00	29.50	32.00
Crude Oil, Average	$/bbl	1.21	36.87	22.88	28.23	24.35	25.00	23.00	19.00	19.00	21.00
Natural Gas, Europe	$/mmbtu	n.a.	3.40	2.55	3.86	4.06	3.00	2.80	2.60	2.75	3.00
Natural Gas, U. S.	$/mmbtu	0.17	1.55	1.70	4.31	3.96	3.25	3.20	3.00	3.00	3.25

Source:: World Bank Development Prospects Group – projections as at November 12, 2002

IV. Review of National Economic Performance and Prospects

Land Area, Population and Employment

4.01 St Lucia, with an area of 616 square kilometres, has about 45% of the arable land under agriculture. The population has been growing at an average rate of about 1.24% p.a. and according to preliminary estimates, increased by 0.78 percent in 2002 to a total of 159,133 persons[30/]. By habitat, the population is equally distributed between urban and rural areas. The Labour force in St. Lucia is estimated to be about 43,800 and is divided by occupation according to: agriculture 43%, services 39%, industry and commerce 18% (1981 estimate) The Unemployment Rate is estimated to be 15% (1996 estimate)

Economic Performance

4.02 1970 - 1990 Between about 1973 and 1980, the economy experienced a period of decline which mainly resulted from the two oil shocks and the mid 1970s recession in the industrial countries. From 1980 up to 1990, however, St. Lucia enjoyed a steady growth, which was spurred by direct private foreign investment in agricultural development and in the tourism sector. During the period 1980 to 1990, while GDP increased at the average rate of about 7.7 % p.a., employment grew at a slower rate. Per Capita GDP increased at the average rate of about 6.3 % during this period.

4.03 1990 – 2000 Between 1991 and 1997, growth rates declined considerably and averaged about 2.7 % during this period. The weakened economic performance during this period largely reflected the erosion of preferential access to the EU banana market and low productivity of the banana industry. Aiming to widen the economic base, the government relied heavily on tax incentives to spur development. However, this policy resulted in a lack of buoyancy of tax revenue which together with large increases in current expenditure, including the wage bill, led to a declining public sector savings. The fall in public sector savings and a downward trend in foreign grants resulted in a large reduction in public sector capital outlays.

4.04 The new administration that took office in mid-1997 introduced revenue measures in the 1998/99 (April–March) budget, and maintained strict control on current expenditure on goods and services. As a result, public sector savings are expected to rise to 8 percent of GDP (6½ percent in 1997/98). With foreign grants (mainly disbursements of STABEX funds from the EU) rising to more than 3 percent of GDP, the public sector was able to raise investment to 10½ percent of GDP (6½ percent in 1997/98) while maintaining an overall surplus in 1998/99. In 1998, output growth picked up to 3 percent (2 percent in 1997) as a rapid rise in revenue from tourism more than offset the continued fall in banana production. The external current account deficit narrowed to 6¾ percent of GDP (12½ percent in 1997) as the fall in banana exports was more than offset by an increase in receipts from tourism and a fall in imports.

[30/] Source: GOSL Economic and Social Review 2002 http://www.stlucia.gov.lc/documents/EconomicSocialRev2002.pdf

4.05 Current position and prospects[31/] – the recent changes in the EU import preference regime and the increased competition from Latin American bananas have made economic diversification increasingly important in Saint Lucia. The island has been able to attract foreign business and investment, especially in its offshore banking and tourism industries. The manufacturing sector is the most diverse in the Eastern Caribbean area, and the government is trying to revitalize the banana industry. Despite negative growth in 2001, economic fundamentals remain solid, and GDP growth recovered in 2002.

4.06 During 2002, the Saint Lucian economy witnessed a marginal recovery, reflected in a real GDP growth rate of 0.1 per cent. This growth rate is of some significance, following the 4.6 per cent contraction in the previous year. Moreover, the significance of this development in the context of the global economic downturn and against the backdrop of major international trends and events resulting from globalization, upheavals in the international financial system, the rise of terrorism and concerns about personal security.

4.07 Activity in the financial sector mirrored the pace of economic activity in the real sector. Accordingly, domestic credit grew by a modest 3.6 per cent to $1,431.81 million. Credit to the business sector increased by 5 per cent, while household credit declined by 3.7 per cent. Broad money supply (M2) increased by 3.1 per cent, reflecting growth in the real sector. Despite the slow pace of economic activity, private sector savings deposits expanded by 13.8 per cent to $652.33 million. Liquidity in the banking system improved to 91.9 per cent, reflecting faster growth in deposits relative to loans and advances.

4.08 Banana Industry – the performance of the Saint Lucian economy was influenced by a recovery in banana output, expansion in output of the manufacturing and communications, sectors and modest recovery in tourism arrivals. However, the increase in activity in tourism was offset by the prevalence of heavy discounting within the industry. Output in the agriculture sector contracted by only 1 per cent in 2002, compared with a contraction of 22.6 per cent in 200. Reflected in this performance, is growth of 36.7 per cent in value added in the Banana Industry. Banana exports increased by 41.5 per cent to 48,160 tonnes, due to the positive impact of restructuring initiatives in the industry. Despite the improvement in output and the restructuring of the industry, the Banana Industry is still faced with the major challenge of liberalisation of the market in 2008. The survival of the Banana Industry beyond 2008 will largely depend on St Lucia's ability to produce and market a top grade, world-class fruit at a high level of efficiency.

4.09 Tourism – against the backdrop of weak demand for travel, the tourism industry began to show signs of recovery over the sharp downturn experienced in 2001. Tourism continued to contribute significantly to the economy, accounting for 12.5 per cent of total GDP, which represents the largest contribution by any sector. Following an unprecedented 7.3 per cent slump in 2002, there was a 1.3 per cent rebound in arrivals to 253,463, just over the 1998 level. The comparatively sharp decline recorded in the first quarter was more than offset by strong increases in the third and fourth quarters. This was the result of a lessening of the negative impact of the 9/11 terrorist attacks on the demand for travel, coupled with generally improved economic conditions in source markets. This boost in arrivals was also aided by more aggressive marketing in key markets. These positive factors notwithstanding, price competition from other destinations,

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[31/] Source: Budget Presentation: http://www.stlucia.gov.lc/primeminister/budgetaddresses/BudgetAddress2003.pdf

including regional ones, continued to pose the most significant challenge for the island's marketing as a stay over tourist destination. Indications are that the real tourism output, as measured by value added in the hotel and restaurant sectors, slipped by 0.6 per cent. This demonstrates that we have virtually stemmed the sharp contraction of 10.6 per cent experienced in 2001.

4.10 With regard to the cruise sector, ship arrivals slumped by 21 per cent, from 378 in 2001 to 245 for 2002. Cruise passenger arrivals totalled 387,180 in 2002, slowing from the more robust gains of the past and below the 500,000 mark, which was achieved in 2001. Many cruise ship companies decided to re-programme vessel itineraries closer to the United States and Central America in response to concerns about safety. Arrivals fell consistently throughout 2002, with sharp drops in April, July, August and November.

4.11 Manufacturing Activity in this sector increased by 5.0 per cent in 2002 compared to a decline of the same magnitude in 2001. This appears to be evidence that the current regime of fiscal incentives, technical assistance grants and Consumption Tax rebates have produced much needed dividends in this difficult environment. The value of food and beverage items produced increased by 17 per cent to $59.7 million. Despite this significant increase, the export of these commodities to the regional market remained weak. Demand in regional economies slackened, as they too faced the full effects of the global recession. In 2002, output of paper and paper derivatives increased by 28.2 per cent, reflecting the recovery in banana output. The production of electrical components increased by 47.4 per cent to $25.8 million, while furniture manufacture increased by 39.7 per cent to $2.7 million. Declines were recorded in the production of copra and its derivatives, and textile and apparel.

4.12 Construction Activity in this area increased during the year 2002. Applications or building permits increased by 12.8 per cent to 503 which was mainly due to applications for building for commercial purposes, as residential related applications declined. During the last calendar year outstanding credit to the construction sector grew by 10.6 per cent to $110.9 million, consistent with the rise in the number of building permit applications. Also consistent with the increase in applications for commercial buildings, 57.7 per cent of credit to the construction sector was targeted at the commercial sector. This boost in commercial construction can be attributed to government's policy of facilitating businesses in improving the physical image of the City of Castries and other urban areas by allowing them duty free concessions on building materials and a tax write-off for expenditure related to the renovation of commercial buildings.

4.13 Service Sector This sector has been identified as the sector that will provide the impetus for the future development of St. Lucia. Despite sluggish economic performance, activity in the banking and insurance sector increased by 1.2 per cent. Value added in the communications sector increased by 7.5 per cent. Declines were noted in the wholesale and retail trade (3.3 per cent) and electricity and water services (0.16 per cent).

Economic Adjustment and Prospects

4.14 St. Lucia is well-endowed with natural resources, has a relatively well-educated and skilled labour force and enjoys proximity to North American markets. However, the economy is highly sensitive to external developments such as foreign demand and prices for its exports and tourism

preferences, etc. The developments and integration of regional trade areas, such as NAFTA in the north, will have major economic implications for St. Lucia.

4.15 The principal economic objectives of GOSL's strategy for Saint Lucia are the following: export diversification, human resource development, poverty reduction, environmental protection and infrastructure development. Projects to be financed under the strategy are particularly important to GOSL's overall thrust to restructure the economy and position Saint Lucia on a path of sustainable growth in the "post-preferences era".

4.16 Liberalisation GOSL is committed to a program of adjustment and stabilisation based on the liberalisation of the economy and enhanced participation of the private sector. It recognises that the private sector is pivotal to its development goals and will therefore focus its efforts on providing incentives and support that will encourage higher levels of private sector activities. Acting within the context of on-going public sector reform and development initiatives, GOSL will *inter alia*:

(a) Provide opportunities for people participation in ownership by selling shares in entities currently owned by the Government on the public market;

(b) Progressively discontinue Governments' involvement in those activities that can be better performed by the private sector, while maintaining regulatory oversight;

(c) Vigorously implement a fiscal reform programme built around the development of efficient revenue and expenditure systems and the harmonisation of taxation policies;

(d) Restructure its investment incentive regimes to provide encouragement to existing and new investors to undertake more sustainable and productive investment in areas of the economy that offer competitive opportunities.

4.17 Growth Prospects For a relatively small island economy, St. Lucia retains unusually diverse opportunities for growth. Barring major external shocks and a continued macroeconomic adjustment process, GDP growth is expected to be fairly broad-based, and is projected to average at about 3 % p.a. in the mid-2000s.

4.18 The major impetus to growth is expected to arise from rehabilitation of export agriculture; construction; expansion in tourism sector; and improvement in social infrastructure. These sectors are closely linked to growth in energy demand and show above average prospects for growth. These higher growth rates are expected to be in response to improvements in the incentive framework for private sector investment. Tourism has become more competitive and is expected to grow steadily through the 2000s.

4.19 Financial Constraints The data on the financial sector suggest that there remains substantial capacity for expansion in the real sector. With the available capacity and cheaper cost of funds, GOSL is expecting that the private sector will be encouraged to see this as an opportunity to increase investments in the productive sector. The economy should benefit from net direct foreign private investment at levels significantly above those of recent years in real terms.

V. Energy and the Economy

Introduction

5.01 As an economy grows, productivity improves for all inputs and the total amount of energy per unit of GDP declines. This is why there is usually an overall decline in energy intensity over time. Initially, as a country develops, the share of commercial energy increases at the expense of non-commercial energy, leading to an increase in commercial energy intensity before it flattens out. Eventually, once the economy matures, this intensity declines.

5.02 As economic development takes place, the impact of density of population, rate of urbanization, climate etc. on the level of energy intensity diminishes, while the role of energy prices becomes fundamental. Low prices result in intense energy use and vice-versa, and as a result there is usually an inverse relationship between energy intensities and end-user prices. However, depending on how efficiently the market operates, similar economic, geographical and price conditions may not always result in the same levels of energy consumption and/or in the same wellbeing.

5.03 There is a role for government to ensure that markets are efficient, to intervene in case of market failure, and to avoid price distortions or to correct those which occur. Different but complementary policies or programmes can increase energy efficiency and lower energy intensity.

5.04 Among such policy measures are:

- Allowing energy prices to reflect market conditions by removing their subsidies and/or incorporating environmental externalities;
- Enhancing the way markets operate by making sure that each energy user pays the price and that investment decisions are not distorted;
- Disseminating information, and establishing and enforcing legal standards for equipment.

Access to Energy Supplies

5.05 About 98% of the population lives in dwellings which are supplied with electricity. In comparison with countries at a similar stage of development, the level of energy requirements in St. Lucia is about average. In 2000, the per capita primary energy consumption was estimated at about 18.7 million Btu which compares with the average per capita consumption of 38.46 million Btu for the OECS states excluding Anguilla for which no data is available. In the ten years from 1985 to 1995, the primary energy consumption per dollar of GDP in 1995 constant dollars, increased at an average of about 1.1% per annum.

Table 21: Primary Energy Consumption in the Caribbean, 2000

Country/Territory	Total (quadrillion Btu)	Petroleum	Natural Gas	Coal	Other
Antigua and Barbuda	0.006	100%	---	---	---
Aruba	0.008	100%	---	---	---
Bahamas, The	0.056	100%	---	---	---
Barbados	0.019	95%	5%	---	---
Cayman Islands	0.005	100%	---	---	---
Cuba*	0.388	93%	5%	1%	1%
Dominica	0.002	78%	---	---	22%
Dominican Republic	0.206	93%	---	1%	6%
Grenada	0.002	100%	---	---	---
Guadeloupe	0.025	100%	---	---	---
Haiti*	0.022	92%	---	---	8%
Jamaica*	0.160	94%	---	1%	5%
Martinique	0.027	100%	---	---	---
Montserrat	0.001	100%	---	---	---
Netherlands Antilles	0.157	100%	---	---	---
Puerto Rico	0.354	95%	4%	1%	---
Saint Kitts and Nevis	0.001	100%	---	---	---
Saint Lucia	0.003	100%	---	---	---
Saint Vincent/Grenadines	0.002	88%	---	---	12%
Trinidad and Tobago	0.417	12%	88%	---	---
U.S. Virgin Islands	0.315	98%	---	2%	---
British Virgin Islands	0.001	100%	---	---	---
Total/Average*	**2.177**	**92.6%**	**4.6%**	**0.3%**	**2.5%**

**Note: Because data and percentages were rounded, not all will total 100%.*

Energy Intensity of the Economy

Energy Input into GDP

5.06 In 1997, for every one US dollar of GDP, about 5,024 Btu of primary energy was input. This level of energy input into each unit of GDP has remained fairly constant over the recent past and averages about 5,050 Btu for each US$ of GDP. This level of energy use compares favourably with most other OECS countries and the economy in St. Lucia continues to remain at a relatively low level of energy intensiveness.

Table 22: Selected Countries - Primary Energy Consumption per Dollar of GDP 1994 – 1999

(Btu per 1995 U.S. Dollars Using Market Exchange Rates)

Country	1994	1995	1996	1997	1998	1999
Saint Lucia	5,039	5,091	5,049	5,024	NA	NA
Saint Kitts and Nevis	6,302	5,778	5,893	5,515	5,453	5,305
Saint Vincent/Grenadines	8,134	7,897	7,784	7,937	7,580	NA
Dominica	5,462	6,058	5,895	5,827	NA	NA
Haiti	3,955	6,574	7,536	9,424	8,634	9,354
Jamaica	22,038	24,131	25,120	27,110	27,971	28,867
Trinidad and Tobago	60,690	61,032	64,855	68,178	64,917	NA

Source: U.S. Energy Information Administration Database

Per Capita Energy Consumption

5.07 Since 1980, per capita primary energy consumption in St. Lucia has averaged 16.2 million Btu p.a. The per capita primary energy consumption of St. Lucia and selected comparator countries and regions is shown in Table 23

Table 23: Selected Countries, Per Capita Primary Energy Consumption 1994 – 2000

(Million Btu)

Country	1994	1995	1996	1997	1998	1999	2000
Saint Lucia	19.8	20.1	20.1	18.8	19.7	19.7	18.7
Saint Kitts and Nevis	35.1	33.3	36.2	36.2	36.2	36.2	36.0
Saint Vincent/Grenadines	18.1	19.0	19.0	20.0	20.1	23.7	20.5
Antigua and Barbuda	94.2	96.7	96.7	96.7	100.5	100.5	88.6
Grenada	26.3	24.5	24.4	34.2	31.3	30.8	20.0
Dominica	17.1	19.3	19.3	20.4	22.6	21.8	22.2
Montserrat	57.2	66.0	61.6	61.6	65.9	110.0	61.1
British Virgin Islands	44.0	41.5	46.5	46.5	44.0	42.7	40.6
Barbados	69.0	70.7	63.1	78.0	77.5	79.4	73.7
Trinidad and Tobago	248.9	258.1	284.8	306.3	302.2	308.9	323.9
Jamaica	49.8	54.5	55.3	58.1	59.3	60.2	60.9
Guyana	21.1	18.1	19.1	20.8	31.2	31.1	28.0
Haiti	1.3	2.1	2.5	3.1	2.8	3.1	2.8
United States	342.8	346.2	354.3	352.4	350.3	354.9	351.0
Canada	404.4	400.3	408.2	412.3	403.3	417.7	425.0
Central and South America	44.5	46.0	47.4	49.0	50.2	49.6	50.4

Source: U.S. Energy Information Administration Database

Energy Demand Management

5.08 The purpose of energy demand management is to reduce the consumption of energy per unit of GDP; and to control the growth of energy demand so as to reduce its overall cost to the economy, as for instance by fostering the use of indigenous energy sources to replace imported energy. Energy demand may be influenced in a number of ways, direct or indirect, short-term or long-term in their effects. Energy pricing is one of the most effective demand management tools. Other methods of influencing energy demand are administrative, such as rationing and allocation schemes; legal, such as the prohibition of certain energy-using equipment such as private power generators, automobiles of more than a certain horse-power; fiscal, by imposing discriminatory taxes on certain fuels or energy-using equipment. Differential import tariffs, variable electric power tariffs, and sales taxes on gasoline are commonly found fiscal measures used to manage energy demand. In some cases, the initial reason for imposing such taxes was to raise revenue for the government, and the energy demand aspect was neglected until recently. In the case of electricity tariffs, multiple rates are often initiated by utilities to reflect the cost of serving different classes of customers. However, it is not uncommon to find that the tariff systems of state-owned utilities have been modified to serve social or political ends.

