

Saint Lucia Sustainable Energy Plan

**Final Draft
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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 SECTOR¹

YEAR	1999		1998		1997		1996		1995	
	MWh	%	MWh	%	MWh	%	MWh	%	MWh	%
Domestic Use	79,491	36.86%	75639	38.04%	69,617	38.51%	65,653	39.74%	62,668	38.37%
Commercial & Hotel Use	120,628	55.93%	108618	54.63%	97,248	53.80%	86,518	52.37%	85,683	52.46%
Industrial Use	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, fueled 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.

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.

¹ Saint Lucia Electricity Services Ltd. Planning and Projects; Load Forecast 2000 to 2010; revised May 2000

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-fueled 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 Fueled 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-fueled 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 traveled 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 fueled 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 kilometer traveled. 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.