5.09 One of the commonly used, but least effective, methods of energy demand management is the appeal to public conscience for energy conservation in one form or another. While this may have an appreciable effect in the short term at a time of national crisis, it becomes less effective each time it is used and cannot be regarded as a substitute for more positive action over the long-term. Short-term measures for energy demand management seek to reduce existing inefficient and wasteful practices, such as excessive display lighting, automobile travel with no passengers, altering of thermostat settings in buildings. They are nearly all restrictive of consumption in some way, and in developing countries are often effective only on a very small proportion of total energy demand.

5.10 Long-term energy demand management seeks to reduce the growth of energy demand relative to GNP by such methods as: replacement of existing energy consuming equipment with new, more energy-efficient types; modification of older buildings and construction of new buildings to minimize energy consumption; changing energy consumption patterns from the use of imported fuels to using indigenous-energy sources; planning industrial growth in accordance with availability or otherwise of indigenous energy sources.

5.11 To achieve these changes, the full range of methods available to governments should be used in a coordinated fashion. For example, if import duties are adjusted to favour the import of energy-efficient equipment, pricing policy should be used to reinforce this. Placing a high import duty on vehicles which are over-engined for their design has little effect if the corresponding fuels are still sold at low subsidized prices. In a developing country it is usual to find that legal and administrative methods of energy demand management are difficult if not impossible to enforce, so greater reliance should be placed on fiscal and pricing mechanisms.

Pricing

5.12 Pricing policy is probably the most flexible and effective method of energy demand management, but many governments are reluctant to use it vigorously because energy price increases invariably arouse serious social and political opposition.

5.13 The income elasticity of demand for energy is a measure of how much energy use will increase or decrease when the price of energy increases or decreases. In St. Lucia this is estimated to be about 1.6 as this is typical for countries at St. Lucia's stage of development. This means that there is not a one to one relationship between price and the demand for energy and that for each unit of price reduction, the demand for energy will increase by 1.6 units.

Table 24: Energy Intensiveness of Various Transport Modes

Mode	Load Factor	Energy Intensiveness
Small Car	2.2	2,582 Btu/passenger-mile
Standard car	2.2	4,323 Btu/passenger- mile
Urban Bus	30%	2,308 Btu/passenger-mile
Air	50%	6,300 Btu/passenger mile
Diesel Truck	59%	2,400 Btu/ton-mile
Air cargo	65%	63,000 Btu/ton-mile

Source: World Bank Staff Working Paper No. SWP 350

Security of Supplies

5.14 Since the resolution of the 1990/91 Gulf crisis, OPEC members have steadily produced oil above their agreed production quotas. Saudi Arabia, being obligated to United States for her role in the resolving the crisis, has committed to ensuring a stability in oil prices by using its production leverage. While there may occur some temporary supply shortages due to unforeseeable political upheavals, on the average, the petroleum market is projected to remain in moderate over-supply. Once Iraq and Kuwait reach full production levels and resume supplies, the supply situation is likely to ease further. The future prospects for petroleum supplies and prices are projected to remain favourable.

Caribbean and North American Region

5.15 The 1990 Gulf crisis had the effect of confirming the role of the United States as the ultimate guarantor of access to Middle East oil. Pressure from United States on Canada and Mexico (owing to NAFTA and other regional developments) is likely to force these countries to restructure their oil and gas industries and increase production.

5.16 Venezuela, to protect its own market interest in the region, has embarked on an ambitious investment programme which is premised on its comparative advantage as a competitive oil producer in the Region. It has also introduced initiatives such as The Caracas Accord which allows Caribbean countries to import product from Venezuela and its Curacao refinery, all refined

products used in the territory – gasoline, diesel, avgas, jet fuel, kerosene and other products, at significantly reduced prices. For example, the price reduction will be typically in the order of seven (7) to ten (10) US cents per gallon for gasoline and diesel. The import limit for total products is currently set at 1000 US barrels per day (35,000 Imperial Gallons per day).

5.17 In addition, Venezuela provides a financing mechanism at 2 percent interest rate over 15 years. These contracts are, however, subject to OPEC guidelines.

Energy Policy in the United States

5.18 The United States is the third largest oil producer in the World. Since 1985 output in the United States has declined. Behind the reluctance of the majors to continue to invest in exploration and production are: (a) rising costs; (b) declining potential; (c) relatively low world oil prices; and (d) environmental and other conflicting interests.

5.19 An essential element of U.S. Energy Policy is to maintain the oil imports at roughly current level of 45% of projected demand. Thus, if implemented effectively, incentives would have to be provided to attract majors to invest in oil and gas exploration and production to meet increases in petroleum demand. However, the administration would be circumscribed in promoting the environmentally controversial elements of the new strategy such as the development of the Arctic National Wildlife Refuge (ANWAR) which is strongly opposed by environmental interests. As United States has impressive gas reserves, one important element of the energy policy is widespread conversion from oil to natural gas for power generation, domestic heating and even vehicle fuel (Compressed Natural Gas - CNG).

Security of Supply Issues

5.20 It appears that an essential component of the United States energy policy is based on an international supply system backed by regional security initiatives to safeguard access. In this sense, United States always had an "assertive energy policy" with the primary goal of keeping the Gulf free for the movement of oil. Analysis suggests that United States would continue to remain dependent on substantial oil imports which would prompt a strong interest in maintaining a stability in the international oil market, both in terms of supply and prices. In view of these, the security of oil supplies and moderate oil prices for this Region are reasonably assured during the short and medium term.

5.21 St. Lucia is situated within the highly competitive US Gulf Coast and Caribbean petroleum supply region. Currently St. Lucia's petroleum requirements amount to about 1.07 million barrels a year, which is small relative to the total regional supply which amounts to about 500 million barrels a year. In addition to the major international companies, a number of independent traders operate in the region. As St. Lucia is a marginal buyer, the security of supplies for St. Lucia is reasonably assured. However, several issues arise from the exclusivity granted to HOSL at Cul-de-Sac:

1. The exclusivity appears to prevent LUCELEC from considering the construction of its own marine facilities to import fuel for its own needs.

2. Ss far as security of supply is concerned, it would appear to be unwise to have a single marine facility to supply the entire country with its liquid fuel needs;

3. From the point of view of where the facility is located, it should be of concern to Government authorities, that both this facility and the only operating power plant of LUCELEC are within a few kilometres of each other which will increase to a considerable degree the vulnerability of energy supplies for a country which is located in the hurricane zone.

Table 25: Caribbean Crude Oil Refining Capacity (January 1, 2002)

Country	**Refinery / Company / Location**	**Capacity** (bbls / day)
Aruba (NETH)*	Coastal Aruba Refining Co. / San Nicolas	280,000
Cuba	Cienfuegos	76,000
	Ermonos Dias / Santiago	101,500
	Niko Lopes / Habana	121,800
	Serhio Soto / Cabaiguan	2,100
	Subtotal, Cuba	*301,400*
Dominican Republic	Falconbridge Dominicana / Bonao	16,000
	Refineria Dominicana de Petroleo / Haina	33,250
	Subtotal, Dominican Republic	*49,250*
Jamaica	Petrojam / Kingston	34,200
Martinique (FR)	Societe Anonyme de la Raffinerie des Antilles / Fort-de-France	17,000
Netherlands Antilles (NETH)	Refineria Isla Curazao / Emmastad	320,000
Puerto Rico (US)	Caribbean Petroleum Refining. / Bayamon	48,000
	Shell Chemical / Yabucoa	45,000
	Subtotal, Puerto Rico	*93,000*
Trinidad & Tobago	Petroleum Co. of Trinidad & Tobago / Pointe-a-Pierre	160,000
U.S. Virgin Islands	Hovensa / St. Croix	495,000
TOTAL	**14 Plants**	**1,749,850**

Source: Oil and Gas Journal, December 24, 2001.

VI. Indigenous Energy Resource Base and Prospects

Introduction

6.01 The oil price shocks of the 1970s, again in 1990-91 and the most recent oil price rises towards the middle of 2002 have left a lasting impact on the economies of oil importing developing countries (OIDCs). A general policy prescription in most affected countries has been to "reduce dependence on external supplies of oil by development and utilization of indigenous energy sources." While this policy prescription merits consideration, its implementation and success depends on the national energy resource base. In this section a brief review of the indigenous energy resource base is presented to determine the extent to which these resources can contribute towards national energy supplies.

Review of Indigenous Energy Resource Base

Geothermal Energy Prospects

6.02 The volcanic origin of St. Lucia makes it a natural candidate for potential geothermal resources. Geothermal energy is already used successfully in Guadeloupe [4.6 megawatts, and there is potential for similar projects in Grenada, Dominica. Over the years, Government has taken several initiatives to develop these resources in St. Lucia. Several exploration programs have been carried out during the last two decades, funded by U.S. and European companies and the United Nations. The drilling explorations have confirmed the presence of a geothermal resource capable of supplying electricity to the national grid. However, no adequate determination of feasibility is currently available.

6.03 The major geothermal manifestation on St. Lucia is within the Qualibou-Caldera, east of the town of Soufrière on the south-western coast. This prospect has been drilled, investigated and studied by various consultants and specialists. The studies indicate a deep-brine holding reservoir with temperatures in the range of 200-250°C, and possibly as high as 350°C, deeper than 1,000 meters below the surface. Exploratory drilling into this reservoir is now required, and there is general agreement that at least three production size exploratory wells should be drilled to a depth of 1,500 meters. Future developments depend on the results of this drilling. However, all the studies seem to agree on a geothermal potential in excess of 10 MW[32]/.

6.04 No substantial work had been carried out on this project for several years but following an agreement signed in February 1999 between GOSL and the Compagnie Francaise de Geothermie (CFG) assisted by the Frager Energie Company and staff from the Massachusetts Institute of Technology (MIT), work commenced on a review of the previous geothermal surveys conducted in Saint Lucia with a view to identifying opportunities for the development of a geothermal power plant of the same type as the Bouillante plant in Guadeloupe, including the identification of any environmental constraints to realizing the development.

[32]/ World Bank Report No. 5111-SLU – St. Lucia: Issues and Options in the Energy Sector; September 1984

6.05 *The Project* The St. Lucia Geothermal Project aims to develop the exploitation of the geothermal resources for electricity generation in Qualibou depression. The Project is conceived in three phases which are: an initial exploratory phase, a development phase and an implementation phase. At the end of the initial exploratory phase, a decision will be taken on the continuation or not of the project, depending on the results obtained. The anticipated cost of the initial exploratory phase, including additional survey work, exploratory drilling and project management is US$3.2 million

6.06 The proposed timing of the Project is given below.

Date	Activity/Milestone
January 2002	▪ **Start of Project**
2002 – mid 2003	▪ **Initial Exploratory Phase** o Agreements on partnering for the development of the project financing, preliminary technical/economic study, success criteria etc. Pre-agreement on electricity tariff (Power Purchase Agreement) o Resource assessment – Additional surveys of Soufrière area – Drilling of exploratory wells – Evaluation of the resource and localization of the future production wells
mid 2003	▪ **Decision to proceed – based on minimum requirements**
mid 2003 – mid 2004	▪ **Development Phase** o Drilling of production wells and evaluation of production potential o Finalization of technical/economic study of the construction phase based on electricity tariff and anticipated investment and operation and maintenance costs.
	▪ **Decision to pursue project in construction phase**
mid 2004 – mid 2006	▪ **Detailed studies and construction of geothermal plant**
mid 2006	▪ **Start of plant operation**

6.07 *Environmental Aspects* The CFG environmental assessment of the project concludes that the choice of the plant site inside a valley with abundant vegetation will significantly reduce the plant's visual impact. It determines that only the plume of vapor will be visible, but that the plume height, and therefore its visibility, will be significantly reduced on windy days. The study also concluded that further work will need to be done to determine the measures required to mitigate the impact of the natural gases that are to be exhausted to the atmosphere, but that this can only be carried out when the type of plant to be selected (CO2 re-injection possible or not) is known. The report also determines that the impact on the ecosystems (wildlife and flora) is limited because the natural environment has already been modified by human activities such as farming and former

boring zones. There is no surface level discharge of water and no waste is produced by the type of plant contemplated. The noise disturbance will be almost non-existent similar to the Bouillante case.

Wind Energy

6.08 World wind energy capacity has been doubling every three years during the last decade and growth rates in the last two years have been even faster. Total world wind capacity at the end of 2000 was around 17, 500 MW and generation from wind now approximately equates to annual consumption of electricity in Chile or Singapore. Germany, with over 6 000 MW, has the highest capacity but Denmark, with over 2 000 MW, has the highest level per capita and the production accounts for about 12% of Danish electricity.

6.09 The attractions of wind as a source of electricity which produces minimal quantities of greenhouse gases has led to ambitious targets for wind energy in many parts of the world. More recently, there have been several developments of offshore wind installations and many more are planned. Although offshore wind-generated electricity is generally more expensive than onshore, the resource is very large and there are few environmental impacts.

6.10 Whilst wind energy is generally developed in the industrialised world for environmental reasons, it has attractions in the developing world as it can be installed quickly in areas where electricity is urgently needed. In many instances it may be a cost-effective solution if fossil fuel sources are not readily available. In addition there are many applications for wind energy in remote regions, worldwide, either for supplementing diesel power (which tends to be expensive) or for supplying farms, homes and other installations on an individual basis.

6.11 Early machines - less than twenty years ago - were fairly small (50-100 kW, 15-20 m diameter) but there has been a steady growth in size and output power. Several commercial types of wind turbine now have ratings over 1 MW and machines for the offshore market have outputs up to 3 MW. Machine sizes have increased for two reasons. They are cheaper and they deliver more energy. The energy yield is improved partly because the rotor is located higher from the ground and so intercepts higher velocity winds, and partly because they are slightly more efficient. The productivity of the 600 kW machines is around 50% higher than that of the 55 kW machines. Reliability has improved steadily and most wind turbine manufacturers now guarantee availabilities of 95%.

6.12 Wind farms now exist in Curacao, Jamaica, Guadeloupe and Martinique. Wind power projects are also being considered in Barbados and Guyana.

6.13 Studies in St. Lucia suggest that areas of moderately high wind speed exists on the island especially on the exposed locations on the windward coat of the island, and in particular at the northern and southern extremities, where the prevailing wind flow has been diverted around the central mountain range. The Government of Saint Lucia and the Saint Lucia Windpower JV, a joint venture company formed by Probyn Company of Toronto, Canada and York Windpower of

Montreal, Canada has completed an assessment of wind potential near the Eastern Coast of the island. Based on the results of this one-year continuous wind resource assessment, GOSL has submitted a proposal to construct a 13.5 MW wind farm to LUCELEC. LUCELEC has expressed interest in purchasing power from wind, provided that the cost of power is below existing variable costs (i.e. the fuel cost of generation), and that no investment by the utility is required. The introduction of this renewable energy source will likely require developmental support.

Hydropower

6.14 A small hydropower station on the Soufrière River (50 kW installed capacity) was damaged during a storm in 1977 and taken out of service.

6.15 A desk study completed in 1982 [33/] recommended that the hydropower potential of the Millet (120 kW), Vieux Fort (260 kW) and Troumasse (160 kW) Rivers be examined. It is believed, however, that the hydropower potential of these rivers is limited because of: (a) intensive deforestation and cultivation in watershed areas; (b) low flows during the dry season; and (c) high sedimentation. Because of the limited contribution which these schemes could make to the national energy production mix and given the high cost/kW to develop these schemes at this time, it is not recommended that these developments be pursued.

6.16 While not economic at the present time, however, some of these schemes could possibly reduce the carbon dioxide effect on the atmosphere and thus be attractive from environmental view point. However, environmental benefits can only be realized if grant or soft financing sources can be found. As part of a LCEP, these schemes can not be pursued at this time. MPDEH should, however, update the evaluation of these alternatives on a periodic basis to determine the timing of their economic viability.

Biomass Resources

6.17 St. Lucia is mainly an agricultural country. Although the use of biomass for energy in St. Lucia has been steadily declining, particularly with the process of urbanization, there are still many forms of biomass in use, including charcoal, firewood and agricultural products such as coconut shells. There are no up-to-date reliable estimates of biomass production in St. Lucia, but in 1996, it was estimated[34/] that 8,276 tonnes of biomass were consumed. 20% of the land in St. Lucia is uncultivated marginal land or scrublands suitable only for forests.

6.18 According to a study conducted by the University of the West Indies, there is a potential to supply a fuel demand of up to 24,000 families or nearly 144,000 people. However, proper management and technical assistance would be needed to develop pilot schemes, and concerns over any deforestation associated with the consumption of charcoal and firewood has seen a decline in the promotion of this source of energy.

33/ Source: World Bank Report No. 5111-SLU – St. Lucia: Issues and Options in the Energy Sector

34/ Renewable Energy on Small Islands, Second edition, August 2000 – Thomas Lynge Jensen; Forum for Energy and Development (FED)

6.19 In an effort to promote the sustainable exploitation of forest covers, Government has established a few "fuel farms" planted with fast growing *leucaena* trees, which are harvested under controlled conditions. Sustainable harvesting of mangroves at Mankote is also occurring.

Table 26: Land Area by Class

Class	**(ha)**	**%**
Rain Forest	*6,779.5*	*11.03*
Montane Thicket	*607.5*	*0.99*
Mangrove	*54.5*	*0.09*
Elfin Woodland	*133.0*	*0.22*
Plantations	*246.0*	*0.4*
Primary Forest	7,820.5	12.73
Scrub Forests	12,509.5	20.35
Open Woodland	1,871.5	3.04
Mixed Agriculture Secondary Forest	29,873.0	48.60
Developed Agriculture	7,101.0	11.55
Urban Influences	1,676.0	2.73
Grassland	619.0	1.01
Total	**61,470.5**	**100**

Source: Government of St. Lucia Forest Division.

6.20 *Charcoal* is an indigenous resource that is renewable if managed well and is a fuel preferred by lower income households. Charcoal plays an important role in both the energy sectors and the economies of several countries. However, the inefficiencies inherent to the production and use of charcoal can place a heavy strain on local wood resources. This in turn has severe environmental consequences. The use of charcoal cannot be stopped; but, experience has shown, it can be reduced through implementing a variety of measures that promote the sustainable production of wood and efficient use of charcoal through incentives at the local level. Players in the charcoal market need to be guided so that they can make efficient use of the resources.

6.21 Up-to-date national consumption figures or estimates for St. Lucia are lacking, but the use is expected to increase if oil prices trend significantly higher in coming years. The increase in the use of charcoal, the increased commercialization of charcoaling on public lands and logging of trees for other uses, have in the past resulted in deforestation and soil degradation. These trends would be cause for serious concern and would be the trigger for urgent attention to prepare a Charcoal Master Plan to: (a) assess resources; (b) research land titlement, tenure and legislative issues; (c) determine charcoal network; (d) identify environmental damage and non-sustainable tree felling; (e) identify measures to overcome these problems; (f) design a comprehensive management plan to allow for sustainable charcoal production without environmental damage; and

(g) monitor the consumption of charcoal, and promote demand management measures through the private sector initiative (such as improved charcoal stoves etc.).

6.22 *Biogas* The use of biogas is known in St. Lucia. During the 1980s several farmers exploited biogas to satisfy a portion of their energy demand. Over the years, the German agency GTZ, through the Caribbean Development Bank, has provided assistance to selected enterprises in St. Lucia. Biogas, however, cannot make significant contribution to the national energy situation, but can improve the performance of the agricultural enterprises where digesters are located. The major advantages of biogas are: farm sanitation; waste treatment; production of organic fertilizers; and use of biogas as possible cooking fuel. The involvement of the MPDEH in these programs should be limited and the programs should be maintained and information disseminated by the Ministry of Agriculture.

6.23 *Solar Water Heating Systems* Currently the major economic solar application is available in the form of Solar Water Heating Systems (SWHS). At present there are about [...] SWHS installed in St. Lucia. This compares with Barbados, where in the year 2000, about 32,000 solar water heaters were installed. It was projected that if each one saves 4,000kWh per year, the total electricity saving would be 128 million kWh. At 15¢US/kWh, the financial savings to the consumers would then be $19.2 million US/year. Since most people in the other Caribbean islands use electricity to produce hot water, at 3.6MJ/kWh, 5.8GJ/barrel of oil and an overall efficiency of 35% for the electricity generation, transmission and distribution system, this represents a heating equivalent of 227,000 barrels of oil.

6.24 In the year 2000, the average price of oil was about $30US per barrel, and so the foreign exchange saving to the island was about $US 6.8 million. This saving represents only financial gains and does not include for the environmental advantages of not having to burn fossil fuel fuels to generate the required electricity with the concomitant production of carbon dioxide, sulphur dioxide and the oxides of nitrogen (CO2, SO2 and NOx). The electric utility, the Barbados Light and Power (BL&P) Company also benefited by not having to produce the 128 million kWh, which is about 19% of its 1998 production of 658 million kWh. The 32,000 solar water heaters are therefore worth about 30 to 35MW of additional electric generating capacity.

6.25 Recently GOSL has taken steps regarding incentives to promote the use of SWHS. Recent increases in the price of electricity would have a further positive impact on demand for solar water heaters. Although the contribution of solar energy into the total energy mix at present is limited, it is important to show a commitment to alternative technologies by:

(i) exploring possibilities to provide soft loans for their installation as the initial cost of SWHS is high;

(ii) creating incentives for consumers to retro-fit electric water heaters to solar by installation of panels;

(iii) making the building codes mandatory for all new building to make provision for the installation of SWHS; and

(iv) providing incentives to SWHS manufacturers.

6.26 To ensure that the SWHS, whether manufactured in St. Lucia or imported, meet the minimum performance standards, an appliance testing facility should be established at the Saint Lucia Bureau of Standards (SLBS) and should include facilities for testing the capability of solar water heaters. The engineers and the installers involved in SWHS should be trained and guided to provide better and reliable service.

6.27 *Photovoltaic* (PV) systems are not in widespread use in St. Lucia. However, PV lighting systems have been installed on four storm shelters with Italian/UN Trust Fund assistance as a demonstration of renewable technologies. About 70 additional storm shelters that are either not connected to the grid or would lose electricity in the event of a storm are in need of this emergency assistance. Most of these shelters are located in schools and churches.

6.28 Recent and dramatic reductions in the costs of photovoltaic (PV) cells have drawn considerable attention to PVs as an answer to important energy problems in poor, rural areas of the developing world. More affordable and flexibly designed PV systems are finding an increasingly wide market: pumping water for drinking and irrigation; powering telecommunications equipment and household and community appliances such as lights, televisions, and videocassette machines; and running vaccine refrigerators in rural health clinics. Presently, various programs for disseminating PV systems in rural areas for home and community use are being implemented or planned by many governments and international agencies[35/].

6.29 PV technology can now be regarded as mature, with internationally accepted standards and specifications for components. Cell prices have fallen steadily from their extremely high level in the 1970s, when they first became commercially available. At present, the ex-factory price for reasonably large orders of crystalline silicon modules is about US$4.00 to 5.00/peak watt (Wp). The installed prices of arrays depend on transport and labor costs, profit margins, the size of the order, and a variety of other factors and are unlikely to be less than US$7.00 to US$8.00/Wp. For small orders in the rural areas of developing countries, the price is likely to range upward from US$10/Wp. Research and development continue and will bring steady technical improvements and reductions in manufacturing costs.

6.30 Along with their advantages, PV systems share significant limitations. The amount of electricity typical household PV installations deliver is extremely small compared with the supply available from a grid, and so households are greatly restricted in their use of electrical appliances. PV installations also have relatively high initial costs, and the incremental costs of increasing the supply are almost as high.

6.31 The maintenance requirements of arrays are simple. The primary need is to keep the surface clean. Even a slight coating of dust can reduce the overall electricity yield significantly. It is also important to remove small objects that may fall on the array, such as bird droppings or leaves-not merely because such objects obscure some of the cells but because the shaded cells can become overheated from the energy of the other cells and may be permanently damaged. It is also

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35/ The World Bank – ESMAP Technical Paper 009 *"Photovoltaic Applications in Rural Areas of the Developing World"*

essential to ensure that the array as a whole is not shaded; even a small amount of shade can reduce the output by as much as 50 percent.

6.32 *Solar Crop Drying and Cooking* The greatest potential for crop drying by sunlight is for the drying of ginger and other spices such as clove, nutmeg, cinnamon, chive, thyme and peppers. This technology is widely used in Africa and Asia. Solar energy is also used for drying cocoa beans and coconuts by open exposure to the sun. There are a number of locally built solar dryers - wire baskets or cabinet dryers, but their use is on the decline. There is a need for the development of cheap and durable dryers.

6.33 The solar drying of crops can improve the product quality of vegetables and fruits and reduce the cost of ensuring low post-harvest losses. However, focus on the use of solar crop dryers should be in the Ministry of Agriculture to ensure that technologies considered and adopted are appropriate for conditions prevailing in St. Lucia. Incentives are also necessary to encourage small businesses to produce dried fruit especially for the tourism market, which would create a market for these dryers.

6.34 In the short and medium term the solar cookers are unlikely to make serious contribution to the quality of life and national energy balance. GOSL should monitor developments in the Region and internationally and publicize the information on their efficiency for the benefit of the public.

Energy from Waste

6.35 From experience elsewhere, because of the relatively low population density, the quantity of municipal solid waste in the Castries/Gros Islet area is not expected to be able to support the economic development of a waste-to-energy facility based solely on locally generated waste. A plant based on waste is likely to have: (a) high investment costs; (b) complex design of boiler and flue gas scrubbing equipment; and (c) high risk of adverse environmental effect. Investments would also be needed in waste handling and management facilities. As a result the cost of energy from the waste based plant would most likely not be selected among the least cost energy supply options.

Ocean Thermal Energy Conversion (OTEC)

6.36 In 1983, as a part of a commitment to develop alternative energy systems, the Government of St. Lucia welcomed the opportunity to be part of an OTEC initiative that included the design and construction of a 10 MW closed cycle floating OTEC demonstration plant off Soufriere. Hydrographic surveys in 1985 confirmed that the 1,000 metre contour was less than 3 km from shore, with cold water in the volcanic canyon adjacent to Petit Piton and Gros Piton. This landfall was also close to the electrical grids. The surface temperature of the sea on that part of the west coast never falls below 25oC, reaching 27o/28oC in summer.

6.37 The UK-designed plant was provided with a fully costed proposal by a merchant bank, which showed that with construction commencing in 1985, and operation from 1989, the OTEC

plant would show a cost benefit over oil-fired plant from 1994, the higher capital cost of OTEC being balanced by the "free fuel", whereas there were ongoing fuel costs for the diesel plant.

6.38 Other regional countries were also involved in research on OTEC in the early 1980s. Bathmetric research was done on various sites which had potential because of deep water in close proximity to the shore. The conclusion was that a 15 MW closed cycle demonstration plant could be feasible at US$35/bbl real price of oil. At current oil prices, this technology is therefore not feasible and St. Lucia should not devote any technical expertise to the development or demonstration of such technology at the present time. St. Lucia's interest in this technology should be to monitor the development until such technologies become established and economically viable.

Renewable Energy Standards Portfolio (RPS)

6.39 Several governments in the Caribbean, including Jamaica and Barbados, have set a target for renewable energy use. Barbados, for example, has set a policy for reaching 10 percent of their total energy from renewable sources by 2012. St. Lucia has essentially achieved similar results with the preparation of its SAP. However, the SAP does not have the force of law. The RPS approach to the development of renewable energy is essentially the promulgation of legal instruments which mandate the specified proportion of electricity generation by the utility which must be derived from renewable sources. In the case of other countries where the sector has been unbundled, the mandate is applied to the distributors, so they in turn purchase the appropriate amounts of conventional and renewable based electricity on the open market and there is no need for further incentives.

6.40 Under RPS, LUCELEC would be required to possess a minimum percentage of renewable energy resources within their overall resource portfolio.

Domestic Energy Supply Prospects

6.41 Barring discovery of hydrocarbons or a technological breakthrough, St. Lucia will continue to rely on imported oil to meet its energy requirements. The scope of indigenous energy sources in the short to medium term is extremely limited. Viable indigenous energy source appear to be geothermal and wind energy and there is some potential for fuel wood use but this would need to be managed properly. Solar water heaters have an economic potential, provided appropriate polices are followed to encourage their use. As far as the resource allocation to the development of other exotic indigenous energy options is concerned, effort should be limited to monitoring international developments by the appropriate government ministries. No large scale staff should be deployed to follow up or test technologies relating to wide renewable options. Appropriate ministries and departments should monitor international developments to determine the timing and suitability of some or any of these technologies and their possible applications in St. Lucia. The public sector should not spread resources too thinly in pursuing un-economic and in-appropriate options at this time. As far as the SWHS are concerned, appropriate incentives and pricing conditions should be established to encourage their use.

VII. Energy Efficiency

Background

7.01 Fuel diversification, energy conservation and efficiency improvements are essential elements in the overall energy strategy to reduce energy costs. Such a strategy, however, should not lead to the selection of energy alternatives which could be uneconomic. A reduction in energy intensity should be achieved in the long run through consistent macro policies and the reduction in price distortions. Since the oil price shocks of the 1970s, GOSL has stressed energy conservation as a major component of its national energy strategy but has had difficulty in achieving lasting results. Government policy to encourage energy conservation should be supported by the economic pricing of petroleum products and electricity. However, pricing policy alone is not adequate to motivate demand side management (DSM) programs. Long term sustainability of DSM programs would depend on the creation of institutional capability and availability of resources.

Energy Efficiency Programs

7.02 Experience with previous regional and extra-regional efforts at energy efficiency programmes during the 1980s and early 1990s suggest that for the overall success of energy efficiency programmes to be assured, there are a number of important pre-conditions which must be fulfilled. Accordingly, government policy to encourage energy conservation should be supported be at least:

- economic pricing of petroleum products and electricity;
- availability of finance and attractive financing terms including a willingness of financial institutions to involve themselves in non-traditional lending – loan officers must be made sufficiently familiar with energy conservation principles and techniques and excessive bureaucratic requirements must be eliminated including undue restrictions on equipment sourcing;
- availability of financial incentives through tax credits;
- availability of information regarding the available opportunities, including public information campaigns and exhortations to save energy – but these should be focused on the individual and the financial benefits which can derive instead of the general national good – experience in the region has shown that campaigns focused on the national good only work for very brief periods, if at all;
- technical support systems – very often, the energy auditing to quantify potential energy efficiency gains and to prepare projects for financing are beyond the resources and capabilities of the project sponsors – technical assistance must therefore be made readily available with subsidised support from government or its agencies.

7.03 In addition, the weak financial condition of several corporations and the lack of organizational capability among them will have to be improved before there can be true success in the development of an energy efficiency programme.

7.04 Judging from the experience of other countries, it is estimated that total energy savings of about 15- 20% (compared with current energy use) in new construction of office buildings over the next ten years could be achieved under the standards of an Energy Efficient Building Code (EEBC). Saving of capital and recurrent expenditures from retrofits over the next ten years would also be achievable under the DSM program through the application of the EEBC. Studies should be commissioned to determine the energy savings and estimate their net present value (NPV) and the further net saving in avoided capital expenditure on generating plant capacity.

Prospects for Energy Efficiency/Conservation

7.05 ESCOs are businesses that derive their income by generating energy savings for their clients. They may be affiliated with the utility or operate as independent, third party enterprises. They typically provide services for commercial businesses, such as the hotel industry. It is common for them to enter into a contract with a client, such as a hotel, whereby they identify and help to implement opportunities to generate energy savings by retrofitting energy-consuming technologies and changing patterns of electricity consumption. The ESCO receives payment for the consulting and engineering services it provides, which are typically less than the overall savings accruing to the client. Given the dominance of the hotel industry in Saint Lucia, and its relatively inefficient energy-consumption patterns, there is tremendous potential for energy savings to be identified and captured. Further, large buildings can benefit from the use of microprocessor-based energy management systems and motion sensor lighting and air conditioning controls. Using these approaches, significant energy savings might be realized in the government sector and large commercial buildings.

7.06 An Energy Efficiency Building Code should be developed for new construction and retrofits in commercial and institutional buildings, compliance with which should be mandatory - it is important that Government should make it mandatory that the EEBC are strictly complied with so that all new buildings can accommodate solar water heaters and the other energy savings devices. This EEBC could, however, be introduced over a period of time, and a technology transfer phase should be implemented and engineers and architects should be trained in the application of the Code through a series of workshops. To facilitate this transfer, design handbooks incorporating local construction practice could be prepared by teams of local architects and engineers with inputs from international specialists where required. GOSL could also facilitate provide funding to assist with ongoing support for the EEBC. This would indicate the commitment of GOSL to a rapid implementation of the EEBC and the early realization of benefits.

7.07 An Appliance Testing and Labelling Program should be established to provide information to consumers on energy consumption in major appliances. An energy efficiency test laboratory for refrigerators and freezers should be established at the SLBS. Alternatively, as much of this work has already been carried out elsewhere in the Region (Barbados and Jamaica), the results of this

work could be borrowed by St. Lucia. A public information and labelling program should also be prepared. Appliances to be included in the initial phase of the programme are refrigerating equipment, air conditioning equipment, electric cookers, gas cookers, and solar and electric water heaters. Later phases would include other equipment such as charcoal stoves, computer monitors and television sets – again, in the case of computer monitors, labelling programmes could be borrowed from work done in the United States.

7.08 Technical assistance should be made available in three areas:

(a) The maintenance of energy equipment has to be improved. Growing demand cannot be serviced by the available local resources;

(b) The identification, design and preparation of energy conservation projects at the facility level are important bottlenecks.

(c) Energy audits should be made by consultants specialized in the particular appliance field; and,

(d) Assistance by independent experts in appraising energy conservation project proposals could facilitate the task of the St. Lucia Development Bank and commercial banks and speed up approval procedures.

7.09 The costs of energy audits, project preparation, and maintenance and the difficulties in securing financing are all constraints to the successful undertaking of energy efficiency/conservation activities. However, with the support of suitable funding, some of the financing gaps will be closed at least for the first stage of the program.

7.10 A considerable level of technical assistance will be required to perform the energy audits and to identify and prepare comprehensive conservation project proposals at the facility level, to submit to the SLDB or commercial banks for financing. In addition, technical assistance will be needed by these banks in their appraisal of these projects. Under the proposed Revolving Fund, there will be additional resources to provide this technical support.

Power Sector Efficiency and Demand Side Management (DSM)

7.11 As experience in OECD countries illustrates, getting the energy prices right is a necessary but not a sufficient condition for inducing consumers to use energy efficiently. Unlike the industrial consumers, residential and commercial consumers of electricity are numerous, each with a relatively small amount of consumption. From their perspective, front-end costs of changing over to energy efficient demand side management (DSM) options (such as compact fluorescent lamps, electronic ballasts, improved switchgear, energy efficient motors, compressors and consumer durables, heating and cooling systems) are far too high compared to the relief they get in monthly energy bills.

7.12 Extensive studies in North America and Europe have conclusively shown that from the perspective of the nation and the utility the cost of reducing demand by a kW of electricity is

substantially lower than the cost of adding a kW of generation, even without taking into account the un-quantified environmental gains by avoiding such generation. It is apparent in many jurisdictions that the cost of a kWh saved is less than the cost of an additional kWh supplied. On this basis, it appears economic to invest in DSM programs as a supply alternative. Often, however, consumers themselves do not invest in conservation because the price of electricity does not reflect the full cost of supply; hence the savings to the consumer do not provide enough incentive.

7.13 Thus, some North American and European utilities have instituted comprehensive DSM measures such as free or subsidized distribution of energy efficient systems and applications, and provision of up-front financing on reasonable terms for energy efficiency investments made by the consumers. The costs incurred are added to the rate base of the utility so that the expenditure incurred is accorded the same status as expenditure incurred in capacity addition.

7.14 The World Bank has analysed several proposed programs and found the economic rates of return to vary in the 10-30% range. Several programs would not be attractive to consumers unless savings were increased by higher electricity prices or tax reduction on equipment. Until price distortions can be overcome it is recommended that DSM efforts should focus on those programs that provide sufficient user savings to be of interest to consumers under prevailing market prices.

7.15 Improvements on the supply side should be established in an electricity system loss reduction programme.

7.16 In preparing least-cost power development plans, these utilities have adopted integrated resource planning, in which: (i) demand reduction options such as DSM are accorded the same status as supply addition options, so that utilities are required to treat all cost-effective DSM options on the same footing as supply additions; and (ii) environmental costs and benefits of all options considered are more fully incorporated than in conventional least-cost analyses.

7.17 The approach of GOSL should be to encourage LUCELEC to:

(i) incorporate into their energy planning models the key elements of integrated resource planning (IRP),

(ii) organize an adequately staffed DSM group to plan and undertake DSM activities,

(iii) support such groups with appropriate training programs, and

(iv) secure TA resources to prepare DSM master plans and components to be included in projects.

7.18 Even with evident consumer benefits, there are barriers and constraints to implementing energy efficiency programs which derive mainly from a lack of information both to consumers and potential suppliers of equipment. At present, there is only a limited energy efficiency/conservation industry in St. Lucia, although one appears to emerging through the activities now underway.

7.19 Industrial Energy Efficiency/Conservation. In addition to electrical DSM opportunities, there is a potential for low cost/no cost savings of about 20% in fuel use in industries through improvements in fuel fired hot water and steam systems. Boiler tune-ups are among the lowest cost measures and should be combined with annual boiler inspections. Other energy conservation opportunities can be identified during walk-through audits in conjunction with the boiler inspection. Opportunities should be followed through the DSM project as a matter of commercial interest.

7.20 Transport The influx of second-hand vehicles from Japan over the last several years means that very soon, St. Lucia will have a fleet in which the average age of vehicles is substantially over ten years old. Improvements in fuel efficiency in vehicles can be achieved through tune-ups and through replacements of the existing fleet. Government has already begun to alter the regime by facilitating the increased importation of new vehicles.

7.21 Government support could also be given to the dissemination of information concerning possible fuel economy measures. Improvements in traffic management and in roadways could lead to reduced engine idling and lower fuel use. These measures are even more justified when benefits in reduced congestion and time savings are considered. Responsibility for improvements in this area lies primarily with Government. Government should also consider encouraging the use of zero or low energy using equipment such as motor bikes, mopeds and small cars. This should be achieved by either eliminating or reducing taxes on such equipment.

7.22 Regulations and Standards The imposition of standards for vehicle fuel performance, appliances, etc. is not recommended. A consistent macro economic policy with the reduction in price distortions coupled with consumer information is more likely to lead to optimal choices than regulations which are costly and extremely difficult to administer. Appliance and equipment testing as relevant to St. Lucia is warranted, however, as an input to providing consumer information. It is recommended that the appliance testing and labelling program is established to include appliances such as refrigerators and freezers, stoves, water heaters, and lighting fixtures.

VIII. Environmental Issues

Background

8.01 The environment is an essential part of the national patrimony of St Lucia and the principal national economic resource. GOSL and the St. Lucian people are becoming increasingly concerned about the impact that energy supply and use are having on the environment and its sustainability. Such concern has been expressed by the attention which GOSL has paid to the establishment of Saint Lucia as a "Sustainable Energy Demonstration Country" by 2008-2012 which requires that a minimum of 20% of energy be contributed from renewable resources by that time. This commitment was given to the international community at a press conference held jointly with the Climate Institute in November 1999 at the Fifth Meeting of the Conference of Parties of the United Nations Framework Convention on Climate Change held in Bonn, Germany.

Current Environmental Initiatives

8.02 GOSL has been active in its support for the United Nations Framework Convention on Climate Change. It took an important first step to encourage renewable energy development in May, 1999, with the adoption of a policy to eliminate all import duties and other trade barriers associated with renewable energy equipment and materials for its installation and use. In addition, the SEP was prepared by the Sustainable Development and Environment Unit (SDEU) of the Ministry of Planning Development Environment and Housing (MPDEH) and approved by Cabinet in July 2001. The SEP has set the course for the achievement of the target of producing a minimum of 20% of energy from renewable resources by 2012 is achieved – a measure which is calculated to reduce greenhouse gas emissions (GHG).

8.03 Currently, it is estimated that GHG from the electricity sector are 156,530 tons of Carbon, and that without intervention, the projected GHG emissions from the sector in 2005 are 188,860 tons of carbon and 230,060 tons of carbon in 2010.

8.04 It is unlikely that there are significant local environmental impacts arising from energy transformation and consumption in St. Lucia. Air quality is not continuously monitored but there is no evidence of unacceptable conditions. Regulations regarding the unloading, storage, transportation and sale of petroleum products, as well as the disposal of wastes are outdated. These regulations are, however, currently the subject of study by the OECS Natural Resources Management Unit, and it is considered that a regional response will be brought to bear on this matter.

8.05 The following targets for green house gas (GHG) emissions from the power and transportation sectors have been established in the SEP:

- Reduction of the annual GHG emissions from the electricity sector to 166 197 tons of carbon/year in 2005 and 149, 539 tons of carbon/year in 2010.

- Reduction in the consumption of gasoline and diesel fuel in the transportation sector to 122, 471 barrels of diesel and 610, 974 barrels of gasoline in 2005 (5% reduction) and 109 579 barrels of diesel and 546 661 barrels of gasoline (15% reduction) in 2010. These reductions will be achieved by a combination of measures, including the increased use of public transportation, the introduction of high-efficiency vehicles, the deployment of a limited number of vehicles powered by alternative fuels, driver education and awareness to reduce fuel consumption, and improvements in road and traffic management.

Institutional Aspects

8.06 SDEU The Government has established the Sustainable Development and Environment Unit of the Ministry of Sustainable Development Environment and Housing (SDEU) as the principal agency responsible for the effective management of the physical environment. Following passage of enabling legislation based on the OECS Model Physical Planning Bill, (Draft OECS Model Act, April, 1994), a formalized mechanism for incorporating EIAs into the planning process has been established and already, an EIA for all new energy related projects is mandatory under the Physical Planning and Development Act No. 29 of 2001 which incorporates Environmental Impacts Assessments as an integral part of the planning approval process. The Ministry of Planning Sustainable Development and Housing is in the process of establishing policies and procedures regarding Environmental Impact Assessments.

8.07 Of particular relevance to the energy sector, SDEU has the responsibility to, inter alia:

(i) develop, implement, and monitor environmental protection programs;

(ii) investigate the effect on the environment of polluting activities and take appropriate action;

(iii) commission studies and promote relevant research;

(iv) introduce training programs; and

(v) formulate standards and codes of practice including those relating to emissions and effluent.

8.08 SDEU is expected to discharge these activities in collaboration with the relevant sector agencies. SDEU has the authority to request EIAs and construction permits for new projects. It however does not have the power to require industries to monitor the pollutants which they discharge and no provision is made for fines and imprisonment of offenders. Neither does SDEU have the authority to order cessation of harmful activities and to require restoration to original condition.

8.09 SDEU should be cautious while establishing environmental standards to ensure that they are consistent with the overall economic objectives of the country. A useful guide for the

standards required in the erection of new power plants would be the guidelines established by the World Bank and IDB for projects that are financed through their loans.

8.10 Strategy: GOSL's strategy should be to consolidate all environmental responsibilities under SDEU but considerable institution building would be required to make it effective. In the meantime, specific environmental action programs should be developed in connection with existing and proposed energy projects. The cost of environmental protection measures to international standards should be internalized as project costs and thus reflected in the price of petroleum products and electricity. However, the standards to be established should be consistent with the overall economic objectives of the country.

8.11 Energy sector related environmental strategy and action plan should include:

(a) cleaning up of existing sources of pollution notably Union power station and all petrol service stations should be a priority for action;

(b) pollution abatement through conservation and energy efficiency improvements;

(d) strengthening SDEU to fulfil its mandate under the Act;

(e) establishing baseline data for air quality and forestry resources; and

(f) identifying standards required for particular environmental zones such as the Castries Gros Islet corridor, tourist areas and national park reserves, etc.

8.12 Pollution Abatement Through Conservation: Energy conservation and efficiency improvements are necessary components of an environmental protection program and should be pursued on both economic and environmental grounds as a matter of national concern. At a macro level, energy pricing including the setting of taxes must reflect economic costs including environmental costs. This policy will be most difficult to implement with respect to charcoal, both socially and administratively; however, pricing is a key element in promoting energy efficiency improvements and reducing demand.

IX. Energy Sector Institutions

Introduction

9.01 Since the fall in oil prices following the price shocks of the 1970s, there has been a significant falling away of support for the energy sector activities in the region generally, and in St. Lucia in the particular case. Energy planning and data collection activities which had made significant strides during the early 1980s have either been cut back or ceased entirely and this has been exacerbated by the ending of the CARICOM and CDB administered USAID Alternative Energy Systems Project which was implemented during the 1980s and offered considerable assistance to GOSL.

9.02 However, MPDEH does not have a sufficiently comprehensive energy planning capability or the capacity to comprehensively analyse the various unsolicited proposals to develop various energy resources and has had to rely extensively on LUCELEC for such analysis. However, as LUCELEC is a private company which has its own interests to protect in the results of such analyses, it is urgent that GOSL develops an independent capability to undertake the required sector analyses.

Energy Sector Entities

9.03 Ministry of Planning Development Environment and Housing (MPDEH) – has, *inter alia*, the responsibility for formulating and overseeing the implementation of a national energy policy, plan and strategy. The present organizational structure of the SDE Unit has been in existence since 19[….]. The role of the Sustainable Development and Environment Unit (SDEU) at the present time covers, inter alia:

(i) coordinating studies on energy resources in close cooperation with the responsible operating entities;

(ii) coordinating issues relating to energy and the environment.

(iii) developing, and monitoring demand side management programs and other programs designed to encourage the implementation of energy efficient technologies by the main energy users; and,

(iv) encouraging private sector participation in renewable energy technologies that are relevant to Saint Lucia (e.g. solar technology).

9.04 The staffing and or portfolio responsibilities within SDEU would need to be reorganised/expanded to cater for any major thrusts in the areas of policy development and project implementation assistance and monitoring. Before meaningful interventions in the energy sector can take place, such as the undertaking of a comprehensive energy end-use analysis, it will be necessary to improve the institutional capabilities within the Ministry to carry out such tasks and to review recommendations from the Regulator for the grant of licences to IPPs by making

recommendations to the Minister. The principal requirement, however, is to focus and consolidate the responsibilities for energy sector policy analysis within the MPDEH/SDEU. This objective, however, can only be accomplished through the strengthening of SDEU and the implementation of measures to ensure the retention of motivated and experienced professionals complemented by consulting and technical assistance services as necessary.

9.05 **St Lucia Electricity Services Ltd (LUCELEC)** – is the only electric utility in St. Lucia and it has exclusive responsibility for the generation, transmission, and distribution of electric power for public consumption in St. Lucia. LUCELEC was incorporated as a private limited liability company on November 9, 1964. The company was granted its exclusive licence by Act of Legislative Council (Ordinance No. 27 of 1964), in which the terms of the licence were specified.

9.06 The company led by Commonwealth Development Corporation (CDC), the strategic investor, acquired the electricity business and assets of the Castries Town Council and the Government of St. Lucia through several agreements. These agreements were all effected during the early half of 1965 and on July 1, 1965, LUCELEC's exclusive licence became effective and it took over complete responsibility for electricity operations in St. Lucia, including generation, distribution and sale of electricity. The shareholding of the company at that time (July, 1965) was:

- CDC 53.1%
- Government of St. Lucia 18.7%
- Castries Town Council 28.2%

9.07 The 1970s saw the company facing a rapid increase in the demand for electricity as hotel development and banana production transformed the economy. Average demand grew by almost 30%, a doubling of capacity every three years, which put severe strains on the resources of manpower and equipment. Two new power stations were commissioned and the basic, and still existing, 11kV sub-transmission system was erected at that time. By the early 1980s it was evident that the company was entering a new phase and there was a need for better trained persons to cope in an increasingly complex technological environment. The company initiated a highly successful craft apprenticeship program and began the recruitment of graduate staff for all senior positions. By the end of the 1980s the company was virtually self sufficient in all but the most specialised needs.

9.08 In 1990, a new power station at Cul de Sac was commissioned and a new 66 kV transmission system was introduced allowing for the more efficient transmission of power around the island. In August 1994, the shareholders removed the private company restriction and the restriction on value of shares. The Company therefore became a public company and had a successful public offering of 3,300,000 ordinary shares at a price of EC$10.00 per share. The current ownership structure and Board membership reflect the results of this public offering. In 1999 the shareholding on record gave GOSL control over a block of shares representing 41.28% of the total shareholding of the company and stood as follows:

- CDC 44.87%
- Castries Town Council 16.33%
- National Insurance Scheme 12.51%
- Government of St. Lucia 12.44%
- Private and Institutional Shareholders 10.53%
- Small Foreign and Local Shareholders 3.32%

9.09 The Board comprises a Chairman, seven other non-executive members and a Managing Director. These Board members are appointed as follows:

- 4 members nominated by the CDC, including the Managing Director
- 1 member nominated by the Castries Town Council
- 1 member nominated by the Government
- 1 member nominated by the National Insurance Scheme
- 1 member nominated by the Institutional Shareholders

9.10 The Board elects the Chairman and the Managing Director is appointed by CDC, in accordance with Clause 4.3 of the Management Contract between LUCELEC and CDC.

LUCELEC Review Commission

9.11 Apropos of the general view of the St. Lucian public that LUCELEC's tariffs are too high, the 1973 base year for the computation of fuel surcharge is unfair; and the need to reassure the public that they are receiving excellent service at good value, GOSL appointed a three-man LUCELEC Review Commission ("the Commission") in recognition of the critical importance of a safe, reliable and reasonably priced power supply to the welfare of the citizens and to the economy of St. Lucia and its responsibility to ensure that LUCELEC is working in the national interest.

9.12 In summary, the Terms of Reference for the Commission required the commissioners to:

(a) assess LUCELEC's efficiency in providing St. Lucia with a safe, readily available, reliable and cost-effective supply of power while at the same time providing a reasonable return to shareholders and contributing a reasonable share of the financing needs for its expansion from its own resources;

(b) examine the adequacy and/or limitations of the existing arrangements for determining the tariff especially with regard to its providing incentives for

LUCELEC to improve the efficiency of its operations and the quality of service to its consumers;

(c) explore alternative cost effective regulatory mechanisms;

(d) suggest energy conservation measures that LUCELEC and the public could use; price and other incentives that could encourage a more even demand for power during a 24 hour day; possibilities for greater use of LUCELEC's assets and facilities and options for greater cooperation among small utilities as a means of reducing the per capita costs of providing essential overhead services; and, other cost effective measures that LUCELEC, the Government and consumers can pursue to help reduce the cost of power to St Lucia;

(a) adopting environmentally sustainable operating practices;

9.13 The detailed Terms of Reference are at Attachment II

Findings of the Commission

9.14 The Commission was critical of several of the company's functions which related mainly to customer service and procurement, but it found less critical deficiencies in the engineering functions of the company. Underlying most of the conclusions and recommendations of the Review Report is the view of the Commission that LUCELEC has, by most standards, been a successful electrical utility. The commission concluded that the expectations of investors, including the Government of St. Lucia, had largely been realised but that it was now appropriate and timely that the customers should become the main focus of the Company. The Commission is strongly of the view, that period going forward should see increased benefits to the customers and citizens of St. Lucia.

9.15 The Commission identified key areas that require priority attention as a pre-requisite to the further success of LUCELEC and the electricity industry in St. Lucia. In the view of the Commission, the priority areas are:

- Customer Service and Community Relations
- Reduction of Fuel Costs
- Application of the Fuel Surcharge
- Human Resource Development
- Monitoring the Performance of LUCELEC
- The Development Plan 2000 - 2005

9.16 It went on to suggest that the resolution of the above areas of concern required a combination of short-term and long-term actions by both GOSL and LUCELEC, and made the specific recommendation that LUCELEC would need to reviews its entire approach to the formulation of its next development plan.

9.17 The Commission also determined that the regulatory regime was inadequate and concluded that if the electricity industry in St. Lucia is to become more efficient and customer-sensitive, the ESA of 1994 must be amended.

9.18 **Sector Regulation** – The Electricity Supply Act No.10 of 1994 (ESA) sets out the arrangements under which the utility generates and supplies electricity in St. Lucia and effectively enshrines the utility's operating licence within the legislation. It also determines the rates which shall be charged for electricity in St. Lucia by a special formula enshrined in the legislation.

9.19 In accordance with the formula, at the end of each year LUCELEC calculates actual and target rates of return on rate base. The target rate of return is the rate of return on the equity of the company to be attained annually. This ESA allowable rate shall be not less than the average twelve-month deposit rate paid by commercial banks in St. Lucia plus an additional ten per cent, provided that such return on equity shall be at a rate not less than fifteen percent per annum. Typically, differences between the actual and target rates of return are reflected in an adjustment of electricity rates in the following year.

9.20 The Act also provides for a fuel price adjustment to be reflected in the tariff and this permits LUCELEC to vary the pricing of electricity to customers so that the company is sheltered from volatility in fuel prices. The fuel price adjustment clause is structured to allow all increases or decreases in the price of imported fuels to be passed through to customers.

9.21 In accordance with the Fourth Schedule of Electricity Supply Act, LUCELEC has calculated its rate base for 1999 to be EC$253,648,450. LUCELEC has also calculated that its operating income for 1999 amounted to EC$26,558,157, which was equivalent to an actual return on the computed rate base of 10.47 per cent. Based on a computation of the weighted average percentage cost of equity and weighted average percentage cost of debt, LUCELEC has determined that the allowable rate of return for 1999 was 11.48 per cent resulting in a shortfall of 1.01 % or 0.411 cents per kilowatt-hour for that year [36/].

9.22 Discount to Government Departments and Agencies – Government departments and agencies benefit from a 10% discount on their electricity bills, including the fuel surcharge. This discount is authorised under Paragraph 29 of the ESA. The actual amounts saved by the implementation of this measure amounted to $1.387 million in 1999, and represents a direct subsidy to Government's electricity consumption from the other consumers of electricity in St. Lucia.

9.23 The provision of this subsidy is not appropriate in economic terms, for apart from providing a disincentive for Government departments and its agencies to take the lead in the

[36/] Source: LUCELEC Commission Report

conservation of energy, it places an unfair burden on the other consumers of electricity and make private sector production cost higher than they would otherwise be.

Privatisation

9.24 GOSL has determined that investments in the power sector in St. Lucia should be left to the private sector. To ensure the participation of private sector in the power sector is sustainable, GOSL will need to maintain a regulatory framework which is consistent with this objective. In addition, GOSL is anxious to increase the competitive forces in the power sector and will need to ensure the development of the institutional framework for the power sector which will ensure the achievement of these objectives. The overall objectives of GOSL is to release itself from the obligation of financing the expansion of the power sector, while at the same time allowing it to continue to pursue broader social and economic policy objectives. GOSL will therefore need to establish a framework to:

(i) attract foreign and local private capital and broaden local ownership of the power sector;

(ii) provide an efficient and reliable supply of electricity at least economic cost; and

(iii) promote environmentally acceptable operation of the power sector.

9.25 However, the privatisation of the electric utility in St. Lucia has raised several questions. Does it satisfactorily address security of supply, extend accessibility to energy services, and promote sustainable development? Does the government have sufficient, or any, control over the activities of the utility in the national interest? Many privately owned utilities believe that they should service their clients by focusing on efficiency, including cost-effective technologies; and that making electricity available to the poor and rural areas is mainly an issue for social policy – is this the case in St. Lucia?

9.26 The answer, generally, is that there is a need for policymakers to introduce effective, strong and transparent regulatory frameworks while avoiding detailed interventions in the sector. This regulatory framework should set clear guidelines as to what utilities are supposed to do, and what incentives they will be allowed for the pursuit of social objectives.

X. Conclusions and Policy Initiatives

Introduction

10.01 Government is committed to the broad objective of relying on market forces to achieve the efficient allocation of resources. The development of energy sector policies and strategies must be consistent with Government's overall macro economic policies and recognize the constraints which would result from changing international economic order. GOSL is also anxious to develop new and renewable energy resources in St. Lucia in its effort to give effect to its commitment to the international community to establish St. Lucia as a "Sustainable Energy Demonstration Country" by 2008-2012. The recommendations and policy options proposed are therefore intended to achieve:

(i) energy supplies to the economy at the least economic cost through a combination of public and private sector participation, deregulation and liberalisation of the energy sector;

(ii) diversification of energy base;

(iii) development of indigenous energy resources base and ensuring security of energy supplies;

(iv) efficiency in energy production, conversion and efficient use of energy with the overall objective of reducing the energy intensity energy use;

(v) reduction of adverse environmental effects and pollution by rehabilitating the deteriorated existing energy sector facilities; road haulage system, change in product specifications and mix, appropriate environmental impact assessments of new projects and options;

(vi) implementation of appropriate pricing polices to ensure that adequate energy supplies are delivered to all economic sectors efficiently and the improved energy supply net work is sustained through economic pricing of energy products with sufficient incentives to encourage private sector investments; and

(vii) establishment of appropriate regulatory framework to protect the consumer and investors.

Public Sector Institutional Arrangements

MPDEH:

10.02 The MPDEH through Sustainable Development and Environment Unit (SDEU), inter alia, has the responsibility for formulating and overseeing and monitoring the implementation of the national energy policy, strategy and resulting plans. The role of SDEU will at least cover:

(i) energy policy formulation, energy planning and energy sector coordination;

(ii) coordination of studies on energy resources, production, transformation and marketing in close cooperation with the responsible operating agencies;

(iii) the compilation of basic energy information which would be used for sectoral planning and evaluating the impact of selected policy initiatives;

(iv) assisting in the development of appropriate regulatory frameworks for the power and petroleum sub-sectors;

(v) assist in setting product and safety standards in collaboration with the Bureau of Standards and other ministries;

(vi) assist and monitor the demand side management programs and other programs designed to encourage the implementation of energy efficient technologies by the main energy users, which is being conducted by LUCELEC;

(vii) encourage private sector participation in renewable energy technologies that are relevant to Saint Lucia (e.g. solar technology); and,

(viii) coordinate issues relating to energy and the environment.

10.03 The staffing and or portfolio responsibilities within SDEU will be reorganized/expanded to cater for the revised role contemplated above. The core of the SDEU should be: (a) Unit manager/director; (b) Power Sector Analyst; (c) Energy Conservation/Renewables Specialist; (d) Energy Economist/Energy Planner; and (e) Public Education Officer. Highly specialized analyses would be provided as required by consultants.

10.04 The Unit will be managed by the Chief Sustainable and Development Officer. The Chief Sustainable and Development Officer will, together with the other specialists, prepare cabinet submissions and liaise with the Legislative Committee in the drafting of legislation for the energy sector.

10.05 The Energy Economist/Energy Planner will: (i) have responsibility for ensuring consistency between energy sector development strategy/policy and the overall macro-economic policies; (ii) assist in the economic analysis for the various sub-sectors; (iii) preparing energy balances for St. Lucia; and, (iv) assist the Chief Sustainable Development Officer in coordinating the activities of the other specialists in the Division.

10.06 The power sector analyst will be responsible for power sector policy development, strategy and monitoring functions within the sector; reviewing the development of least cost supply and integrated resource planning options; demand forecasting; development and implementation of appropriate regulatory framework and standards for the sector; project analysis and financing of studies within the sector.

10.07 The Energy Conservation/Renewable Specialist will have overall responsibility for coordinating DSM programme, energy efficiency and conservation, renewable energies and their relevance to St. Lucia; and monitoring the energy efficiency programs of sector entities and for liaising with the SLBS in the preparation of energy efficiency standards for appliances.

10.08 Each specialist will be responsible for maintaining the database related to their responsibility. They will be computer literate, and proficient in spread sheet analysis and word processing programs.

10.09 A Public Education Officer within the Government Information Service (GIS) will be assigned special responsibility for the public education program of the Ministry and should work closely with SDEU, the Ministry of Education, Ministries responsible for tourism, commerce and industry and other public and private sector entities to develop public awareness programmes and advise individuals and organizations of the opportunities and incentives available for DSM and energy efficiency improvements.

Inter-Ministerial Steering Committee

10.10 Because of the significant inter-ministerial collaboration which will be required to implement the new arrangements, GOSL should establish an ad-hoc inter-ministerial steering committee which should be co-chaired by the Minister of Physical Development, Environment and Housing and the Minister of Communications Works and Public Utilities. This should be a high-level committee which should have representation from among the senior technocrats from:

- Ministry of Finance
- Ministry of Physical Development, Environment and Housing
- Ministry of Communications, Works and Public Utilities
- Ministry of Tourism
- Ministry of Agriculture
- Attorney General's Chambers
- St. Lucia Bureau of Standards
- A Government Representative on the Board of LUCELEC

The senior Staff of the SDEU will act as the Secretariat for the inter-ministerial committee – the Ministerial Steering Committee (MSC), and will be responsible for the recruitment of consultants/advisors from among other GOSL agencies and the private sector, including the St. Lucia Hotel and Tourism Association, and LUCELEC, preparing briefs for the MSC, summoning meetings of the MSC and keeping the record of decisions taken at meetings.

Petroleum Sub-Sector

Pricing

10.11 Although the market is partially liberalised, the analysis of the pricing formula, including a comparison of prices for diesel paid by LUCELEC and that paid by the remainder of the trade, indicates that the price differential which is charged for freight and insurance from Trinidad compared with those rates form the greater distance from St. Croix will need investigation and resolution.

10.12 The application of the present pricing formula could be resulting in excess costs of supply. It is important that MPDEH establishes a mechanism to monitor the pricing mechanism to ensure that prices of petroleum products do not get out of hand, and that prices are not being loaded with unreasonable transportation, loss and insurance costs.

10.13 To achieve this GOSL will:

(i) re-visit the recommendations of the 1991 World Bank Caribbean Least Cost Petroleum Supply Study;

(ii) review with the petroleum import companies, their guidelines for the calculation of the transportation, losses and insurance costs; and,

(iii) establish a capability within the MPDEH to monitor the pricing arrangements and formulae on a continuous basis, making use of other regional and international benchmarks

Taxation

10.14 Government will discontinue the present method of adjusting the excise tax levied on petrol and diesel fuel in order to keep the price to the consumer constant. Taxation computations will be revised to ensure a domestic fuel price taxation mechanism which allows the costs at the pump to fully reflect international price movements.

10.15 GOSL will also review the taxation regime relating to two burner table-top gas stoves and consider removing all taxes to discourage the use of charcoal.

Safety and Standards

10.16 Standards will be established and licensing requirements set for the operation of oil related operations in St. Lucia. These standards are necessary to safeguard the environmental, safety concerns and protect the consumer.

Power Sub-Sector

Regulatory Arrangements

10.17 Even under a regime where there is substantial private participation in the energy/power sector, GOSL continues to have a vital role in the sector in that is has responsibility for regulating the entire sector. GOSL will analyse policy on an on-going basis and if necessary, effect policy change so as to benefit the economy of St. Lucia as a whole.

10.18 GOSL will repeal The Electricity Supply Act No.10 of 1994 (ESA) and replace it by (a) new legislation which will govern the overall operations of the power sector; (b) a separate non-exclusive operating licence which will be negotiated with the utility which will, in the interest of maintaining investor confidence, guarantee as far as possible, substantially the same commercial arrangements which now obtain under the ESA; and, (c) legislation which will either establish, either on its own, or in consultation and conjunction with the Member States of the OECS, an independent regulatory body headed by a utility regulator ("the Regulator") to regulate the power sector in St. Lucia.

10.19 The new ESA will unambiguously allow for self-generation without the possibility of disconnection by the utility; but a new tariff design will identify realistic fixed costs of supply, and separate them from the variable cost of supply so that hotels which desire to self-generate could do so, relying on the utility for their standby power. These arrangements will allow the utility to recover the capital and fixed operating costs of maintaining the capacity to supply the consumer. If hotels retain the ultimate right to self-generate it will provide proxy competition for the utility and assist in keeping the utility's prices in line because, guaranteed rate of return or not, the utility will then be forced to keep their rates to the hotels competitive or lose them as customers.

Independent Regulator

10.20 The Regulator will be mandated to, inter alia:

- undertake the economic regulation of the sector;
- set and monitor quality of service standards;
- approve reliability criteria for the utility;
- review and approve the expansion plans of the utility;
- determine which renewable energy options should be exploited by the utility or IPPs;
- determine whether the utility should face competition from IPPs for the provision of incremental power plant additions;
- determine whether an IPP would be allowed to generate power for a specific end-user;

- determine the tolls to be charged by the utility for transmitting power and energy over its network; and,

- process licence applications from new players in the power market and make recommendations to the Minister responsible for energy/public utilities regarding the grant of licences.

Regional Approach

10.21 Significant economies of scale, as well as a fillip to the important perception of independence and impartiality, would be brought to bear on the operation of the utility regulatory body if it were founded at a regional level, and regulated not only electric utilities, but other utilities as well. GOSL will move speedily to consider promoting the establishment of such a regional office of utility regulation (ROUR) as suggested by CDC in the LUCELEC Review Commission Report – perhaps operating under the auspices of the OECS as in the case of ECTEL – which would be responsible for administering the various licences under which electric and water utilities operate throughout the OECS region.

10.22 In the case where it is not possible to negotiate away the return on ratebase (ROR) criteria of utilities which have such compensation principles included in their licences, regulation would be restricted to all of the above areas excepting economic regulation, but instead the ROUR would be responsible for determining what items entered the rate base computation if these were not already tightly specified in the utility's licence.

Quality of Service Standards

10.23 Experience has shown that a utility which enjoys a monopoly position and is also subject to price cap regulation will under-invest in measures aimed at improving the utility's customer service activities and the quality of service as these expenditures do not necessarily result in increased revenues and profits. Changing the current regulatory regime under which the utility operates will therefore require that quality of service standards be specified for the protection of consumers.

10.24 The Regulator will require the utility to agree on standards by which the quality of service received by customers of the utility should be measured and targets for improvement will be established. The agreement will incorporate two types of standards – (a) guaranteed, and (b) overall.

10.25 Guaranteed standards set service levels that must be met in provision of service to each individual consumer. Included in this group are such measures of performance as the time taken to provide service after an application is made; response time to emergency service calls; reconnection after payment of overdue amounts, etc. If the utility fails to meet a guaranteed standard, a specified payment will be made to the affected customer. The objective is not so much to compensate the customer for inconvenience or loss, as to provide an incentive to the utility to maintain a high level of service.

10.26 Overall standards cover areas of service that affect all or a large group of customers and therefore compensatory payments are not feasible. However, even in such circumstances it is desirable for the utility to provide service at a predetermined minimum quality. Examples of overall standards include: service reliability, as measured by the number of minutes per year in which service to the average customer is interrupted; advance notice to customers of planned outages; frequency of meter readings, etc. LUCELEC will not be exposed to direct financial penalties if it fails to meet an overall standard, but its performance in this regard will be taken into consideration during rate reviews. Failure to maintain the established overall standards could therefore result in lower tariffs than would otherwise have obtained.

Economic Regulation and Tariff Design

10.27 The Regulator will ensure that the electricity tariff is designed to reflect:

(a) the full costs of producing electricity, including duties and taxes on a non-discriminatory basis to all consumers of electricity;

(b) indexation of fuel cost fluctuations;

(c) adjustments for inflation based on a retail price index minus an incentive factor for productivity improvements;

(d) the long run marginal cost of supply to each consumer category, each supply voltage level and the cost of supplying capacity and energy to consumers at different times of day, etc.

10.28 The design will also ensure that:

(a) cross-subsidies are minimised by further ensuring that any subsidies which are required to either (a) protect the poorest categories of consumers, or (b) promote tourism or industrial development are, as far as possible, supplied form within the broad consumer class and not across consumer classes or voltage levels.

(b) purchased power charges and adjustments are passed through to the consumer in the tariff and that initial contracts with IPPs are subject to the approval of the Regulator.

(c) performance targets are set for:

(i) technical line losses; and,

(ii) generator heat rates.

(d) In order to provide greater incentives for LUCELEC to obtain fuel at lower cost, the fuel cost used to calculate the fuel charge to consumers will be indexed to movements in an appropriate product reference price, and not to the actual price paid. If the company were able to purchase fuel at costs appreciably below the indexed price it could then gain a financial advantage since the cost from the local supplier would be used to determine the

fuel charge to the consumer. The price that would have been paid to the local supplier can be independently verified, since it is determined by the Platts US Gulf prices, which are openly available.

(e) non-discriminatory pricing of electricity is implemented, and GOSL will not be entitled to any special discounts.

Return-on-equity.

10.29 The allowable earnings of a company should cover the cost of capital of the business. This cost of capital is the supply price of funds (equity and debt) needed in the regulated business to finance its operations, i.e. its fixed assets and working capital. Linking the rate-of-return to fixed assets only, although quite common, runs the danger of not providing enough revenue to compensate investors for the risks assumed.

10.30 The standard method for determining a fair return on capital employed (total assets less current liabilities) will involve:

- estimation of the capital attraction rate for each component of the company's capital;
- combination of the various rates into one overall rate in accordance with the percentages each bears to the overall capitalisation.

10.31 The cost of capital so derived or established by benchmarking will normally be applied to the net assets of the company.

Adjusting the Equity Base of the Company

10.32 In determining the appropriate equity base, the Regulator will make reasonable adjustments for all assets which were not utilised in the provision of electricity services.

Appropriate Return on Equity [37/]

10.33 In determining the appropriate rate-of-return for LUCELEC, the factors to be considered by the Regulator will include, *inter alia*:

- Returns of other enterprises having corresponding risks
- Country risk
- Debt/equity ratio
- The annual revaluation of assets

[37/] The methodologies used in calculating the return on equity all calculate return on the basis of the opening value. The earnings are assumed to flow at the end of the period. These assumptions are important in determining what rate base should be used in calculating the return on equity.

- The company's monopoly status

10.34 In choosing an appropriate rate-of-return on equity to be used in calculating LUCELEC's revenue requirements the basic steps to be used in determining the rate of return on equity will be:

1. Calculating the return likely to be required by an international investor in the sector;

2. Adjustment of the rate-of-return calculated above for country risk;

3. Determining whether this rate should be adjusted by an exchange risk premium;

4. Deciding whether a real or nominal rate is to be applied.

Rate-of-return for an International Investor

10.35 Using data from several companies the appropriate rate-of-return for an international investor will be determined by applying, *inter alia*, the following methodologies:

- Dividend Discounted Cash Flow (DCF)[38/]

- Capital Asset Pricing Model[39/]

10.36 The average of the rates resulting from application of these methodologies will be taken to be the appropriate rate.

Investments in the Energy Sector

10.37 All investments in new power generation, transmission and distribution facilities in St. Lucia will be through private sector interventions. Accordingly, GOSL/LUCELEC will jointly develop a strategy to deal with proposals from non-utility generators to develop new projects for the generation of electricity which shall include:

(a) definition of the future needs of the power system and the preparation and publication of a list of projects with probable time frame so that the prospective sponsors can focus on the pre-defined needs of the St. Lucian generation system and respond to solicited timetable and capacity requirements;

38/ This approach is based on the realisation that the price of a share of stock, P, should equal the present value of all future dividends.

39/ In this model – Cost of equity = Risk-free rate + (Beta x Market risk premium)

Where:

- the risk-free rate is the rate on GOSL Treasury securities;
- Beta measures the systematic risk in investing in a company; and
- the market risk premium is the amount of added expected return that investors require to hold a broad portfolio of common stock instead of risk-free Treasury securities.

(b) establishment of a programme outlining the sequence for the addition of new plant capacity which could be provided to prequalified project sponsors to guide in the preparation of solicited proposals on a standardized format[40/] for submission to the GOSL/the utility; and,

(c) a technical panel be established to review and evaluate solicited projects before they are considered by the decision makers. The political directorate should refrain from dealing directly with the sponsors of proposals.

10.38 For the longer term, GOSL/the Regulator will ensure that power system studies at regular intervals to up-date the LCEP. Delays in implementing the expansion requirements of the system would have a much more negative effect than selecting an option which is not quite in line with the least cost development.

Indigenous Energy Sources

10.39 The scope of indigenous energy sources in the short to medium term is limited. The only viable indigenous energy source appears to be wind and geothermal energy for electricity production. Solar water heaters have an economic potential, provided appropriate polices are followed to encourage their use. As for the resource allocation to the development of other exotic indigenous energy options is concerned, effort will be limited to monitoring international developments by appropriate ministries. No large staff at the MSDEH will be deployed to follow up or test technologies relating to renewable options. Appropriate ministries and departments will monitor international developments to determine the timing and suitability of some or any of these applications to Saint Lucia. As far as the SWHS are concerned, incentives and pricing conditions will be established to encourage their use.

Self-Generation

10.40 GOSL is anxious to encourage the development of self-generation where appropriate, as there could be significant savings to certain types of enterprises such as hotels if they decided to generate their own power. This is because the hotels would then have the opportunity to recover waste heat from the generation process for use in water heating and steam production for their laundries etc. If hotels find it cheaper, and accordingly decide to generate their own power, this would provide economic benefit to the country, as more energy would then be extracted from each barrel of imported fuel. The ESA will permit self generation by these enterprises, subject to the approval of the Regulator.

Independent Power Producers

10.41 GOSL wishes to encourage limited competition in the generation of electricity in St. Lucia and will facilitate the development of independent power projects (IPPs) in St. Lucia, particularly those which make use of renewable energy technologies. The ESA will accordingly permit the licensing of non-utility generators. However, it would not be wise, to allow IPPs to have unlimited

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40/ This would avoid undue strain on public sector technical resources to evaluate unstructured projects

and indiscriminate access to the utility's system and GOSL will therefore permit the development of independent power projects only at the discretion of the Regulator.

10.42 In the above regard, GOSL will not encourage the submitting of unsolicited proposals for the development of independent power projects excepting where they are submitted within the overall framework of the expansion needs of the utility. The framework for accommodating such projects is set out in Attachment III.

10.43 Initially, such access will be permitted by the Regulator only in exceptional circumstances to allow for the development of unique opportunities to exploit renewable energy resources which the utility did not wish to exploit; and these opportunities will be subject to a competitive procurement process directed by the utility in the case of IPPs to be procured by the utility and by the Ministry responsible for energy in other cases. All competitive procurement by LUCELEC will be at the discretion of, and under the supervision of the Regulator.

10.44 As the sector matures and competitive forces become stronger, the Regulator will, at his discretion, mandate the use of "net metering" which would measure the net energy consumed by a customer generating power from renewable sources such as very small householder wind machines or photovoltaic/inverter systems.

Access to Transmission Network

10.45 The ESA will permit so called "open access" to the transmission system of the utility. However, such access will be determined at the discretion of the Regulator. This is a feature will have the effect of permitting industrial enterprises that identified suitable self-generation opportunities at sites remote from where the use of the power is contemplated to have access to the transmission system for transmitting the power generated to the site where the power will be used. This feature could perhaps have benefit in attracting an industry which would be able to develop the fumaroles at Soufrière and to supply power to an industry which could not, for logistical or other reasons, be located close to the site of the power development at Soufrière.

- Open Access will be allowed on the transmission system for large industries/hotels at the discretion of the Regulator;

- The ESA and the utility's licence will, however, mandate that the utility be allowed by the Regulator to recover all direct costs associated with allowing and providing such open access to its system; and,

- The Open Access charges which the utility would bill to such users of the system will be developed and regulated by the Regulator.

Renewable Energy Portfolio Standards

10.46 Following a more detailed assessment of the energy sector, an evaluation of the performance of the initial set of renewable energy projects to be implemented, GOSL will commission a study to determine the likely impact of RPS on the development of the energy sector

in St. Lucia. At that stage, GOSL will decide whether to give the RPS approach to the development of renewable energy the force of law by promulgating the legal instruments which will mandate a specified proportion of electricity generation which must be derived from renewable sources.

Energy Efficiency

10.47 Energy efficiency/conservation efforts will be supported by the economic pricing of energy products. However, to fully exploit the potential, demand side management (DSM) programs are also necessary but their sustainability will depend on the creation of institutional capability and availability of resources.

10.48 This will require the implementation of a comprehensive energy-efficiency training program for utility personnel, hotel developers and engineers, potential entrepreneurs, and other relevant persons.

Power sector

10.49 On the **demand side** efficiency improvements will be as determined by the revised regulatory regime and arrangements. To facilitate this work, a project will be prepared by GOSL/LUCELEC for possible financing through the Global Environmental Trust Fund (GET) which is being supported jointly by the UNEP, UNDP, World Bank. The main objectives of this programme is to demonstrate on a small scale, and within reasonable time frame: (i) the potential for electricity savings to replace fossil fuel power generation thereby avoiding CO2, NOx and SO2 emissions; and (ii) the capacity of the electric power sector and other relevant agencies, public and private, to achieve these savings. The broader, global objectives are to replicate among utilities in other developing countries a similar programme to demonstrate large scale demand side management capability. This programme will seek to:

(a) develop institutional mechanism to assess end use energy and efficiency potential;

(b) design and recommend specific programs to capture this potential;

(c) evaluate the effectiveness of the proposed programs; and

(d) develop the necessary institutional capabilities to implement these programs on a larger scale.

10.50 On the **supply side** efficiency improvements are to be programmed by the utility in system loss reduction programmes, and these will be ensured by the targets to be set in the revised regulatory regime and arrangements.

Energy Efficiency Building Code (EEBC)

10.51 An EEBC will be developed for new construction and retrofits in commercial and institutional buildings. The EEBC will be made mandatory for both the public and private sector buildings and be implemented as part of the development approval process. Compliance with EEBC will be mandatory but introduced on a phased basis which will provide for the grandfathering of designs which are at an advanced stage. It will be mandatory, for instance that all new buildings can accommodate solar water heaters and the other energy savings devices and that buildings will be capable of talking advantage of passive techniques for cooling.

10.52 A technology transfer phase will be implemented and engineers and architects will be trained in the application of the Code through a series of workshops. To facilitate this transfer, design handbooks incorporating local construction practice will be prepared by teams of local architects and engineers with inputs from international specialists where required.

Energy Service Companies (ESCOs)

10.53 Government will implement measures to promote the establishment of energy service companies to undertake energy efficiency improvements on the premises of consumers. Accordingly, it will take actions to catalyse the creation of one or more ESCOs in Saint Lucia. It will also seek funding from international agencies to assist with the establishment of an energy-sector venture capital fund and will explore and assess the potential for promoting investments in one or more entrepreneurial enterprises.

Funding

10.54 GOSL will with ongoing support for the EEBC. The work program will include the design workshops, preparation of the design handbooks, energy audits for about six government buildings, and compliance reviews of a further six buildings. This will indicate the commitment of GOSL to a rapid implementation of the EEBC and the early realization of benefits.

Government Sector

10.55 The Water and Sewerage Company (WASCO) is the major energy consumer in the Government sector. An assessment of the energy conservation potential will be undertaken as significant benefits could probably result from the implementation of energy efficiency and conservation measures.

10.56 Specifically, with the introduction of a time-of-day tariff for electricity, WASCO could rationalise its storage capacity, ensure that it its pumping operations were scheduled for off-peak periods and take advantage of the lower off-peak rates to significantly reduce its operating costs

10.57 Energy consumption in Government buildings has never been monitored. This will be started as soon as possible with a focus on air conditioning and lighting ECO's. It may be possible to make use of the results in the commercial sector program.

Environmental Strategy

10.58 The cost of environmental protection measures to international standards will be internalized as project costs and thus be reflected in the energy price. The following environmental action programs are to be implemented in connection with existing and proposed energy projects:

(a) Environmental Impact Assessments of new energy related projects should be mandatory;

(b) cleaning up existing sources of pollution notably power stations and petrol stations;

(c) pollution abatement through conservation and energy efficiency improvements;

(d) establishing baseline data for air quality and forest resources; and

(e) identifying standards required for particular environmental zones such as the Pigeon Island National Park, tourist areas, etc.

Transport Sector Strategy

10.59 The transport sector is the largest energy consumer in St. Lucia. One positive development is the growing preference for small, energy-efficient vehicles. Fuel taxation and import duties could reinforce this trend. Most energy conservation measures in transport are effective only in the medium- and long-term. In the short term, Government strategy will be confined to maintaining relatively high levels of taxes and road user charges on automotive diesel fuel and gasoline to encourage attention to fuel consumption.

10.60 In the medium term, attention will be paid to the stock of vehicles. In the longer term, infrastructural measures (road maintenance, repairs and construction), transport planning and mode shifts (towards public transport) will be implemented.

10.61 Finally, maintenance is of great importance. Obligatory inspection and improved training of car mechanics are likely to be effective measures. An in-depth analysis of energy conservation options in this sector needs to be undertaken.

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XIII. List of Tables

Attachment I.

Saint Lucia

Sustainable Energy Plan

Final Draft

3 May 2001

Background

Saint Lucia is a nation blessed with abundant resources and potential for economic and social development. Its location in the Eastern Caribbean, together with its friendly population and its diverse scenery, makes Saint Lucia an ideal location for commercial and tourism development. For this to occur however requires significant energy inputs, including fuel for electricity generation, water heating, refrigeration, air conditioning, and transportation.

For its electricity, Saint Lucia relies on an installed capacity of 66.4 megawatts (MW) derived from three diesel-powered generating plants. The customer base comprises industrial, commercial, and residential users. The following chart illustrates the proportions of consumption according to the major users (See table 1).

Table 1: CONSUMPTION OF ELECTRICITY IN SAINT LUCIA, 1995-1999, BY SECTOR [41]/

YEAR	1999		1998		1997		1996		1995	
	MWh	%	MWh	%	MWh	%	MWh	%	MWh	%
Domestic	79,491	36.86	75639	38.04	69,617	38.51	65,653	39.74	62,668	38.37
Commercial & Hotel	120,628	55.93	108618	54.63	97,248	53.80	86,518	52.37	85,683	52.46
Industrial	12,271	5.69	11640	5.85	11,287	6.24	10,860	6.57	12,697	7.77
Street Lighting	3,271	1.52	2931	1.47	2,605	1.44	2,185	1.32	2,282	1.40
TOTAL SALES	215,661	100	198,828	100	180,757	100	165,216	100	163,330	100

Growth in the Saint Lucian economy, fuelled largely by the expanding tourism sector, is resulting in 4.31% annual net increases in power demand. As a result, LUCELEC, the national utility responsible for electricity generation, transmission, and distribution, projects a need to add 33.3MW in generating capacity over the next 10 years.

[41]/ Saint Lucia Electricity Services Ltd. Planning and Projects; Load Forecast 2000 to 2010; revised May 2000

Continued growth also requires that this energy be provided at the lowest possible prices. Current prices for electricity are considerably higher than comparable services in North and South America, and are on a par with those of other OECS countries (current electricity costs exceed US$0.19/kWh). The result might be to limit economic development in Saint Lucia, especially given recent increases in petroleum prices.

Further, electricity supplies must be delivered in a manner that ensures protection of the local and global environments. Sustainable-energy technologies (renewable energy and energy efficiency) offer the potential to both reduce electricity costs and protect the environment. Saint Lucia recently took important first steps to encourage renewable-energy development. In May 1999, government adopted a policy to eliminate all import duties and consumption taxes on renewable energy equipment and materials, and in April 2001 decided to allow the purchase of solar water heaters as an allowance against taxable income. However, there remain significant impediments to the widespread use of these technologies. Recognizing the need to address and ensure the long-term sustainability of its energy sector, the Cabinet of Ministers, in March 2000, approved the development of a Sustainable Energy Plan for Saint Lucia.

Goals of the Sustainable Energy Plan

The Sustainable Energy Plan lays out a strategy for the maintenance and growth of the energy sector by pursuing the following objectives:

- Ensure the existence of adequate energy supplies to sustain economic development, while meeting current and projected power demand.
- Provide for stable and reliable electricity supplies for all customers.
- Enhance the security of energy supply and use for all sectors of the economy.
- Allow reasonable incomes for businesses engaged in the local energy sector, while attracting international investment where appropriate.
- Promote energy efficiency and conservation at all levels of the economy in order to achieve optimum economic use of renewable and non-renewable sources of energy.
- Protect the local and global environment by maximizing the use of renewable-energy and energy-efficiency alternatives where viable, thereby enabling Saint Lucia to become a "Sustainable Energy Demonstration Country" by 2008-2012 in accordance with its announcement made at the Fifth Meeting of the Conference of Parties of the United Nations Framework Convention on Climate Change.

Energy Sector Baseline

The following baseline and projections for the energy sector through 2010 are based on analyses prepared by the Government of Saint Lucia, LUCELEC, and other organizations. The baseline has been established for purpose of comparison and is consistent with the goal of ensuring that sufficient, cost-effective, and reliable electrical power will be available to all customers in keeping with an expected annual economic growth rate of 3.1%.

- Current installed capacity is 66.4MW. The peak demand is 43 MW, and the average base load is 26.6 MW. All installed capacity is derived from diesel-powered generators.
- Installed capacity in 2005 will be 79MW (21.3 MW additional diesel-powered generating capacity); peak demand in 2005 will be 53.6 MW.
- Installed capacity in 2010 will be 91 MW (33.3 MW additional diesel-powered generating capacity); peak demand in 2010 will be 65.6 MW.
- Universal electricity coverage of the residential sector will be achieved by the year 2002. Electricity is currently available to approximately 98% of commercial and residential properties in the country.
- Current greenhouse gas emissions (GHG) from the electricity sector are 156,530 tons of Carbon.
- The projected GHG emissions from the sector in 2005 are 188,860 tons of carbon.
- The projected GHG emissions from the electricity sector in 2010 are 230,060 tons of carbon.
- In 1999, 82,214 barrels of diesel and 338,454 barrels of gasoline were consumed in the transport sector by a fleet of 33,563 vehicles. In 2010, 128 916.7 barrels of diesel and 643 130.7 barrels gasoline will be consumed by a fleet of 60,575 vehicles (no alternative-fuelled vehicles are assumed for this baseline figure).

Sustainable Energy Plan: Energy Sector Targets

Proposed alternatives to the baseline and scenarios described above, including reductions in demand and additions to capacity via renewable energy systems, are based on the best available information regarding project feasibility and commercial interest. The following targets established for the energy sector are to be achieved by the years 2005 and 2010 (See also table 2).

- Reduce projected electricity demand by 5% in 2005, resulting in a peak demand in 2005 of 51 MW, which will require an installed capacity of 75MW.
- Reduce projected electricity demand by 15% in 2010, resulting in a peak demand in 2010 of 55.7 MW, which will require an installed capacity of 77.4 MW.
- Deliver 5MW, or 7% of installed capacity, via renewable energy technologies in 2005.
- Deliver 17MW, or 20% of installed capacity, via renewable energy technologies in 2010.
- As a result of reductions in demand and increased use of renewable energy resources, reduce the annual consumption of diesel fuel for electricity generation to 436 579 barrels in 2005 (12% reduction from the baseline) and 392 823 barrels in 2010 (35 % reduction from the baseline.

- Reduce the annual GHG emissions from the electricity sector to 166 197 tons of carbon/year in 2005 and 149 539 tons of carbon/year in 2010.
- Reduce the consumption of gasoline and diesel fuel in the transportation sector to 122 471 barrels of diesel and 610 974 barrels of gasoline in 2005 (5% reduction) and 109 579 barrels of diesel and 546 661 barrels of gasoline (15% reduction) in 2010. These reductions will be achieved by a combination of measures, including the increased use of public transportation, the introduction of high-efficiency vehicles, the deployment of a limited number of vehicles powered by alternative fuels, driver education and awareness to reduce fuel consumption, and improvements in road and traffic management.

Table 2. ELECTRICITY SECTOR TARGETS

Year	**Target Peak Demand** *(% reduction from baseline)*	**Target Installed Capacity** *(% reduction from baseline)*	**Target Renewable Energy Installed** *(% of total installed capacity)*	**Diesel Fuel Consumption** *(% reduction from baseline)*	**GHG Emissions** *(% reduction from baseline)*
2005	51 MW (5% reduction)	75 MW (5% reduction)	5 MW (7% of total)	436 579 barrels (12% reduction)	166 197 tons of carbon equiv. (12 % reduction)
2010	55.7MW (15% reduction)	77.4 MW (15% reduction)	17 MW (20% of total)	392 823 barrels (35% reduction)	149 539 tons of carbon equiv. (35 % reduction)

Sustainable Energy Plan: Required Actions for Achieving Targets

Attaining the foregoing targets is considered feasible, according to the information obtained by the Government of Saint Lucia for the development of this *Sustainable Energy Plan*. However, the present policy and regulatory framework requires adaptation to put in place suitable market rules and signals. Recommended actions for creating such an environment in which sustainable energy actions are implemented are described below.

Assessment of Market Potential

To expand the use of renewable-energy and energy-efficiency measures, it will be critical to ascertain, at least in broad terms, where key project opportunities exist.

In the case of renewable energy projects, one of the main prerequisites to attracting potential investors is a basic set of data identifying key resource locations and describing the likely quantity and quality of such resources. A broad assessment of renewable energy resources, including wind, biomass, solar, and geothermal, will be assembled. In some cases, such as geothermal energy, resource assessments have been undertaken for several years but have not resulted in the commercial

development of a project. As part of this *Sustainable Energy Plan*, additional site-specific assessments will continue in anticipation of locating quality resources with the potential for commercial exploitation. In the area of wind-resource assessments, both broad national wind mapping and site-specific monitoring will be undertaken.

> ***Action***: Conduct renewable-energy resources assessments for wind, biomass, geothermal, hydro, and solar energy and compile these into a single Renewable Energy Resource Database for use in promoting Saint Lucia as a possible destination for renewable-energy investments.

Similar analyses of technical potential are also required for the energy-efficiency market. It is assumed that opportunities for electricity savings, through conservation, the use of high efficiency technologies, and better management of demand, are plentiful.

> ***Action***: An analysis/survey of the market potential for energy efficiency measures will also be undertaken. This will review generation and consumption patterns throughout the country and in each of the key sectors. These analyses will be used in the design of appropriate energy-efficiency measures and in efforts to attract entrepreneurial initiatives focused on energy savings.

Grid-Tied Renewable Energy Initiatives

1. *Electricity Generation Mix:* The current generation profile for Saint Lucia consists entirely of diesel-powered generators. Even though Saint Lucia has to import all its petroleum products, there are several logical reasons for the use of these systems. They are relatively inexpensive to procure, install, and maintain, and the utility is very comfortable with their operation. The power generated is quite stable and is appropriate for baseload use. However, an analysis of the long-term costs of operation (including investment, O&M, fuel costs, etc.) shows that the cost of power is quite high: US$0.13/kWh fixed cost and US$0.068/kWh fuel cost. Further, the country faces a considerable fuel price risk as a result of the vagaries of international oil markets and the current trend towards higher costs. The utility, however, avoids much of this risk, as it is able to charge a regulated price for electricity with a built-in escalator that ensures a minimum profit of 15% of the Weighted Average Percentage Cost of Equity and the Weighted Average Cost of Debt. Several renewable-energy technologies offer a cost-competitive alternative when compared with the long-term costs of diesel-based generation. For example, modern wind farms and geothermal plants can produce electricity for US$0.04-US$0.11/kWh. Initial capital cost investment comprises the majority of the life-cycle costs for renewable energy technologies. Therefore, even when the long-term costs are competitive, developers/utilities are often reluctant to assume the perceived risks associated with their operation.

   Utilities often make choices about adding capacity according to their historical practices. They tend to be conservative, reluctant to try new technologies. Since the country has determined that it

is in its best interest to add renewable energy to its generation portfolio, government will mandate the addition of such capacity in the national system. This is a practice followed in various countries, including the UK's Non-Fossil Fuel Obligation and the Renewables Portfolio Standard in several U.S.A. states. Such a strategy may dictate that the utility must have available (or must deliver) a specific percentage of its electricity capacity via renewable-energy systems. The mandated portion may increase over time to let the utility gain experience with them gradually.

Action: Establish a Renewable Energy Portfolio Standard (RPS) for Saint Lucia. The RPS will impose a minimum of 7% installed capacity by the year 2005 and 20% by the year 2010. The government will also adopt and enforce regulations for the implementation of this policy.

2. *Adopt Policies that Encourage Private Power Development:* Achieving specific renewable-energy targets in Saint Lucia might not occur under the current exclusive arrangements currently afforded to LUCELEC. In many cases independent power producers with experience in renewable energy would be better suited to develop these projects. Therefore, policies and regulations that permit and encourage Independent Power Producers (IPPs) will be developed. These regulations will describe the potential relationships between the IPP and the utility, which might include model power purchase arrangements, under which the third-party power developer sells electricity to the utility or, alternatively, wheels power on the utility lines to specific consumers (such as a hotel).

Action: The Government of Saint Lucia will explore alternatives to the current electricity monopoly granted to LUCELEC, including consideration of provisions that make possible independent power projects that sell electricity to the utility.

3. *Renewable-Energy Capacity and Awareness-Building Initiatives*: Among the greatest impediments to the widespread use of renewable-energy technologies is the limited capacity of key decision makers and technicians. In addition, utility officials and engineers lack the information necessary to select, develop, and use renewables within their system. Likewise, gaining technical capacity in the operation and maintenance of renewable technologies, would make it much more likely that the systems installed would be successful and achieve their full potential.

Action: Establish a comprehensive renewable energy training initiative with the purpose of increasing the capacity to develop and utilize these systems among the utility staff and potential project developers. This effort will be conducted in cooperation with CARILEC. The Government will request financial and technical assistance for it, from such sources as the Caribbean Renewable Energy Development Project (CREDP), in which it is a participating country.

The Government has determined that it is in the country's best interest to catalyze the use of sustainable energy technologies, including renewables. The policies and regulations resulting from

this Plan will contribute to the accomplishment of this objective; however, the long-term success of such efforts depends on a high level of support from the general public. A well-designed awareness and promotion campaign would result in a population that not only was more receptive to assuming the initial risks of these alternatives, but also would demand the incorporation of cleaner energy systems.

Action: Initiate a national renewable energy education and awareness programme aimed at all sectors of civil society, to communicate the overall goals of the government with respect to the country's economic development, protection of the environment, and the advantages of renewables.

4. *Establish Renewable-Energy Feasibility and Project Investment Fund*: It is recognized that the initial cost of investment in renewable-energy facilities, coupled with the perceived risks of their use, may make it difficult for project developers to attract financing. This situation often presents itself in the preparatory phases of the potential project (i.e., pre-feasibility and feasibility studies), but may also include project financing for well-designed, commercially viable projects. Thus, it is critical to make funds available for investment in sound renewable-energy project opportunities. While such funds would not account for the entire investment of any project, they would be targeted at catalyzing additional resources and serving as seed capital for worthy ventures.

   Action: The Government of Saint Lucia will take the lead role in the creation of a dedicated renewable energy fund. This fund will provide concessional financing for renewable energy project feasibility studies and for project investment. The Government of Saint Lucia will seek funds from several institutions, including the CREDP, the World Bank's Prototype Carbon Fund, and international investors and donors to catalyze this financing.

5. *Establish Policies to Encourage and Enable Auto-Generation and Co-Generation:* At present, LUCELEC is the only electricity provider permitted within the national grid framework. If a commercial or industrial property were to generate its own electricity, the utility would not continue to provide it with grid-based electricity. Thus, it is all or nothing for the potential auto-supplier. This discourages would-be entrepreneurs, such as a hotel that would otherwise choose to install renewable energy generation on its property but would still need the grid to meet part of its demand on occasion or at all times.

   Action: The Government of Saint Lucia will consider the establishment of policies that permit companies to generate their own electricity while still maintaining continuous link to the power grid. This policy may also include a mechanism that permits auto-generators to sell excess capacity back to the utility.

6. *Establish Comprehensive Renewable Energy Regulations:* In the absence of comprehensive power-sector reform, specific regulations will be required to govern areas such as independent power generation and the pricing and use of renewable-energy technologies. Also, an independent regulator with enforcement powers will be required for their implementation.

   Action: Electricity regulations and an independent regulator governing the generation and use of private power, and specifically renewable-energy technologies, will be established.

Independent Solar Energy Initiatives

1. *Create a National Solar Water Heating Initiative:* The abundant direct solar radiation in Saint Lucia offers tremendous potential for solar-based water-heating applications. Solar water heaters have proved technically viable and economically efficient in other Caribbean island nations. In Saint Lucia growing numbers of such systems have been installed for residential and commercial use. In addition to the removal of import duties on these systems Government has as of April 2001, allowed the cost of solar water heaters to be charged against taxable income. This measure is expected to further promote their use. Given the high cost of electricity in Saint Lucia, and the significant load required for water heating, which show the cost-effectiveness and relatively quick return on investment required for solar water heating systems, the potential for a national awareness and promotion initiative is considerable.

   Action: Establish a national solar water heating awareness initiative to target both the residential and the commercial sectors. This initiative will be linked to the energy efficiency activities described below.

2. *Support the Use of Solar Photovoltaic Systems in Widespread Installations:* Solar Photovoltaic (PV) systems offer advantages for a diverse set of applications. With its price falling and the cost of traditional electricity in Saint Lucia remaining high, increasing PV may be a cost-effective alternative in several areas. The use of PV in demonstration applications will introduce the nation to the demands and the potential of these units. In other instances, such as hurricane shelters, PV offers an immediate benefit as a reliable back-up power source. If applied to hurricane shelters, many of which are located in schools or other public buildings, then the systems will offer the opportunity to introduce these systems to school children via educational programs.

   Action: Identify and deploy solar PV systems on a variety of installations, both connected and unconnected to the grid. Such applications may include back-up power for hurricane shelters and schools, demonstration units at gasoline service stations, and demonstration units at government buildings.

Energy Efficiency Initiatives

1. *Conduct a Comprehensive Energy End Use Analysis:* As a means of determining the energy use patterns of the various sectors of the economy a comprehensive study will be undertaken. The results of this analysis will provide the necessary information regarding potential areas for energy efficiency applications and will serve to guide the other activities described in this Plan.

   Action: A study of energy end use practices in all sectors (public, commercial, residential, etc.) of the economy will be conducted in collaboration with LUCELEC. This report will highlight key opportunities for energy savings.

2. *Initiate a Comprehensive Capacity-Building Initiative Among Personnel of Utilities, Commercial Energy Plants, and Other Relevant Organizations:* A critical first step toward the success of any energy-efficiency initiative involves the development of appropriate awareness and technical capacity among the organizations and individuals that will participate in these programs. Traditional utilities and other energy-sector personnel are often hesitant to promote strategies that effectively reduce the demand for electricity. However, it has been well demonstrated that there are many business opportunities for both the utility and third party organizations that may result in attractive investments. Further, the most cost-effective reductions in environmental impacts from the energy sector are typically derived from efficiency improvements. There are many areas of training that will be useful in laying the foundation for a solid energy-efficiency program in Saint Lucia. Such measures should address wide-ranging areas as business development and creative strategies to technical aspects of energy efficiency. This initiative will seek to build a consensus among both existing electricity-sector personnel and potential entrepreneurs that promotes greater energy efficiency in Saint Lucia, representing a win-win opportunity for all.

   Action: Implement a comprehensive energy-efficiency training program for utility personnel, hotel developers and engineers, potential entrepreneurs, and other relevant persons.

3. *Support and Assist in the Establishment of Energy Service Companies (ESCOs):* ESCOs are businesses that derive their income by generating energy savings for their clients. They may be affiliated with the utility or operate as independent, third party enterprises. They typically provide services for commercial businesses, such as the hotel industry. It is common for them to enter into a contract with a client, such as a hotel, whereby they identify and help to implement opportunities to generate energy savings by retrofitting energy-consuming technologies and changing patterns of electricity consumption. The ESCO receives payment for the consulting and engineering services it provides, which are typically less than the overall savings accruing to the client. Thus, it is a win-win relationship for both. Given the dominance of the hotel industry in Saint Lucia, and its relatively inefficient energy-consumption patterns, there is tremendous potential for energy savings to be

identified and captured. Further, significant energy savings might be realized via the government sector and other commercial buildings.

Action: Catalyze the creation of one or more ESCOs in Saint Lucia. The Government, in cooperation with an energy-sector venture capital fund (E&Co.), will assess the potential and seek opportunities to invest in one or more entrepreneurial enterprises.

4. *Launch a National Demand-Side Management (DSM) Initiative Designed to Reduce Residential Energy Consumption:* Residential energy consumption patterns in Saint Lucia offer the potential for DSM measures to reduce electricity demand. Effective DSM programs require well-designed and targeted campaigns that communicate to the population the need for and potential benefits from reducing consumption. They often include printed materials describing successful applications of energy efficiency measures and the economic savings realized (newspaper advertisements or articles, brochures, and utility-sponsored seminars).

   Action: Saint Lucia will implement a residential demand-side management (DSM) program intended to reduce consumption in the residential sector by 10% by the year 2010.

   Action: St. Lucia will establish regulations setting energy-efficiency standards for new construction.

5. *Support the Establishment of and Participate in the Caribbean Energy Efficiency Development Project (UNDP/GEF, PDF Block B):* A regional project for the promotion of energy efficiency is being prepared for implementation by the United Nations Development Programme (UNDP) with funding from the Global Environment Facility (GEF). This project will assist participating countries in the identification and execution of energy-efficiency programs. This project has the potential to offer Saint Lucia technical and financial resources for its energy-efficiency activities.

   Action: Participate as an active member country in the newly launched Caribbean Energy Efficiency Development Project.

6. *Establish Guidelines for Energy Efficient Practices in all Government Buildings:* By establishing standards for energy efficient practices in all government buildings, two important objectives may be achieved. First, given the considerable number of government installations, reducing energy consumption in this sector will contribute to the national efficiency goals and reduce costs. Secondly, the Government will serve as an example to other sectors in the economy by adopting energy efficiency practices. The Government may implement a variety of energy efficiency practices, including the use of energy efficient lighting and other appliances, training and

implementation of energy conservation practices, and design and acquisition of efficient buildings for all new locations.

Action: Assess the potential for energy efficiency practices in all Government buildings. Based on this assessment, develop a standards manual for use by all government agencies describing recommended and/or required practices for existing and new buildings and equipment.

Transportation Sector

1. *Demonstration Fleet of Alternative Fuelled Vehicles (electric, biofuel, CNG, hybrid):* A significant portion of the GHG emissions produced in Saint Lucia is generated by the transportation sector. The transportation sector is also a major contributor to local air pollution. All the vehicles operate on gasoline or diesel fuel. Identifying alternatives to these vehicles could significantly reduce transportation-related environmental impacts. Efforts will be initiated to attract a demonstration fleet of alternative-fuelled vehicles. At present several vehicles operating on alternative fuels are commercially available--for example, new electric-powered vehicles and electric/gasoline hybrids. Saint Lucia offers an ideal location for the demonstration of such vehicles, since one of the limiting factors of such cars is their range. Given the relatively short distances travelled by most Saint Lucians, this is not an issue here. Other alternatives such as compressed natural gas (CNG) or biofuels also offer attractive solutions, but would require infrastructure for acquiring fuel.

   Action*:* Investigate options for the deployment of a demonstration fleet of alternative fuelled vehicles in Saint Lucia.

2. *Establish Regulations Requiring, or Provide Incentives for, the Purchase of Higher Efficiency Vehicles:* Vehicle fuel economy has a large impact on the volume of emissions. New, higher-efficiency vehicles emit lower emissions per kilometre travelled. Increasing the number of high-efficiency vehicles in Saint Lucia might be achieved by regulations requiring certain emissions/efficiency standards, by offering tax incentives for the purchase of efficient vehicles, or a combination of these.

   Action*:* Analyze potential alternatives for improving the fuel efficiency and reducing harmful emissions of Saint Lucia's vehicle fleet.

3. *Improvements in Public Transportation Fleet*: In an effort to keep public transportation costs down and thereby encourage its greater use, Government has reduced the customs duties on vehicles to be used as taxis and public transport. Government will also set standards for

exhaust emissions for all vehicles, including those used for public transportation, in an effort to improve air quality.

It will be in Saint Lucia's long-term interest to promote efficient energy use in the transportation sector. However, policy and other measures will have limited impact if the population at large is unaware of its role in the process. It will therefore be necessary to sensitize and educate users to ensure maximum effectiveness of the energy-efficiency drive.

Action: Initiate a national education and awareness programme to promote efficient energy use in the transportation sector. Aimed at all relevant sectors of society, this will communicate the overall goals of the government with respect to the country's economic development and the role of users in achieving these goals in the short, medium, and long term.

Conclusion – Benefits to the Nation and the World

Saint Lucia's Sustainable Energy Plan will contribute significant benefits to the nation. Additionally, the country will effectively demonstrate the feasibility and advantages derived from sustainable energy policies to a global audience.

The benefits of sustainable energy development in the case of Saint Lucia are substantial, as the use of fossil fuel contributes to global climate change, local environmental damage, and growing debt due to significant foreign reserves being spent on fuel imports. An indigenous fuel source and a sustainable-energy policy will bring about both environmental and economic benefits.

Attachment II.

LUCELEC Review Commission: Terms of Reference

Using data and other information from LUCELEC and elsewhere; calling in expert witnesses as necessary; getting reactions from the general public; factoring in progressive developments in the power sector globally; and taking due account of financial, physical, resource, structural and other constraints:

1. Assess LUCELEC's efficiency in providing St. Lucia with a safe, readily available, reliable and cost-effective supply of power; and compare its performance particularly with other similarly placed utilities in the region and elsewhere;
2. Suggest:
   (a) energy conservation measures that LUCELEC and the public can use;
   (b) price and other incentives that could encourage a more even demand for power during a 24 hour day;
   (c) possibilities for greater use of LUCELEC's assets and facilities to add value to the company and to provide additional services to the public;
   (d) options for better insurance of assets including the use of self-insurance either independently or in association with other utilities;
   (e) avenues for greater cooperation. among small utilities as a means of reducing the per capita costs of providing essential overhead services;

(f) identifying other cost-effective measures that LUCELEC, the Government and consumers can pursue to help reduce the cost of power to St Lucia;

(g) examine the adequacy and/or limitations of the existing Tariff Determination Arrangements to Provide incentives for LUCELEC to seek efficiencies in its operations in. order to provide a cost-effective and reliable source of power to all those desiring it;

(h) explore alternative cost-effective regulatory mechanisms that will help ensure that the utility fulfills its mandate to provide St Lucia with a safe, readily available, reliable, competitively or cost-effectively priced source of power, while:

(i) responding promptly to the public's concerns;

(ii) being a good corporate citizen;

(iii) adopting environmentally sustainable, friendly, acceptable operating practices;

(iv) providing a reasonable return to shareholders

(v) having the financial capacity to ensure that growth in capacity can be effectively financed (from its own resources); and

(vi) make general and specific suggestions and recommendations to improve LUCELEC's consumer image, overall operating efficiency, its financial strength and in particular, its service to consumers

Attachment III.

BRIEF GUIDELINES FOR TREATMENT OF UNSOLICITED PROPOSALS

Background

Government often receives expressions of interest from developers who are anxious to submit proposals for the development of projects, particularly renewable energy projects, and sometimes in the national interest Government will attempt to persuade the utility to enter into negotiations with the developer to determine how the project could be accommodated. It may be noted that in the past several approaches have been made regarding the provision of LUCELEC system. Most notable of these recent approaches has been the proposal to build a 9MW waste to energy plant which would be supplemented petroleum coke, and the proposal to build a 7-9MW wind-powered generator which has not been accepted so far. This raises several questions regarding the relationship between the preparation of non-utility generation projects and the planning for utility expansion.

In the situation where Government is anxious to encourage the participation of independent power producers, particularly those which are offering to develop renewable energy projects for connection to the national grid, in the absence of a well-defined roadmap showing the utility's generating plant requirements, situations will arise whereby the processing of the utility's expansion plans would be required to be suspended until the unsolicited proposals from independent power producers could be properly evaluated for, inter alia, compatibility with the utility's requirements. If this were to take place, it would result in costly delays in realising new capacity for the power system. Or on the other hand, if these approaches are to be ignored because the time-frame did not fit with the utility's expansion needs, the possibility of developing viable renewable energy or other unconventional IPP projects which offer significant economic benefits to St. Lucia would be denied.

Issues Concerning Un-solicited Proposals

The utility must at all time be able to satisfy itself that there is every reasonable assurance that the project company will be able to provide the capacity needed on the system to maintain the loss of load expectation (LOLE) at or below the levels at which it will remain accountable to the regulatory authorities for. If the Power Purchase Agreement (PPA) cannot be structured to provide the utility with these reasonable assurances, the alternative is for the utility to provide its own backup capacity and make no capacity payments to the project company, paying instead for only the energy supplied at the rate of the utility's avoided cost of producing that energy.

In relation to the above, several issues often arise in the treatment of unsolicited proposals. This is because unsolicited proposals for power generating projects are often based on:

(a) the cheapest available units, both in terms of technology or age;

(b) providing limited technical, financial, economic, feasibility and environmental details;

(c) limited information on operational experience and this usually requires considerable follow up to ascertain if these projects can operate to meet the system requirements;

(d) the project developers seeking to sign agreements, or memorandums of understandings, or commitments to arrangements before they can put the financing arrangements into place;

(e) incompatible with the system needs in that the timetables and technologies offered by these proposal are often inappropriate; and,

(f) considerable analysis is required to determine the implications of such proposals both for the economy and the system.

If such proposals are accepted without the proper analysis to determine their credibility and viability, they could compromise the performance of the system and the international credibility of the country. Furthermore, proceeding with unsolicited offers without due process could also send conflicting signals regarding the stated policy of Government and compromise the country's international image and credibility with:

(a) other sponsors who have been asked to submit proposals after being pre-qualified through a due, transparent and fair process; and,

(b) financing agencies, both public and private, which are assisting St. Lucia to meet its critical energy needs and policy objectives for the sector.

Proposed Approach

In order to encourage private investments in the energy sector, a clearly defined framework for reviewing, selecting and approving projects is needed. As private investors and commercial lenders would be required to take project specific risks without direct government guarantees, GOSL will need to take measures to eliminate sovereign risk and provide clear definition of the responsibilities and obligation of each party.

An appropriate framework for utility planning in conjunction with the decision makers in Government which would incorporate the views of GOSL and the Independent Regulator will also need to be developed.

The following framework for the design and implementation of privately owned projects would be appropriate:

(a) **Eligibility Criteria –** projects should form a part of the integrated resource plan for the energy sector and should be competitive in price. Unsolicited proposals submitted outside the framework of the utility's integrated resource plan can only be accommodated for their energy value and capacity credits cannot be provided, as to do so will mean that the utility will have more capacity that it needs to satisfy reliability criteria and result in higher costs

to the consumer. They should be required to be technically, financially, economically viable, and environmentally acceptable. Projects should be implemented by private companies and repayment of debt financing and returns on equity should not require direct government guarantees. All project proposal should be consistent with St Lucia's national interests and conform, *inter alia*, to the following criteria:

- Least Cost Alternative **–** Public and private sector investments should form an integral part of the integrated resource (least cost) development plan for the power sector;

- Proven Technology **–** The technologies proposed by private investors should be proven, that is, they should have a successful track record in countries at a similar level of technological development and support infrastructure as in St. Lucia;

- Competitiveness **–** competitiveness would be ensured by considering proposals that offer prices for electricity which would be less than the unit cost of generation that LUCELEC would have incurred for the same generation, adjusted for financing available to the private sector;

- Viability **–** sponsors should be credit worthy to undertake the investments and possess the capability to develop the project. To ensure commitment to projects, minimum equity contributions should be required as part of the financial plan which would result in viable capital structure and an acceptable debt service coverage ratio; and

- Limited Recourse Financing **–** Private investors and lenders should not require direct sovereign guarantees. Institutions providing these funds should be prepared to assume project specific risks. In the event of occurrence of these risk(s), the recourse of lenders would be limited to the provisions contained in the project's Security Package.

(b) **Measures to Attract Private Investments –** these could include, in the case of renewable energy projects, long term debt from aid agencies provided as a subsidy which would be subordinated to commercial lenders, and an agreed price of energy based on internationally accepted operating norms, sufficient to cover the operating costs, debt service and returns on equity for private investors, with an agreed adjustment provisions for changes in costs beyond the investor's control. The price paid would not be based on cost plus formula. In addition the investors should be free to repatriate profits. These measures should form a part of Power Purchase and Implementation agreements.

(c) **Security Package –** each project would require a set of agreements between the project company, the government and LUCELEC, and the lenders which define responsibilities and obligations of each of the parties to the agreements. These agreements would also incorporate measures to attract private sector investments. The Security Package would, *inter alia*, include the Implementation Agreement (IA), the Power Purchase Agreement (PPA), the Fuel Supply Agreement (FSA), the Construction Agreement (CA), and the Operations and Maintenance Agreement (O&MA).

Power Purchase Agreements should, *inter alia*, provide for:

- incorporation of the project company in St. Lucia. This is important because in the event of any legal proceedings being necessary, it will be far more difficult and costly to conduct them if the company is registered in the U.S.

- even in the case of a foreign investor, payment of a Capacity Charge which is separate from an Energy Charge which should both be payable in EC$ as the utility earns its revenue from its customers in EC$. If the Seller is to be paid in US$ then the utility would have to seek a modification to its tariff which would allow it pass the exchange risk on to the customer. The project developer could be made to seek an Implementation Agreement (IA) with Government which would, *inter alia*, grant him convertibility rights and/or alternatively, the project developer could buy convertibility insurance but this would result in a higher costs to the utility and ultimately the consumer, as these costs would have to be passed on by both the Seller and the utility.

- the project company to pay penalties for poor performance. In these types of contracts, it is normal to provide incentives against poor performance by writing into the PPA conditions which would provide for the payment of assessed liquidated damages in respect of items such as the following:

  - delays in financial closing;

  - delays in completion of the project;

  - shortfalls in capacity at completion of the project;

  - subsequent shortfalls in capacity of the project; and/or

  - failure to deliver energy in accordance with the utility's despatch instructions which effectively requires the project company to maintain a minimum level of availability of generating plant.

- the project company to post security deposits to ensure the payment of these liquidated and other damages.

- the details of the financing of the project to be approved by the utility. The utility should have a considerable interest in the financing arrangements for the plant for a number of reasons: the first of these is that if the project is financed off balance sheet, it is likely that the project finance arrangements will require that the assets of the project company be pledged to the financiers and this will usually result in the lenders demanding certain rights with respect to the plant in the event of a loan repayment default. This would leave the project in the hands of financiers who would bring no expertise in the operation of the project to the table. The utility will want to ensure that these demands do not interfere with its right to obtain the power from the plant. In addition, the utility will want to insist on certain minimum equity positions from the

project company to make it more difficult for them to walk away from the project if things do not work out in accordance with their expectations. They, as the lead investors, should remain in the project for its duration, and only be released to sell their interest with the approval of the utility. It is not uncommon in these types of projects to insist that the lead investors can only sell down their equity to a defined minimum and even that should be with the approval of the utility.

- financing to be in the form of equity and debt with a minimum level of equity specified.

- the project company to arrange for a stand-by facility to established at a percentage of the total project cost to be available during the construction phase to finance any cost overruns. The utility needs to ensure that the project is not delayed for want of finance to pay for project cost overruns.

- the utility to retain approval rights on the sale or transfer of shares from the lead investor to other investors.

The acceptance of unsolicited proposals to satisfy a requirement from Government to install a portfolio of renewable energy generation, or to avoid possible power shortages, can result in the utility locking itself into accepting unattractive terms. If unfavourable terms are accepted at an early stage from a non-competitive sponsor, they might become precedents for all future proposals and negotiations. Such a development would not be in the interest of St. Lucia, consumers or the utility. GOSL policy should therefore be that all generation proposals from non-utility generators are obtained through an international competitive bidding process (ICB) under the framework defined above. This will ensure that prices are as low as possible and that the best terms can be obtained.

The future needs of the power system should be fully defined following the development of an integrated resource plan which would specify the increments and timing of future plant requirements. Publication of these requirements will be carried out under the direction of the ministry responsible for energy and the Regulator so that the prospective sponsors can focus on the pre-defined needs of the St. Lucian generation system and respond to specific timetable and capacity requirements.